1ST & 2nd YEAR COURSE STRUCTURE

FOR

B.TECH – CIVIL ENGINEERING

w.e.f.

2013-2014 ADMITTED BATCH



DEPARTMENT OF CIVILENGINEERING

COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA – 516 390.

Academic Regulations 2013 (R13) for
B. Tech (Regular-Full time)

(With effect from the Academic Year 2013-2014 for the students admitted into I year)

1. Award of B.Tech. Degree

A student will be declared eligible for the award of the B.Tech. Degree if he/she fulfils the following academic regulations:

i. **Pursue a course of study for not less than four academic years and in not more than eight academic years.**

ii. **Register for 180 credits and secure all 180 credits**

2. Students, who fail to fulfill all the academic requirements for the award of the degree within eight academic years from the year of their admission, shall forfeit their seat in B.Tech. course and their admission is cancelled.

3. Courses of study

The following courses of study are offered at present under B. Tech. program with effect from the academic year 2013-2014.

S. No.	Branch
01.	*Civil Engineering*
02.	*Electrical & Electronics Engineering*
03.	*Mechanical Engineering*
04.	*Electronics and Communication Engineering*
05.	*Computer Science and Engineering*
06.	*Bio Technology*

and any other course as approved by the authorities of the University from time to time.

4. Credits

	I Year		Semester	
	Periods / Week	Credits	Periods / Week	Credits
Theory	03	03	04	03
	04	05	--	--
Practical	03	04	03	02
Project	--	--	15	10

5. Distribution and Weightage of Marks

i. The performance of a student in each semester / I year shall be evaluated subject –wise with a maximum of 100 marks for theory and 75 marks for practical subject. In addition seminar and project work shall be evaluated for 50 and 200 marks respectively.

ii. For theory subjects the distribution shall be 30 marks for Internal Evaluation and 70 marks for the End-Examination.

iii. There shall be five units in each of the theory subjects.

iv. For theory subjects during the semester, there shall be two midterm examinations. Each mid term examination consists of objective paper for 10 marks and subjective paper for 20 marks with duration of 1hour 50 minutes (20 minutes for objective and 90 minutes for subjective paper).

Objective paper is set for 20 bits for 10 marks. Subjective paper shall contain 5 questions of which, student has to answer 3 questions evaluated for 20 marks. First midterm examination shall be conducted for I, II units of syllabus and second midterm examination shall be conducted for III, IV & V units. Final Internal marks for a total of 30marks shall be arrived at by considering the marks secured by the student in both the mid examinations with 80% weight-age to the better mid exam and 20% to the other.

However, for first year, there shall be three midterm examinations as in the above pattern. Final Internal marks for a total of 30 marks shall be arrived at by considering the marks secured by the student in all the three mid examinations* with 80% weightage to the average marks of the best two midterm examinations and 20% to the other.

*****Note 1: 1st midterm examinations, shall be from unit – I, Second midterm examinations shall be from II & III units, and third midterm examinations shall be from IV & V units.

*****Note 2: The subjective paper shall contain 5 questions of equal weightage of 10 marks and the marks obtained for 3questions shall be condensed to 20 marks, any fraction rounded off to the next higher mark.

*****Note 3: The midterm examination shall be conducted first by distribution of the Objective paper simultaneously marking the attendance, after 20 minutes the answered objective paper is to be collected back. The student is not allowed to leave the examination hall. Then the descriptive question paper and the answer booklet shall be distributed. After 90minutes the answered booklets are to be collected back.

v. For practical subjects there shall be a continuous evaluation during the semester for 25 sessional marks and 50 end examination marks. Day-to-day work in the laboratory shall be evaluated for 25 marks by the concerned laboratory teacher based on the report of experiments/jobs. *The end semester practical examination shall be conducted by an external examiner and an internal examiner nominated by the Principal*.

vi. There shall be an audit pass course in Human values & Professional ethics and Advanced Communication skills lab with no credits. There shall be no external examination. However, attendance in the audit course shall be considered while calculating aggregate attendance and student shall be declared pass in the audit course when he/she secures 40% or more in the internal examinations. *If he/she doe not secure 40% in the midterm examinations, he/she has to re-register that subject as and when it is offered.*

vii. For the subject having design and/or drawing, such as Engineering Drawing, Machine Drawing and Estimation, the distribution shall be 30 marks for internal evaluation and 70 marks for end examination. The Internal evaluation for sessionals will be 15 marks for day-to-day work in the class that shall be evaluated by the concerned subject teacher based on the reports/submissions prepared in the class. And there shall be two midterm exams in a semester for a duration of 2hrs each,evenly distributed over the syllabi for 15 marks and the weightage is 80% for better mid marks and 20% for the other shall be considered as internal test marks. The sum of day to day evaluation and the internal test marks will be the final sessionals for the subject. However, when offered in the I year as 5 credits course, there shall be three midterm exams and the weightage is 80% of average marks of the best two midterm examinations and 20% from the other will be taken into consideration.

viii. There shall be a seminar presentation in IV year II Semester. For the seminar, the student shall collect the information on a specialized topic and prepare a technical report, showing his understanding over the topic, and submit to the department before presentation. The report and the presentation shall be evaluated by the departmental committee consisting of Head of the department, seminar supervisor and a senior faculty member. The seminar shall be evaluated for 40 marks. There shall be no external examination for seminar.

There shall be a Comprehensive Viva – Voce in IV year II Semester. The Comprehensive viva-voce will be conducted by the committee consisting of Head of the department and two senior faculty members of the department. The Comprehensive Viva – voce is aimed at to assess the students' understanding in various subjects he/she studies during the B.Tech. course of study. The Comprehensive Viva- Voce is valued for 60 marks by the committee.

A student shall acquire 3 credits assigned to the seminar & comprehensive viva-voce only when he/she secures 40 marks on aggregate out of 100 marks allocated. *If he/she fails to get 40 marks (put together) out of 100, he/she has to re-register for the seminar & comprehensive viva-voce as and when it is offered*.

ix. Out of total of 200 marks for the project work, 60 marks shall be for Internal Evaluation and 140 marks for the End Semester Examination (Viva-voce). Project work shall start in IV- I semester and continue in the next semester. During IV – I semester, the project work (part – A) will be evaluated internally for 30 marks out of allotted internal marks 60, and is given 2 credits. Out of 30 marks, concerned project guide shall evaluate for 15 marks based on day to day performance of the student, and the remaining 15 marks will be evaluated bythe departmental committee consisting of Head, project guide and two senior faculty members of the department on the basis of a seminar given by each student on the topic of his/her project.

At the end of IV – II semester, the remaining internal marks (i.e. 30) for the project work (Part – B) shall be evaluated in the same manner as in IV – I semester. The end semester examination (viva-voce) shall be conducted by a committee consisting of HOD, Project Supervisor and an External Examiner nominated by the Principal at the end of the project work.

x. The laboratory records and internal test papers shall be preserved for minimum of 3 years in the respective institutions as per the University norms and shall be produced to the Committees of the University as and when the same are asked for.

6. Attendance Requirements:

i. A student shall be eligible to appear for end semester examinations if he/she acquires a minimum of 75% of attendance in aggregate of all the subjects in a semester/ I year.

ii. **Shortage of Attendance below 65% in aggregate shall in <u>NO</u> case be condoned**.

iii. Condonation of shortage of attendance in aggregate up to 10% (65% and above and below 75%) in each semester or I year may be granted by the College Academic Committee.

iv. Students whose shortage of attendance is not condoned in any semester / I year are not eligible to take their end examination of that class and their registration shall stand cancelled.

v. A student will not be promoted to the next semester unless he/she satisfies the attendance requirements of the present semester / I year, as applicable. They may seek readmission for that semester / I year when offered next.

vi. A stipulated fee shall be payable towards condonation of shortage of attendance to the institution.

7. Minimum Academic Requirements:

The following academic requirements have to be satisfied in addition to the attendance requirements mentioned in item no.**6**

i. A student shall be deemed to have satisfied the minimum academic requirements and earned the credits allotted to each theory, practical, design, drawing subject or project if he/she secures not less than 35% of marks in the end examination and a minimum of 40% of marks in the sum total of the internal evaluation and end examination taken together. In the Seminar & Comprehensive viva – voce he/she should secure 40% put together.

ii. A student shall be promoted from II to III year only if he fulfills the academic requirement ofsecuring **26 credits (40%)** of the subjects that have been studied up to II year I semester.

a. One regular and one supplementary examinations of I year.

b. One regular examination of II year I semester irrespective of whether the candidate takes the end examination or not as per the normal course of study.

iii. A student shall be promoted from third year to fourth year only if he fulfills the academic requirements of securing 44 **credits(40%)** of the subjectsthat have been studied upto III year I semester from the following examinations,

a. Two regular and two supplementary examinations of I year.

b. Two regular and one supplementary examinations of II year I semester.

c. One regular and one supplementary examinations of II year II semester.

d. One regular examination of III year I semester irrespective of whether the candidate takes the end examination or not as per the normal course of study.

And in case of getting detained for want of credits by sections 7-(ii) and (iii), the student may make up the credits through supplementary exams of the above exams before the date of class work commencement of Third or Fourth year I semester respectively.

iv. A student shall register and put up minimum attendance in all 180 credits and earn all the 180 credits. Marks obtained in all 180 credits shall be considered for the calculation of percentage of marks obtained.

v. Students who fail to earn 180 credits as indicated in the course structure within eight academic years from the year of their admission shall forfeit their seat in B.Tech. course and their admission shall stand cancelled.

8. Course pattern:

i. The entire course of study is of four academic years. The first year shall be on yearly pattern and the second, third and fourth years on semester pattern.

ii. A student eligible to appear for the end examination in a subject, but absent at it or has failed in the end examination may appear for that subject at the next supplementary examination offered.

9.Transitory Regulations:

Candidates who have been detained for want of attendance or not fulfilled academic requirements or who have failed after having undergone the course in earlier regulations or have discontinued and wish to continue the course are eligible for admission into the unfinished semester from the date of commencement of class work with the same or equivalent subjects as and when subjects are offered, subject to Section **2** and they will be in the academic regulations into which the candidate is presently readmitted.

10. With–holding of results:

If the candidate has any dues not paid to the university or if any case of indiscipline or malpractice is pending against him, the result of the candidate shall be withheld and he will not be allowed / promoted into the next higher semester. The issue of awarding degree is liable to be withheld in such cases.

11. Award of Class:

After a student has satisfied the requirements prescribed for the completion of the program and is eligible for the award of B. Tech. Degree he/she shall be placed in one of the following four classes:

Class Awarded	% of marks to be secured	
First Class with Distinction	70% and above	From the aggregate marks secured for the best 180 Credits.
First Class	Below 70% but not less than 60%	
Second Class	Below 60% but not less than 50%	
Pass Class	Below 50% but not less than 40%	

(The marks in internal evaluation and end examination shall be shown separately in the marks memorandum)

Further, the University, vide its University order RP/No. 164/2013 dt: 02.05.2013, has permitted for rounding of percentages to the extent of 0.5% to effect change of class from pass class to Second class, Second class to First class, First class to First class with distinction for all the courses being offered or to be offered by the college without adding any marks to the original marks secured by the students.

12. Minimum Instruction Days:

The minimum instruction days including exams for each semester / I year shall be 90/180 days respectively.

13. There shall be no branch transfers after the completion of admission process.

14. There shall be no place for transfer within the Constituent Colleges.

15. General:

i. **The academic regulations should be read as a whole for purpose of any interpretation.**

ii. **Malpractices rules- nature and punishments is appended**

iii. **Where the words "he", "him", "his", occur in the regulations, they include "she", "her", "hers".**

iv. **In the case of any doubt or ambiguity in the interpretation of the above rules, the decision of the Principal is final.**

v. **The college may change or amend the academic regulations or syllabi at any time and the changes or amendments shall be made applicable to all the students on roles with effect from the dates notified by the institution.**

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Course structure for I B.TECH. CIVIL ENGINEERING(Regular) with effective from 2013-2014

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	13AHS01	Communicative English	2	-	3
2	13ABS01	Engineering Physics	2	-	3
3	13ABS03	Engineering Chemistry	2	-	3
4	13ABS04	Mathematics – I	3+1		5
5	13ACS01	Programming in C And Data Structures	3+1		5
6	13ACE01	Engineering Mechanics	3+1		5
7	13AME01	Engineering Drawing *	1	5	5
8	13ACS02	Programming in C And Data Structures Lab	0	3	4
9	13ABS02	Engineering Physics And Engineering Chemistry Lab**	0	3	4
10	13ACS03	Engineering & IT Workshop	0	3	4
11	13AHS02	English Language Communication Skills Lab	0	3	4
		Total	19	17	45
		Total Contact Periods/Week : 36			
		Total Credits(7 Theory +4 Labs) : 45			

***Engineering Drawing will have External exam**

****the students shall attend the physics lab and chemistry lab in alternate weeks. The end exam shall be conducted separately and average of the two exams shall be recorded by the exam section.**

#the students shall attend engineering workshop & IT workshop as a single lab every week and the end of the exam is conducted as a single lab. Sharing the maximum marks and time for one task each from engineering workshop and IT workshop. The sum of the marks awarded shall be recorded.

II B.TECH I Sem:

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	13ABS06	Mathematics – II	3+1	-	3
2	13AEMT01	Electrical & Mechanical	3+1	-	3
3	13ACE02	Strength of Materials – I	3+1	-	3
4	13ACE04	Surveying-I	3+1	-	3
5	13AME02	Fluid Mechanics	3+1	-	3
6	13ACE06	Building Materials &	3+1	-	3
7	13ACE05	Surveying Lab – I	-	3	2
8	13ACE03	Strength of Materials Lab	-	3	2
		Total	24	6	22
		Total contact periods/week : 30			
		Total Credits (6 Theory + 2 Labs) : 22			

II B.TECH II Sem

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	13ABS08	Probability & Statistics	3+1	-	3
2	13ACE07	Strength of Materials – II	3+1	-	3
3	13ACE08	Hydraulics & Hydraulic Machinery	3+1	-	3
4	13ABS10	Environmental Science	3+1	-	3
5	13ACE10	Structural Analysis – I	3+1	-	3
6	13ACE11	Surveying-II	3+1	-	3
7	13ACE09	Fluid Mechanics & Hydraulic Machinery Lab		3	2
8	13ACE12	Surveying Lab - II		3	2
		Total	**24**	**6**	**22**
		Total contact periods/week : 30			
		Total Credits : 22			

III Year B. Tech - I Semester

S.No.	Course Code	Subject Name	Theory/ Tutorial	Drawing /Lab	Credits
1	13ACE13	Building Planning & Drawing	2	2	3
2	13ACE14	Design of reinforced concrete structures	3+1		3
3	13ACE15	Concrete Technology	3+1	-	3
4	13ACE17	Water resources Engineering – I	3+1	-	3
5	13ACE18	Structural Analysis - II	3+1	-	3
6	13ACE19	Highway Engineering	3+1	-	3
7	13ACE20	Highway Materials Lab		3	2
8	13ACE16	Concrete Technology Lab		3	2
9	13AHS05	Advanced English Communication Lab(Audit)	-	3	0
10	13ACE21	Comprehensive Online Examination			1
		Total	**22**	**11**	**23**
		Total contact periods/week : 33			
		Total Credits : 23			

III Year B. Tech - II Semester

S.No.	Course Code	Subject Name	Theory/ Tutorial	Drawing/Lab	Credits
1	13ACE22	Design of Steel Structures	3+1		3
2	13ACE23	Soil Mechanics	3+1	-	3
3	13ACE24	Environmental Engineering	3+1	-	3
4	13ACE25	Water Resources Engineering - II	3+1	-	3
5	13ACE26	Engineering Geology	3+1	-	3
6	**Choice Based Credit Course(Inter Department)** **ANNEXURE-I**		3+1	-	3
7	13ACE30	Engineering Geology Lab		3	2
8	13ACE31	Environmental Engineering Lab		3	2
9	13ACE32	Comprehensive Online Examination			1
		Total	**24**	**6**	**23**
		Total contact periods/week : 30			
		Total Credits : 23			

ANNEXURE-I (Choice based credit course of inter department)

Branch	Course Code	Subjects
Physics	13ABS11	Nanomaterials And Engineering Application
Chemistry	13ABS12	Green Chemistry and Catalysis for Sustainable Environment
	13ABS13	Instrumental Methods of Chemical Analysis
	13ABS14	Chemistry of Nano Material and Application
English	13AHS07	Campus Recruitment Training & Soft Skills
	13AHS08	Competitive & Spoken English
Mathematics	13ABS15	Mathematical Modeling and Simulation
	13ABS16	Optimization Techniques
CE	13ACE27	Green Buildings
	13ACE28	Disaster Management and Mitigation
	13ACE29	Water Harvesting and Conservation
EEE	13AEE23	Renewable energy sources
	13AEE14	Power Electronics
	13AEE24	Electrical energy Management & Conservation
ME	13AME30	Robotics
	13AME31	Mechanical Manufacturing Process
	13AME32	Non Conventional Sources of Energy
ECE	13AEC29	Fundamentals of communication Systems
	13AEC30	Industrial Electronics
	13AEC31	Neural Networks & Fuzzy Logic
CSE	13ACS14	Operating Systems
	13ACS18	Database Management Systems
	13ACS27	Java Programming
BT	13ABT27	Immunology
	13ABT28	Downstream Processing
	13ABT29	Transport Phenomena in Bioprocess

IV Year B. Tech - I Semester

S.No.	Course Code	Subject Name	Theory/ Tutorial	Drawing/ Lab	Credits
1	13AHS04	Managerial Economics & Financial Analysis	3+1	-	3
2	13ACE33	Construction Technology and Project management	3+1	-	3
3	13ACE34	Foundation Engineering	3+1	-	3
4	13ACE35	Advanced Structural Engineering	3+1	-	3
	Choice based credit course				
5	13ACE36	Ground Improvement Techniques	3+1	-	3
	13ACE37	Earth Quake Resistant Design of Structures			
	13ACE38	Prestressed Concrete			
	Choice based credit course				
6	13ACE39	Architecture and Town Planning	3+1	-	3
	13ACE40	Retrofitting and Rehabilitation of Structures			
	13ACE41	Transportation Engineering			
7	13ACE42	CAD Lab		3	2
8	13ACE43	Geotechnical Lab		3	2
		Total	**24**	**6**	**22**
		Total contact periods/week : 30			
		Total Credits : 22			

IV Year B. Tech - II Semester

S.No.	Course Code	Subject Name	Theory/ Tutorial	Drawing/ Lab	Credits
1	13ACE44	Estimation, costing & valuation	3+1	-	3
2	13ACE45	Design and Drawing of Irrigation Structures	3+1	-	3
3	**MOOC-I**	**Subject -I**	3+1	-	3
		Subject -II			
4	**MOOC-II**	**Subject -III**	3+1	-	3
		Subject -IV			
5		comprehensive viva voce		-	1
6		Seminar & Project Work		20	10
7		Survey camp			
		Total	**16**	**20**	**23**
		Total contact periods/week : 36			
		Total Credits : 23			

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

CIVIL -I YEAR

COMMUNICATIVE ENGLISH

1. INTRODUCTION:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and technology. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The first text prescribed for detailed study focuses on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and student-centered. They should be encouraged to participate in the classroom activities keenly.

The text for non-detailed study is meant for extensive reading/reading for pleasure by the students. They may be encouraged to read some select topics on their own, which could lead into a classroom discussion. In addition to the exercises from the texts done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. OBJECTIVES:

1. To enable the students to communicate in English for academic and social purpose
2. To enable the students to acquire structure and written expressions required for their profession.
3. To develop the listening skills of the students
4. To inculcate the habit of reading for pleasure
5. To enhance the study skills of the students with emphasis on LSRW skills

3. SYLLABUS:

UNIT –I

1. **Chapter titled –ASTROLOGER'S DAY (Humour) from "Using English"**
2. **Chapter titled 'HOMI JEHANGIR BHABHA' from 'New Horizons'**

L- Listening -Techniques - Importance of phonetics
L- Meet & Greet and Leave taking, Introducing Oneself and Others (Formal and Informal situations)
R- -Reading Strategies -Skimming and Scanning
W- Writing strategies- sentence structures
G-Parts of Speech –Noun-number, pronoun-personal pronoun, verb- analysis
V-Affixes-prefix and suffix, root words, derivatives

UNIT –II

1. **Chapter titled –BUILDING A NEW STATE (Inspiration) from "Using English"**
2. **Chapter titled 'MY STRUGGLE FOR AN EDUCATION' from "New Horizons"**

L- Listening to details
S- Apologizing, Interrupting, Requesting and Making polite conversations
R-note making strategies
W- Paragraph-types- topic sentences, unity, coherence, length , linking devices
G-Auxiliary verbs and question tags
V- synonyms-antonyms, homonyms , homophones, homographs, words often confused

UNIT –III

1. **Chapter titled WATER THE ELIXIR OF LIFE ('Sustainable Development) from "Using English"**
2. **Chapter titled 'THE AUTOBIOGRAPHY OF ABRAHAM LINCOLN' from "New Horizons"**

L- Listening to themes and note taking
S- Giving instructions and Directions, making suggestions, Accepting ideas, fixing a time and Advising
R- Reading for details -1
W- Resume and cover letter
G- Tenses – Present tense, Past tense and Future tense
V-Word formation and One-Word Substitutes

UNIT –IV

1. **Chapter titled THE WOODROSE ('Relationships') from "Using English"**
2. **Chapter titled 'THE HAPPY PRINCE' from "New Horizons"**

L- Listening to news
S- Narrating stories, Expressing ideas and opinions and telephone skills
R- Reading for specific details and Information
W- Technical Report writing-strategies, formats-types-technical report writing
G- Voice and Subject – Verb Agreement
V- Idioms and prepositional Phrases

UNIT –V

1. **Chapter titled PROGRESS 'Science and Humanism' from "Using English"**
2. **Chapter titled 'IF' from "New Horizons"**

L -Listening to speeches
S- Making Presentations and Group Discussions
R- Reading for Information
W- E-mail drafting
G- Conditional clauses and conjunctions
V- Collocations and Technical Vocabulary and using words appropriately

4.EXPECTED OUTCOME:

The students will get the required training in LSRW skills through the prescribed texts and develop communicative competence

Prescribed Books:

1. **Using English** published by Orient Black Swan,2013
2. **New Horizons** published by Pearson,2013

SUGGESTED READING:

1. **Raymond Murphy's English Grammar with CD,** Murphy, Cambridge University Press, 2012.
2. **English Conversation Practice –**Grant Taylor, Tata McGraw Hill,2009.
3. **Communication SKILLS, Sanjay Kumar & Pushpalatha** Oxford University Press, 2012.
4. **A Course in Communication Skills**- Kiranmai Dutt & co. Foundation Books, 2012.
5. **Living English Structures**- William Standard Allen-Pearson, 2011.
6. **Current English grammar and usage**-S M Guptha, PHI, 2013.
7. **Modern English Grammar**-Krishna SWAMI .McMillan, 2009.
8. **Powerful Vocabulary Builder**- Anjana Agarwal New Age International Publishers, 2011.

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

CIVIL -I YEAR

ENGINEERING PHYSICS

PREAMBLE:

The study of Engineering Physics leads to the development of scientific temper and analytical capability through learning physical concepts and their applications in engineering and technology fields. Comprehension of some basic physical concepts will enable the students to logically solve engineering problems.

UNIT 1: PHYSICAL OPTICS, LASERS AND FIBRE OPTICS

Objectives: To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.

Physical Optics: Interference – Formation of Newton's Rings by reflection –Working principle of Michelson Interferometer - Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Characteristics of laser – Spontaneous and stimulated emission of radiation –- Einstein's coefficients — Population inversion – optical resonator - He-Ne laser – CO_2 laser – Semiconductor laser - Applications of lasers - Holography

Fiber optics: Structure and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in fibers - Optical fiber communication system – Fiber optic sensors

UNIT 2:CRYSTALLOGRAPHY AND ULTRASONICS

Objectives: To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and also to understand different types of defects in crystals and non-destructive evaluation using ultrasonic techniques.

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Structures of NaCl and Diamond – Directions and planes in crystals – Miller indices – Interplanar spacing in cubic crystals – Bragg's law - X-ray diffraction – Bragg's Spectrometer – Defects in solids: point defects.

Ultrasonics: Introduction – Production of ultrasonics by Magnetrostriction & piezoelectric methods – Properties and detection – Applications in non-destructive testing.

UNIT 3: **QUANTUM MECHANICS AND FREE ELECTRON THEORY**

Objectives: To get an insight into the microscopic meaning of conductivity , classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.

Quantum Mechanics: Introduction to matter waves – de'Broglie hypothesis - Heisenberg's uncertainty principle - Schrodinger's time independent and time dependent wave equation – Significance of wave function - Particle in one dimensional infinite potential well - Eigen values and Eigen functions.

Free electron theory: Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution –Kronig-Penny model (qualitative) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT 4: **SEMICONDUCTORS, MAGNETIC MATERIALS AND DIELECTRICS**

Objectives: To open new avenues of knowledge and understanding semiconductor based electronic devices , basic concepts and applications of semiconductors, magnetic materials and dielectrics have been introduced which find potential in the emerging micro device applications.

Semiconductors: Introduction – Intrinsic and extrinsic semiconductors – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Working principle of p-n junction diode.

Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magnetron – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials (Qualitative) – Hysteresis - Soft and hard magnetic materials and applications.

Dielectrics: Dielectric Polarization – Types of Polarization – Lorentz field – Clausius-Mosotti equation.

UNIT 5: **SUPERCONDUCTIVITY AND PHYSICS OF NANOMATERIALS**

Objectives: To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in emerging technologies are elicited.

Superconductivity: Introduction – Meissner effect - Properties of superconductors – Type I and type II superconductors – Flux quantization – BCS theory (qualitative) – High T_c superconductors - Applications of superconductors.

Physics of Nanomaterials: Introduction - Significance of nanoscale - Surface area and quantum confinement – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials: ball mill, chemical vapour deposition, and thermal evaporation – Carbon nanotubes – properties – High strength applications - Graphene- Properties – Applications.

OUTCOMES:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the basis for the band theory are focussed.
- The properties and device applications of semiconducting, magnetic and dielectric materials are illustrated.
- The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

Prescribed Text books:

1. Engineering Physics – Hitendra K Mallik and AK Singh
MacGraw Hill Publishers, New Delhi
2. Engineering physics – S. ManiNaidu, Pearson Education, New Delhi
3. Engineering Physics – K.Thyagarajan, MacGraw Hill Publishers, NewDelhi

Reference Books:

1. Engineering Physics – B K Pandey, S. Chaturvedi, Cengage Learning, New Delhi
2. Engineering Physics – V.Rajendran, MacGraw Hill Publishers, NewDelhi
3. Engineering Physics - Sanjay D. Jain, Girish D Sahasrabudhe
University Press, Hyderabad

3. Engineering physics – M.N. Avadhanulu and P.G. KrshiSagar,
Chand and Co, New Delhi
4. Text book of Nanoscience and Nanotechnology: B S Murthy, P.Shankar,
Baldev Raj B B Rath, James Murday, University Press
5. Carbon nanotubes and Graphene Device Physics – H.S. Philip Wong, Deji
Akinwande, Cambridge University Press

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA
CIVIL -I YEAR

ENGINEERING CHEMISTRY

Preamble: Knowledge in chemistry serves as basic nutrient for the understanding and thereby design of materials of importance in life. Thus the advancement in Engineering is depending on the outcome of basic sciences. Many advances in engineering either produce a new chemical demand as in the case of polymers or wait upon chemical developments for their applications as in the case of implants and alloys. Currently the electronics and computer engineers are looking forward for suitable biopolymers and nano materials for use in miniature super computers, the electrical engineers are in search of proper conducting polymers, the mechanical engineers are on lookout for micro fluids and the civil engineers are looking for materials that are environmental friendly, economical but long lasting.

COURSE OBJECTIVES (CO):

- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, engineering materials and water chemistry.

UNIT.1: ELECTROCHEMISTRY

i).Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries),Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen)

ii). Voltammetry: Basic Principles and applications (Ferrous/Ferric System)

Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples : analysis of Glucose and urea

iii).Corrosion: Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and cathodic protection and electro and electroless plating.

UNIT.2: POLYMERS

i).Introduction to polymers, Polymerisation process, mechanism: cationic, anionic, free radical and coordinate covalent, Polydispercity Index.

Elastomers (rubbers)

Natural Rubber; Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethene, Polysulfide (Thiokol) rubbers

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications , PVC, Bakelite, nylons, Polyester

ii).Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.

iii).Liquid Crystals: Introduction, classification and applications

iv).Inorganic Polymers: Introduction, Silicones, Polyphospazins (-(R)2-P=N-), applications

UNIT.3: FUEL TECHNOLOGY

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

i). Solid Fuels–Coal, Coke : Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

ii).Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis

Power Alcohol: Manufacture, merits and demerits of Power Alcohol

iii). Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.

iv). Bio Fuels: Biogas, Biodiesel and their significance

UNIT.4: CHEMISTRY OF ENGINEERING MATERIALS

i).Semiconducting and Superconducting materials-Principles and some examples

ii).Magnetic materials – Principles and some examples

iii).Cement: Composition, Setting and Hardening (Hydration and Hydrolysis)

iv).Refractories: Classification , properties and applications

v).Lubricants: Classification and characteristics of lubricants, Theory of lubrication.

vi). Rocket Propellants: Classification, Characteristics of good propellant

UNIT.5: WATER TREATMENT

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching, ozonisation, U.V. treatment)

Industrial Use of water:

For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment.

External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

EXPECTED OUTCOMES (EO): The student is expected to:

- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Foruth Edition, 2012.

2. A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.

REFERENCES:

1. A Text Book of Enigneering Chemistry, Jain and Jain, Dhanapath Rai Publishing Company, New Delhi, 15th Edition, 2010.

2. Engineering Chemistry, K. Sesha Maheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.

3.Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.

4.Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi, Acme Learning Pvt Ltd, First Edition, 2013.

5. Text Book of Engineering Chemistry – C. Parameswara Murthy, C.V.Agarwal and Andra Naidu, BS Publications, Hyderabad, 3rd Edition, 2008.

6. Text Book of Engineering Chemistry, Shashichawla, Dhanapath Rai Publications, New Delhi, 4th Edition, 2011

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

CIVIL -I YEAR

MATHEMATICS-I

Objectives

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications in electrical circuits, deflection of beams, whirling of shafts.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential, Integral and vector calculus, ordinary differential equations and Laplace transforms.
- To develop the skill pertinent to the practice of the mathematical concepts including the students abilities to formulate the problems, to think creatively and to synthesize information.

UNIT – I

Exact, linear and Bernoulli equations. Applications to Newton's law of cooling, law of natural growth and decay, orthogonal trajectories.

Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type eax, Sin ax, cos ax, polynomials in x, eax V(x), xV(x), method of variation of parameters. Applications to oscillatory electrical circuits, Deflection of Beams, whirling of shafts.

UNIT – II

Taylor's and Maclaurin's Series - Functions of several variables – Jacobian – Maxima and Minima of functions of two variables, Lagrange's method of undetermined Multipliers with three variables only. Radius of curvature, center of curvature, Involutes evolutes, envelopes.

UNIT – III

Curve tracing – Cartesian, polar and parametric curves. Length of curves.

Multiple integral – Double and triple integrals – Change of Variables – Change of order of integration. Applications to areas and volumes, surface area of solid of revolution in Cartesian and polar coordinates using double integral.

UNIT – IV

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – Application of Laplace transforms to ordinary differential equations of first and second order.

UNIT – V

Vector Calculus: Gradient – Divergence – Curl and their properties; Vector integration – Line integral - Potential function – Area – Surface and volume integrals. Vector integral theorems: Green's theorem – Stoke's and Gauss's Divergence Theorem (Without proof). Application of Green's – Stoke's and Gauss's Theorems.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers-42 Edition(2012)
2. Engineering Mathematics, Volume - I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher 1st Edition (2010)

REFERENCES:

1. Engineering Mathematics Volume-I, by T.K.V. Iyengar, S.Chand publication-12th Edition(2013)
2. Engineering Mathematics, Volume - I, by G.S.S.Raju, CENGAGE publisher.(2013)
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India-10thEdition(2012)
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers(2008)
5. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier-1st Edition(2001)

Outcomes:

- The students become familiar with the application of differential, integral and vector calculus, ordinary differential equations and Laplace transforms to engineering problems.
- The students attain the abilities to use mathematical knowledge to analyze and solve problems in engineering applications.

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

CIVIL -I YEAR

PROGRAMMING IN C AND DATA STRUCTURE

Course Objectives:

- To make the student understand problem solving techniques
- Students will be able to understand the syntax and semantics of C programming language and other features of the language
- Get acquaintance with data structures, searching and sorting techniques

Course Outcomes:

- Student can effectively apply problem solving techniques in designing the solutions for a wide-range of problems
- Student can choose appropriate data structure and control structure depending on the problem to be solved
- Student can effectively use existing data structures and design new data structures appropriate to the problem to be solved
- Student can modularize the problem and also solution
- Student can use appropriate searching and sorting technique to suit the application

Unit-I

Introductory Concepts: Introduction to computers, What is a Computer, Block diagram of Computer, Computer Characteristics, Hardware Vs Software, How to develop a program, Software development life cycle, Structured programming, Modes of operation, Types of programming languages, Introduction to C, Desirable program characteristics.

Introduction to Computer problem solving: Introduction, The problem solving aspect, Top down design, Implementation of algorithms.

Introduction to C programming: The C character set, Writing first program of C, Identifiers and key words, A more useful C program, Entering the program into the computer, Compiling and executing the program, Data types, Constants, Variables and arrays, Declarations, Expressions, Statements, Symbolic Constants.

Operators and Expressions: Arithmetic operators, Unary operators, Relational and Logical operators, Assignment operators, Conditional operator, Library functions.

Fundamental algorithms: Exchanging the values of two variables, Factorial computation, Sine function computation, Reversing the digits of an integer, Generating prime numbers.

Unit-II

Data Input and Output: Preliminaries, Single character input-getchar function, Single character output-putchar function, Entering input data-the scanf function, More about the scanf function, Writing output data-The printf function, More about the printf function, The gets and puts functions, Interactive(conversational) programming.

Preparing and running a complete C program: Planning a C program, Writing a C program, Error diagnostics, Debugging techniques.

Control statements: Preliminaries, Branching: if-else statement, Looping: The while statement, More looping: The do-while statement, Still more looping: The for statement, Nested control structures, The switch statement, Break statement, Continue statement, The comma operator, The goto statement.

Functions: A brief overview, Defining a function, Accessing a function, Function prototypes, Passing arguments to a function, Recursion

Unit-III

Program Structure: Storage classes, Automatic variables, External (global) variables, Static variables, Multi file programs, More about library functions.

Arrays: Defining an array, Processing an array, Passing arrays to functions, Multi dimensional arrays.

Array Techniques: Array order reversal, Removal of duplicates from an ordered array, Finding the K^{th} smallest element.

Merging, Sorting and Searching: The two way merge, Sorting by selection, Sorting by exchange, Sorting by insertion, Sorting by partitioning, Recursive Quick sort, Binary Search.

Strings: Defining a string, NULL character, Initialization of strings, Reading and Writing a string, Processing the strings, Character arithmetic, Searching and Sorting of strings, Some more Library functions for strings

Unit-IV

Pointers: Fundamentals, Pointer Declarations, Passing pointer to a function, Pointers and one dimensional array, Dynamic memory allocation, Operations on pointers, Pointers and multi dimensional arrays, Arrays of pointers, Passing functions to other functions, More about pointer declarations.

Structures and Unions: Defining a structure, Processing a structure, User defined data type (typedef), Structures and Pointers, Passing structures to functions, Unions.

File Handling: Why files, Opening and closing a data file, Reading and Writing a data file, Processing a data file, Unformatted data files, Concept of binary files, Accessing the file randomly (using fseek).

Additional Features: Register variables, Bitwise operations, Bit Fields, Enumerations, Command line parameters, More about Library functions, Macros, The C Preprocessor

Unit-V

Introduction to Data Structures: Data abstraction

Stacks and Queues: Stacks, Stacks using dynamic arrays, Queues, Circular Queues using dynamic arrays

Evaluations of expressions: Expressions, Evaluating postfix expressions, Infix to Postfix, Multiple Stacks and Queues.

Linked Lists: Singly Linked lists and chains, Representing chains in C, Linked Stacks and Queues.

Text Books:

1. "Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, 3rd edition, 2010, Mc Graw Hill.
2. "Fundamentals of Data Structures in C", Horowitz, Sahni, Anderson-freed, 2nd Edition, 2011, Universities Press.
3. "How to Solve it by Computer", R.G. Dromey, 14th impression, 2013, Pearson. (*Pascal implementations may be considered without loss of generality or Instructors may replace them with C language programs*)

References:

1. "Programming in C", Pradip Dey, Manas Ghosh, Oxford Higher Education
2. "Programming in C and Data Structures", Hanly, Koffman, Kamthane, Ananda Rao, Pearson.
3. "Programming in C", Reema Thareja, Oxford Higher Education.
4. "Computer Fundamentals and C Programming", First Edition, Dr.P.Chenna Reddy, Available at: www.pothi.com.
5. "Data Structure and Program Design in C", Second Edition, Kruse, Tondo, Leung, Mogalla, Pearson.
6. "Programming with C", R.S. Bichkar, University Press.
7. "Computer Science A Structured Programming Approach Using C", Third Edition, Fourouzan & Gilberg, Cengage Learning.

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA
CIVIL -I YEAR

ENGINEERING MECHANICS

OBJECTIVE:

Through this course students will advance their development of the following specific capabilities:

1. *Ability to utilise scalar and vector analytical techniques for analysing forces in statically determinate structures.*
2. *Ability to apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.*
3. *This course will serve as a basic course by introducing the concepts of basic mechanics which will help as a foundation to various courses.*

UNIT – I

INTRODUCTION OF ENGINEERING MECHANICS – Basic concepts - System of Forces – Moment of Forces and its Application – Couples and Resultant of Force System – Equilibrium of System of Forces - Degrees of Freedom – Free body diagrams –Types of Supports – Support reactions for beams with different types of loading – concentrated, uniformly distributed and uniformly varying loading.

UNIT – II

FRICTION : Types of friction– Laws of Friction – Limiting friction- Cone of limiting friction– Static and Dynamic Frictions – Motion of bodies – Wedge, Screw jack and Differential Screw Jack.

UNIT – III

CENTROID AND CENTER OF GRAVITY: Centroids of Simple Figures – Centroids of Composite Figures – Centre of Gravity of bodies – Area moment of Inertia - Parallel axis and Perpendicular axis theorems - Moments of Inertia of Composite Figures.

MASS MOMENT OF INERTIA: Moment of Inertia of Simple solids – Moment of Inertia of Composite Masses.(Simple problems only)

UNIT – IV

KINEMATICS: Rectilinear and Curvilinear Motion – Velocity and Acceleration – Motion of a Rigid Body – Types and their Analysis in Planar Motion.

KINETICS : Analysis as a particle and Analysis as a Rigid Body in Translation – Central Forces of motion – Equations of Plane Motion – Fixed Axis Rotation – Rolling Bodies – Work-Energy Method – Equation for Translation – Work-Energy application to Particle Motion, Connection System – Fixed Axis Rotation and Plane Motion.

UNIT – V

ANALYSIS OF PERFECT FRAMES: Types of Frames – Cantilever Frames and Simply Supported Frames – Analysis of frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

MECHANICAL VIBRATIONS: Definitions, Concepts-Simple Harmonic Motion-Free Vibrations-Simple Compound and Torsional pendulums- Numerical problems.

TEXT BOOKS:

1.Singer's Engineering Mechanics Statics and Dynamics , K. Vijaya Kumar Reddy, J.Suresh Kumar, BS Publications, 3rd Edition(SI Units)Fifth impression 2013
2.Engg. Mechanics / Timoshenko & Young – Mc Graw Hill International Edition
3.Engineering Mechanics by Shames & Rao – Pearson Education.
4.Engineering Mechanics by Dr.R.k.Bansal -- Lakshmi Publications.
5.Engineering Mechanics – B. Bhattacharyya, Oxford University Publications.
6.Engineering Mechanics by S.S Bhavikatti and Rajasekharappa

REFERENCES:

(1) Engineering Mechanics by Fedrinand L.Singer – Harper Collings Publishers.
(2) Engineering Mechanics by Seshigiri Rao, Universities Press, Hyderabad.
(3) Engineering Mechanics by Rajsekharan, Vikas Publications.
(4) Engineering Mechanics (Statics and Dynamics) by Hibller and Gupta; Pearson Education
(5) Engineering Mechanics by S.Timoshenko, D.H.Young and J.V.Rao, Tata McGraw-Hill Company
(6) Engineering Mechanics by Chandramouli, PHI publications.
(7) Engineering Mechanics –Arthur P. Boresi and Richard J. Schmidt. – Brooks/Cole – Cengage Learning

Course outcomes:

After learning this course, Students will be able to

- *Solve for the resultants of any force systems*
- *Determine equivalent force systems*
- *Determine the internal forces in plane frames, simple span trusses and beams*
- *Solve the mechanics problems associated with friction forces*
- *Obtain the centroid, first moment and second moment of an area*
- *Describe the motion of a particle in terms of its position, velocity and acceleration in different frames of reference*
- *Analyze the forces causing the motion of a particle*

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA
CIVIL -I YEAR

ENGINEERING DRAWING

Course Objectives:

- *To impart and inculcate proper understanding of the theory of projection.*
- *To improve the visualization skills.*
- *To enable the students with various concepts like dimensioning, conventions and standards related to working drawings in order to become professionally efficient.*
- *To impart the knowledge on understanding and drawing of simple residential/office buildings.*

Unit-I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their significance;Drawing Instruments and their Usage – BIS Conventions in drawing and Lettering.
Curves used in engineering practice:

a) Conic sections including Rectangular Hyperbola
b) Cycloid, Epicycloid and Hypocycloid –Normals and Tangents
c) Involute of a circle –Normals and Tangents

Principles of orthographic projection in I and III angle projections –Conventions & dimensions –Projections of points.

Unit –II

Projection of lines inclined to both planes –traces, Projection of planes inclined to both planes.
Projection of regular solids inclined to both planes.

Unit –III

Sections of solids: Sections and Sectional views of Regular solids –Prism, Cylinder, Pyramid, Cone – True shapes.
Development of surfaces of right Regular solids-prisms, Cylinders, Pyramid, cone and their sectional parts.

Unit –IV

Conversion of Pictorial views to orthographic views –Conventions.
Isometric projections: Principles of pictorial representations-Isometric projection- Isometric scale-Isometric views- conventions- Isometric views of plane figures, solids-Isometric projection of objects with non isometric lines.

Unit –V

Interpenetration of Solids – Intersection of Cylinder Vs Cylinder, Cylinder Vs Prism, Cylinder Vs cone, square prism Vs square prism.
Perspective projections –Planes and simple solids. Vanishing point Method only.

TEXT BOOKS:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, Shah and Rana, 2/e, Pearson Education
3. Engineering Drawing, K.L. Narayana, P. Khanniah, Scitech Pub.

REFERENCES:

1. Engineering Drawing and Graphics, Venugopal/ New age
2. Engineering Drawing, B.V.R. Gupta, J.K. Publishesrs
3. Engineering Drawing, Johle, Tata McGraw-Hill
4. Engineering Drawing, K.Venkata Reddy, B.S.Publishers.

Course Outcomes:

- *Students will be able to improve their visualization skills so that they can apply these skills in developing new products.*
- *Students will be able to prepare simple layout of factory buildings.*
- *Students will be able to know and understand the conventions and the methods of engineering drawing.*

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

CIVIL -I YEAR

PROGRAMMING IN C AND DATA STRUCTURE LAB

Course Objectives:

- To make the student learn C Programming language
- To make the student solve problems, implement them using C language.
- To strengthen the ability to identify and apply the suitable data structure for the given real world problem

Course Outcomes:

- Apply problem solving techniques to find solutions to problems
- Able to use C language features effectively and implement solutions using C language.
- Be capable to identity the appropriate data structure for a given problem or application.
- Improve logical skills

List of Experiments/Tasks

1. Practice DOS and LINUX Commands necessary for design of C Programs.
2. Study of the Editors, Integrated development environments, and Compilers in chosen platform.
3. Write, Edit, Debug, Compile and Execute Sample C programs to understand the programming environment.
4. Practice programs: Finding the sum of three numbers, exchange of two numbers, maximum of two numbers, to read and print variable values of all data types of C language, to find the size of all data types, to understand the priority and associativity of operators using expressions, to use different library functions of C language.
5. Write a program to find the roots of a quadratic equation.
6. Write a program to compute the factorial of a given number.
7. Write a program to check whether the number is prime or not.
8. Write a program to find the series of prime numbers in the given range.
9. Write a program to generate Fibonacci numbers in the given range.
10. Write a program to find the maximum of a set of numbers.
11. Write a program to reverse the digits of a number.
12. Write a program to find the sum of the digits of a number.
13. Write a program to find the sum of positive and negative numbers in a given set of numbers.
14. Write a program to check for number palindrome.
15. Write a program to evaluate the sum of the following series up to ‘n’ terms $e^{x}=1+x+x^2/2!+x^3/3!+x^4/4!+$--------
16. Write a program to generate Pascal Triangle.
17. Write a program to read two matrices and print their sum and product in the matrix form.
18. Write a program to read matrix and perform the following operations.

i. Find the sum of Diagonal Elements of a matrix.
ii. Print Transpose of a matrix.
iii. Print sum of even and odd numbers in a given matrix.

19. Write a program to accept a line of characters and print the count of the number of Vowels, Consonants, blank spaces, digits and special characters.
20. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings.
21. Write a program to perform the operations addition, subtraction, multiplication of complex numbers.
22. Write a program to split a 'file' in to two files, say file1 and file2. Read lines into the 'file' from standard input. File1 should consist of odd numbered lines and file2 should consist of even numbered lines.
23. Write a program to merge two files.
24. Write a program to implement numerical methods Lagrange's interpolation, Trapezoidal rule.
25. Write a program to read a set of strings and sort them in alphabetical order.
26. Write a program to sort the elements of an array using sorting by exchange.
27. Write a program to sort the elements of an array using Selection Sort.
28. Write a program to perform Linear Search on the elements of a given array.
29. Write a program to perform Binary Search on the elements of a given array.
30. Write a program to find the number of occurrences of each number in a given array of numbers.
31. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions.
    i. String length determination ii .Compare Two Strings
    iii. Concatenate them, if they are not equal iv. String reversing
32. Write programs using recursion for Factorial of a number, GCD, LCM, Towers of Hanoi.
33. Write a program to convert infix expression to postfix expression and evaluate postfix expression.
34. Write a program to exchange two numbers using pointers.
35. Write a program to implement stack, queue, circular queue using array and linked lists.
36. Write a program to perform the operations creation, insertion, deletion, and traversing a singly linked list
37. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.

38. A file consists of information about employee salary with fields employeeid, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employeeid, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as

80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.

39. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion.
40. Write a program to find the square root of a number without using built-in library function.
41. Write a program to convert from string to number.
42. Write a program to generate pseudo random generator.
43. Write a program to remove duplicates from ordered and unordered arrays.
44. Write a program to sort numbers using insertion sort.
45. Write a program to implement quick sort using non-recursive and recursive approaches. Use randomized element as partitioning element.
46. Write a program to search a word in a given file and display all its positions.
47. Write a program to generate multiplication tables from 11 to 20.
48. Write a program to express a four digit number in words. For example 1546 should be written as one thousand five hundred and forty six.
49. Write a program to generate a telephone bill. The contents of it and the rate calculation etc should be as per BSNL rules. Student is expected to gather the required information through the BSNL website.
50. Write a program for tic-tac-toe game.
51. Write a program to find the execution time of a program.
52. Design a file format to store a person's name, address, and other information. Write a program to read this file and produce a set of mailing labels

Note: The above list consists of only sample programs. Instructors may choose other programs to illustrate certain concepts, wherever is necessary. Programs should be there on all the concepts studied in the Theory on C programming and Data structures. Instructors are advised to change atleast 25% of the programs every year until the next syllabus revision.

References:

4. “Programming with C”, Byron Gottfried, Third Edition, Schaum’s Outlines, Mc Graw Hill.
5. “Fundamentals of Data Structures in C”, Horowitz, Sahni, Anderson-freed, Second Edition, Universities Press.
6. “How to Solve it by Computer”, R.G. Dromey, Pearson.
7. “The C Programming Language”, Brian W. Kernighan, Dennis M. Ritchie, Pearson.
8. “Classic Data Structures”, Samantha, PHI
9. “Let us C”, Yeswant Kanetkar, BPB publications
10. “Pointers in C”, Yeswant Kanetkar, BPB publications

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

CIVIL -I YEAR

ENGINEERING PHYSICS LABORATORY

PREAMBLE:

By performing the experiments engineering students acquire the knowledge about the importance of the studied theoretical physical concepts.

LAB OBJECTIVE:

- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor
- Will understand the applications of B H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms of lattice constant.
- Will recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Will learn to synthesis of the nanomaterials and recognize its importance by knowing its nano particle size and its impact on its properties.

Any 10 of the following experiments has to be performed during the academic year

1. Determination of radius of curvature of a lens by forming Newton's rings.
2. Determination of wavelength of various colours of mercury spectrum using diffraction grating in normal incidence method.
3. Determination of Numerical aperture, acceptance angle and losses of an optical fiber.
4. Energy gap of a material using p-n junction diode.
5. Hall effect – Determination of mobility of charge carriers.
6. B-H curve – Determination of hysteresis loss.
7. Determination of lattice constant using X-ray spectrum.
8. Determination of particle size by using laser source.
9. Determination of dielectric constant.
10. Study of Laser characteristics.
11. Synthesis of nanomaterial by sol-gel method.
12. Particle size analysis of the synthesized nanomaterials.

LAB OUTCOMES:

- Would have acquired the practical application knowledge of optical fiber, semiconductor, dieclectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.
- Would recognize the significant importance of nanomaterials in various engineering fields.

ENGINEERING CHEMISTRY LAB

Preamble: The experiments are designed in a manner that the students can validate their own theory understanding in chemistry by self involvement and practical execution. Thus the execution of these experiments by the student will reinforce his/her understanding of the subject and also provide opportunity to refine their understanding of conceptual aspects. As a result, the student gets an opportunity to have felt good factor at the laboratory bench about the chemical principles that he/she learned in the classroom.

Programme Objective:

- Will learn practical understanding of the redox reaction
- Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus toengineer these to suit diverse applications
- Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

LIST OF EXPERIMENTS

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Manganese by colorimetry.
5. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Alkalinity of Water
7. Determination of acidity of Water
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Conductometric titration of Barium Chloride vs Sodium Sulphate (Precipitation Titration)
13. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
14. Estimation of Chloride ion using potassium Chromate indicator (Mohrs method)
15. Acid-Base neutralisation by pH method.

(Any 10 experiments from the above list)

Course Outcomes

- **Would be confident in handling energy storage systems and would be able combat chemical corrosion**
- **Would have acquired the practical skill to handle the analytical methods with confidence.**
- **Would feel comfortable to think of design materials with the requisite properties**
- **Would be in a position to technically address the water related problems.**

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.

2. Chemistry Practical – Lab Manual by K.B.Chandra Sekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

CIVIL -I YEAR

Engineering &IT Workshop(13ACS03)

ENGINEERING WORKSHOP

(*common for all branches)*

Course Objective:

- *The objective of this Lab is to provide the basic concepts about different manufacturing processes, use of various workshops tools and exposer to the power tools.*
- *Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.*

TRADES FOR EXERCISES:

At least 2 exercise in each:

1. Carpentry
2. Fitting
3. House-wiring
4. Foundry
5. Tin smithy
6. Power Tools Demonstration.

TEXT BOOK:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/Scitech Publishers.
2. Workshop practice manual by K.Venkata Reddy B.S Publications

Codes / Tables : will be provided

Question Paper pattern: Test in any two trades out of 6 trades.

Course outcomes

- *Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops.*
- *This course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing.*
- *Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems.*
- *Workshop curricula build the hands on experiences which would help to learn manufacturing processes and production technology courses in successive semesters.*
- *Workshop practice is also important since only practice can make the man perfect.*

ITWorkshop

Course Objectives:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

Preparing your Computer (5 weeks)

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Operating system features**: Students should record the various features that are supported by the operating system(s) installed. They have to submit a report on it. Students should be able to access CD/DVD drives, write CD/DVDs, access pen drives, print files, etc. Students should install new application software and record the installation process.

Networking and Internet (4 weeks)

Task 5:Networking: Students should connect two computers directly using a cable or wireless connectivity and share information. Students should connect two or more computers using switch/hub and share information. Crimpling activity, logical configuration etc should be done by the student. The entire process has to be documented.

Task 6:Browsing Internet: Student should access the Internet for Browsing. Students should search the Internet for required information. Students should be able to create e-mail account and send email. They should get acquaintance with applications like Facebook, skype etc.

If Intranet mailing facility is available in the organization, then students should share the information using it. If the operating system supports sending messages to multiple users (LINUX supports it) in the same network, then it should be done by the student. Students are expected to submit the information about different browsers available, their features, search process using different natural languages, and creating e-mail account.

Task 7: Antivirus: Students should download freely available Antivirus software, install it and use it to check for threats to the computer being used. Students should submit information about the features of the antivirus used, installation process, about virus definitions, virus engine etc.

Productivity tools (6 weeks)

Task 8: Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 9: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement.Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 10: Presentations : creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Optional Tasks:

Task 11: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material

- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

Task 12: Software: Students may submit a report on specifications of various software that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. The software may be proprietary software or Free and Open source software. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop operating system
- Server operating system
- Antivirus software
- MATLAB
- CAD/CAM software
- AUTOCAD

References:

1. "Introduction to Computers", Peter Norton, Mc Graw Hill
2. "LaTeX Companion" – Leslie Lamport, PHI/Pearson.
3. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
4. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
5. "Networking your computers and devices", Rusen, PHI
6. "Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH.

JNTUA COLLEGE OF ENGINEERING (Autonomous) PULIVENDULA

CIVIL -I YEAR

English Language & Communication Skills Lab

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

OBJECTIVES:

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To expose the students to a varied blend of self-instructional learner-friendly modes of language learning through computer-aided multi-media instruction.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

SYLLABUS:

Unit-1

1. Phonetics -importance
2. Introduction to Sounds of Speech
3. Vowels sounds
4. Consonants sounds
5. Phonetic Transcription

Unit-2

6. Word Stress
7. Syllabification
8. Rules of word stress
9. Intonation
10. Falling
11. Rising Tone
12. Fall rise tones

Unit-3

Situational Dialogues

13. Role Plays
14. JAM
15. Describing people/object/place
16. Stage dynamics
17. Body language

Unit-4

18. Debates
19. Group Discussions
20. Interview skills
21. Telephone skills
22. Public Speaking
23. Preparation of resume

Unit-5

24. Basics of Communication Skills
25. Objectives & Characteristics of Communication
26. LSRW Skills –
27. Presentation Skills

EXPECTED OUTCOMES:

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students
- Speaking with clarity and confidence thereby enhancing employability skills of the students

MINIMUM REQUIREMENT FOR ELCS LAB:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab:
   The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.

2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.

System Requirement (Hardware component):

Computer network with Lan with minimum 60 multimedia systems with the following specifications:

i) P – IV Processor
   a) Speed – 2.8 GHZ
   b) RAM – 512 MB Minimum
   c) Hard Disk – 80 GB

ii) Headphones of High quality

SUGGESTED SOFTWARE:

1. Clarity Pronunciation Power – Part I (Sky Pronunciation)
2. Clarity Pronunciation Power – part II
3. K-Van Advanced Communication Skills
4. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
5. *DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.*
6. Lingua TOEFL CBT Insider, by Dreamtech
7. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
8. Cambridge Advanced Learners' English Dictionary with CD.
9. Oxford Advanced Learner's Compass, 8th Edition
10. Sanjay Kumar & Pushp Lata. 2011. Communication Skills, OUP

REFERENCE BOOKS:

1. **A Textbook of English Phonetics for Indian Students** 2nd Ed T. Balasubramanian. (Macmillian),2012.
2. **A Course in Phonetics and Spoken English**, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
3. **Strengthen Your Steps,** Maruthi Publicaions, 2012.
4. **Speaking English Effectively**, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
5. **Listening in the Language Classroom**, John Field (Cambridge Language Teaching Library),2011
6. **A Hand book for English Laboratories**, E.Suresh kumar, P.Sreehari, Foundation Books,2011
7. **English Pronunciation in Use. Intermediate & Advanced** ,Hancock, M. 2009. CUP
8. **Basics of Communication in English** ,Soundararaj, Francis. 2012.. *New Delhi: Macmillan*
9. **Spoken English** (CIEFL) in 3 volumes with 6 cassettes, OUP.

English Pronouncing Dictionary, Daniel Jones Current Edition with CD.Cambridge, 17th edition, 2011.

II Year B.Tech - I Semester

MATHAMATICS-II

Objectives:

 This course aims at providing the student with the concepts of Matrices, Fourier series, Fourier and Z-transforms and partial differential equations which find the applications in engineering.

 Our emphasis will be more on logical and problem solving development in Numerical methods and their applications.

UNIT – I

Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonolization of matrix. Calculation of powers of matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

UNIT – II

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method.

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's Interpolation formula.

Curve fitting: Fitting of a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation and Integration – Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – III

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Euler's Method-Runge-Kutta Methods – Predictor-Corrector Method – Milne's Method. Numerical solution of Laplace equation using finite difference approximation.

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation –Half-range Fourier sine and cosine expansions.

UNIT – IV

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms. z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by ztransforms.

UNIT – V

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers- 42 Edition(2012)
2. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher 5th Edition(2012)

REFERENCES:

1. Engineering Mathematics, Volume - II, E. Rukmangadachari & E. Keshava Reddy,Pearson Publisher-1st Edition (2010)
2. Engineering Mathematics, Volume - II, by G.S.S.Raju, CENGAGE publisher – 1st Edition(2013)
3. Mathematical Methods by T.K.V. Iyengar, S. Chand publication-8th Edition(2013)
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers(2008)
5. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India 10th Edition(2013)

Outcomes:

 The student becomes familiar with the application of Mathematical techniques like Fourier series, Fourier and z-transforms.

 The student gains the knowledge to tackle the engineering problems using the concepts of Partial differential equations and Numerical methods.

Electrical&MechanicalTechnology
(Part A) ElectricalTechnology

Objectives: This course aims at providing fundamental concepts of electrical circuits, DC, AC Machines and Electrical instruments, which help to increase knowledge and to apply principles in their applications

UNIT – I

DC MACHINES: Principles of operation of DC Generator – emf equation – types – DC motor types – torque equation – applications –three point starter.

TRANSFORMERS: Principles of operation of single phase transformers – emf equation – losses – efficiency and regulation.

UNIT – II

AC MACHINES: Principles of operation of alternators – regulation by synchronous impedance method, principle of operation of induction motor slip – torque characteristics – applications.

UNIT – III

INSTRUMENTS: Basic Principles of indicating instruments –permanent magnet moving coil and moving iron instruments.

TEXT BOOKS:

1. Electrical Technology by B.L. Theraja, S.Chand Publishers.
2. Introduction to Electrical Engineering – M.S. Naidu &S.Kamakshaiah, TMH

COURSE OUTCOME: Students able to apply fundamental concepts, principle of electrical engineering for their applications

(PART – B) MECHANICAL TECHNOLOGY

UNIT – IV

WELDING PROCESSES: Introduction to welding classification of welding processes, Oxyacetylene welding – equipment, welding fluxes and filler rods, Gas cutting, Introduction to arc welding – Manual metal arc welding. Submerged arc welding, TIG and MIG processes, soldering and brazing Importance, comparison and applications.

UNIT - V

E.C Engines:-Description and working of steam engines and steam turbines (Prime movers) – impulse and Reaction turbines. Gas Turbines – Closed and open type gas turbines comparison.

I.C. Engines:- Description and working of 4 stroke and 2 stroke engines

UNIT- VI

TRANSMISSION OF POWER; Belt, Rope, Chain and gear drive-simple problems. Earth moving machinery and Mechanical handling equipment – bull dozers – power showels – Excavators – concrete mixer – Belt and bucket conveyers.

II Year B.Tech - I Semester

STRENGTH OF MATERIALS – I

UNIT – I

SIMPLE STRESSES AND STRAINS:

Deformable bodies- Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy- Resilience- Gradual ,sudden, impact and shock loadings- simple applications

UNIT – II

SHEAR FORCE AND BENDING MOMENT:

Definition of beam – Types of beams – Concept of shear force and bending moment -Relation between S.F., B.M and rate of loading at a section of a beam.– S.F and B.M diagrams for cantilver, simply supported and overhanging beams subjected to point loads, u.d.l., uniformly varying loads and combination of these loads – Point of contra flexure –

UNIT – III

FLEXURALSTRESSES:

Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/y = E/R Neutral axis – Determination bending stresses – section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

SHEAR STRESSES-Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections.

UNIT – IV

DEFLECTION OF BEAMS:

Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods – Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, - U.D.L. Uniformly varying load.-Mohr's theorems – Moment area method – application to simple cases

UNIT – V

PRINCIPAL STRESSES AND STRAINS: Introduction- stresses on an inclined section of a bar under axial loading- compound stresses- normal and tangential stresses on an inclined plane for biaxial stresses- Two perpendicular normal stresses accompanied by a state of simple shear- Mohr's circle of stresses- principal stresses and strains- analytical and graphical solutions.

THEORIES OF FAILURES- Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

TEXT BOOKS:

1. Strength of materials by R. Subramanian, Oxford university press, New Delhi
2. Mechanics of materials- Dr. B. C. Punmia, Ashok Kumar Jain, Arun kumar jain, Lakshimi publications

REFERENCES :

1. Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications 2000.
2. Strength of Materials by Schaum's out line series – Mc. Grawhill International Editions.
3. Strength of Materials by S. Ramakrishna and R.Narayan – Dhanpat Rai publications.
4. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
5. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah, New Delhi.
6. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Delhi.
7. Strength of Materials by Bhavi Katti

II Year B.Tech - I Semester

SURVEYING-I

UNIT-I : INTRODUCTION

Definition of Surveying, Classification of Surveys, Uses of Surveying Units of Measurements, Map & Classification, Survey of India topographical Maps and their numbering., Basic principles of surveying, Errors, Classification, Precision and accuracy.

UNIT-II : MEASUREMENT OF HORIZONTAL DISTANCES.

Chain and types, - Tape and types, - EDM devices, - Ranging of lines Direct and Indirect, Measurement of distances over sloping grounds, Chain and Tape corrections - Numerical problems. Accessories required Selection of stations and lines Offsets and types Setting out of right angles Working principle and use of optical square, prism square, cross staff., Linear methods of setting out right angles Booking of chain survey work, Field book, entries, conventional symbols, Obstacles in chain survey, Numerical problems, Errors in chain survey and precautions to be taken.

Unit-III : COMPASS SURVEYING

Meridians and bearings, Principle, working and use of - Prismatic compass Surveyor's compass, Magnetic bearing, true bearings, WCB and Reduced bearing. Dip and Declinationn Accessories required for compass surveying, Traverse - closed and open traverse Computation of bearings of legs of closed traverse given the bearing of one of the legs, Computation of included angles given the bearings of legs of a closed traverse. Local attraction, determination and corrections, Dependent and independent co-ordinates, Checks for closed traverse and determination of closing error and its direction Bowditch's graphical method of adjustment of closed traverse, Bowditch's rule and transit rule, Omitted measurements (Only Length and corresponding bearing of one line)

UNIT IV : INTRODUCTION TO LEVELING

Principles and basic definitions, Fundamental axes and part of a dumpy level, Types of adjustments and objectives, Temporary adjustments of a dumpy level, Sensitiveness of bubble tube, Curvature and refraction correction, Type of leveling, Simple leveling, Reciprocal leveling, Profile leveling, Cross sectioning, Fly leveling, Booking of levels Rise and fall method and Height of instrument method comparison Arithmetic checks Fly back leveling., Errors and precautions. Contouring , Contours and their characteristics, Methods of contouring, direct and indirect methods, Interpolation techniques, Uses of contours Numerical problems on determining intervisibility, Grade contours and uses

UNIT V : PLANE TABLE SURVEYING

Plane table and accessories, Advantages and limitations of plane table survey, Orientation and methods of orientation, Methods of plotting – Radiation, Intersection, Traversing Resection method, Two point and three point problems, Solution to two point problem by graphical method, Solution to three point problem Bessel's graphical method, Errors in plane table survey.

TEXT BOOKS:

1. 'Surveying' Vol–1 – B.C. Punmia , Laxmi Publications, New Delhi.
2. Surveying and Levelling – R Subramanian. Oxford University Press (2007)9
Text Book of Surveying – C. Venkataramiah. Universities Press.(2009 Reprint)

REFERENCE BOOKS:

1. Fundamentals of Surveying - Milton O. Schimidt – Wong, Thomson Learning.
2. Fundamentals of Surveying - S.K. Roy – Prentice Hall of India.
3. Surveying Vol. I, S.K. Duggal, Tata McGraw Hill - Publishing Co. Ltd., New Delhi.
* Survey of India Publication on maps.

II Year B.Tech - I Semester

FLUID MECHANICS

UNIT I

INTRODUCTION : Dimensions and units – Physical properties of fluids specific gravity, viscosity, surface tension, vapor pressure and their influences on fluid motionpressure at a point, Pascal's law, Hydrostatic law - atmospheric, gauge and vacuum pressure- measurement of pressure. Pressure gauges, Manometers: differential and Micro Manometers.Hydrostatic forces on submerged plane, Horizontal, Vertical, inclined and curved surfaces – Center of pressure. Derivations and problems.

UNTI – II

FLUID KINEMATICS: Description of fluid flow, Stream line, path line and streak lines and stream tube. Classification of flows : Steady, unsteady, uniform, non uniform, laminar, turbulent, rotational and irrotational flows – Equation of continuity for one, two , three dimensional flows – stream and velocity potential functions, flow net analysis.

FLUID DYNAMICS: Surface and body forces – Euler's and Bernoulli's equations for flow along a stream line for 3-D flow, Momentum equation and its application – forces on pipe bend.

UNIT –III

BOUNDARY LAYER THEORY: Boundary layer – concepts, Prandtl contribution, Characteristics of boundary layer along a thin flat plate, Vonkarmen momentum integral equation, laminar and turbulent Boundary layers

(no deviations), separation of BL, control of BL, flow around submerged objects-Drag and Lift- Magnus effect.

UNIT – VI

LAMINAR&TURBULENT FLOWS:Reynold's experiment – Characteristics of Laminar & Turbulent flows. Flow between parallel plates, Flow through long tubes, flow through inclined tubes.

UNIT - V

CLOSED CONDUIT FLOW: Laws of Fluid friction – Darcy's equation, Minor losses – pipes in series – pipes in parallel – Total energy line and hydraulic gradient line. Pipe network problems, variation of friction factor with Reynold's number – Moody's Chart.

MEASUREMENT OF FLOW : Pitot tube, Venturi meter and orifice meter – classification of orifices, flow over rectangular, triangular and trapezoidal and Stepped notches - –Broad crested weirs.

TEXT BOOKS:

1. Fluid Mechanics by Modi and Seth, Standard book house.
2. Introduction to Fluid Machines by S.K.Som & G.Biswas (Tata Mc.Grawhill publishers Pvt. Ltd.)
3. Introduction to Fluid Machines by Edward J. Shaughnessy, Jr, Ira M. Katz and James P. Schaffer, Oxford University Press, New Delhi

REFERENCES:

1. Fluid Mechanics by J.F.Douglas, J.M. Gaserek and J.A.Swaffirld (Longman)
2. Fluid Mechanics by Frank.M. White (Tata Mc.Grawhill Pvt. Ltd.)
3. Fluid Mehanics by A.K. Mohanty, Prentice Hall of India Pvt. Ltd., New Delhi
4. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) ltd., New Delhi

II Year B.Tech - I Semester

BUILDING MATERIALS AND CONSTRUCTION

UNIT – I

STONES, BRICKS AND TILES:

Properties of building stones – relation to their structural requirements. Classification of stones – Stone quarrying – precautions in blasting, Dressing of stone, Composition of good brick earth, various methods of manufacture of bricks. Comparison between clamp burning and kiln burning.

ROOFING MATERIALS:. Characteristics of good tile – manufacturing methods, Types of tiles. Use of Materials like aluminium, gypsum, glass and bituminous materials – their quality.

UNIT – II

LIME AND CEMENT:

Various ingredients of lime – Constituents of lime stone – classification of lime – various methods of manufacture of lime. Various types of cement and their properties. Various file and laboratory tests for Cement. Various ingredients of Cement concrete and their importance

UNIT- III

WOOD: Structure – properties – Seasoning of timber. Classification of various types of woods used in buildings – Defects in timber. Alternative materials for wood, Galvanized Iron, Fiber-reinforced plastics, steel, Aluminum.

UNIT - VI

MASONARY :

Types of masonry, English and Flemish bonds , Rubble and Ashlar masonry, cavity and partition walls.

FOUNDATIONS:

Foundations : Shallow foundations – Spread, combined strap and mat footings.

UNIT –V

BUILDING COMPONENTS: Lintels, Arches, Vaults-stair cases – Types. Different types of floors- Concrete, Mosaic, Terrazo floors, Pitched, flat and curved Roofs. Lean-to-Roof, Coupled Roofs, Trussed roofs- King and Queen Post Trusses. RCC Roofs, Madras Terrace/Shell Roofs.

FINISHINGS : Proofing Damp and water proofing- materials used. Plastering, pointing, white washing and distempering – Painting – Constituents of a paint – Types of paints – Painting of new/old Wood – Varnish – Form work and scaffolding.

TEXT BOOKS:

1. Building material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
3. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

REFERENCES:

1. R.Chudly “Construction Technology “– Volumes I and II” 2nd Edition, Longman, UK, 1987.
2. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.

SURVEYING LAB – I

LIST OF EXERCISES :

1. Survey of an area by chain survey (closed traverse) & Plotting
2. Chaining across obstacles
3. Determination of distance between two inaccessible points with compass.
4. Surveying of a given area by prismatic compass (closed traverse) and plotting after adjustment.
5. Radiation method, intersection methods by plane Table survey
6. Two point and three point problems in plane table survey
7. Traversing by plane table survey
8. Fly leveling (differential leveling)
9. An exercise of L.S and C.S and plotting
10. Two exercises on contouring.

List of Major Equipment:

1. Chains, tapes, Ranging rods, cross staff, arrows
2. Compasses and Tripods, Optical square.
3. Plane tables, Alidade, Plumbing fork, trough compasses
4. Leveling instruments and leveling staves
5. Box sextants, planimeter.

II Year B.Tech - I Semester

STRENGTH OF MATERIALS LAB

1. Tension test
2. Bending test on (Steel / Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test
5. Hardness test
6. Spring test
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges
12. Continuous beam – deflection test.

List of Major Equipment:

1. UTM for conducting tension test on rods
2. Steel beam for flexure test
3. Wooden beam for flexure test
4. Torsion testing machine
5. Brinnell's / Rock well's hardness testing machine
6. Setup for spring tests
7. Compression testing machine
8. Izod Impact machine
9. Shear testing machine
10. Beam setup for Maxwell's theorem verification.
11. Continuous beam setup
12. Electrical Resistance gauges.

PROBABILITY AND STATISTICS

(Common to Civil & Mech.)

Objectives:

- To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory

UNIT – I

Conditional probability – Baye's theorem. Random variables – Discrete and continuous Distributions – Distribution functions. Binomial and poison distributions Normal distribution – Related properties.

UNIT – II

Test of Hypothesis: Population and Sample - Confidence interval of mean from Normal distribution - Statistical hypothesis - Null and Alternative hypothesis - Level of significance - Test of significance - Test based on normal distribution - Z test for means and proportions; Small samples - t- test for one sample and two sample problem and paired t-test, F-test and Chi-square test (testing of goodness of fit and independence).

UNIT – III

Analysis of variance one way classification-CRD and two way classification (RBD and Latin square Design)

UNIT – IV

Statistical Quality Control: Concept of quality of a manufactured product -Defects and Defectives - Causes of variations - Random and assignable - The principle of Shewhart Control Chart-Charts for attribute and variable quality characteristics- Constructions and operation of X- bar Chart, R-Chart, P-Chart and C-Chart.

UNIT – V

Queuing Theory: Pure Birth and Death process, M/M/1 & M/M/S & their related simple problems.

TEXT BOOKS:

1. Probability & Statistics for engineers by Dr. J. Ravichandran WILEY-INDIA publishers(2010)
2. Probability & Statistics by T.K.V. Iyengar, S.Chand publications-4th Edition(2013)

REFERENCES:

1. Probability & Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher-1st Edition(2010)
2. Statistical methods by S.P. Gupta, S.Chand publications-41th Edition(2011)
3. Probability & Statistics for Science and Engineering by G.Shanker Rao, Universities Press-1st Edition(2011)
4. Probability and Statistics for Engineering and Sciences by Jay L.Devore, CENGAGE-8th Edition,(2011).
5. Probability and Statistics by R.A. Jhonson and Gupta C.B, Pearson Education- 7th Edition(2007).

Outcomes:

- The student will be able to analyze the problems of engineering & industry using the techniques of testing of hypothesis, ANOVA, Statistical Quality Control and Queuing theory and draw appropriate inferences.

II Year B.Tech - II Semester

STRENGTH OF MATERIALS – II

UNIT- I

THIN CYLINDERS :

Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and volumetric strains – changes in dia, and volume of thin cylinders – Thin spherical shells.

THICK CYLINDERS: Introduction Lame's theory for thick cylinders – Derivation of Lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage- Thick spherical shells.

UNIT – II

TORSION OF CIRCULAR SHAFTS :

Theory of pure torsion – Derivation of Torsion equations : T/J = q/r = N?/L – Assumptions made in the theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

SPRINGS

Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple – springs in series and parallel – Carriage or leaf springs.

UNIT – III

COLUMNS AND STRUTS :

Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns- assumptions- derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.

UNIT – IV

DIRECT AND BENDING STRESSES :

Stresses under the combined action of direct loading and B.M,. core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and B.M. about both axis.

UNIT – V

UNSYMETRICAL BENDING :

Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid – Location of neutral axis Deflection of beams under unsymmetrical bending.

BEAMS CURVED IN PLAN:

Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semi-circular beam simply-supported on three equally spaced supports.

TEXT BOOKS:

1. A Text book of Strength of materials by R.K.Bansal –Laxmi Publications (P) ltd., New Delhi
2. Introduction to Strength of Materials by U.C. Jindal, Galgotia publications.
3. Strength of Materials by B.C. Punmia

REFERENCES:

1. Mechanics of Solid, by Ferdinandp Beer and others – Tata Mc.Grawhill Publications 2000.
2. Strength of Materials by Schaum's out line series – Mc. Graw hill International Editions.
3. Strength of Materials by S. Ramakrishna and R.Narayan – Dhanpat Rai publications.
4. Strength of materials by R.K.Rajput, S.Chand & Co, New Delhi.
5. Strength of Materials by A.R.Basu, Dhanpat Rai & Co, Nai Sarah, New Delhi.
6. Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Delhi.
7. Mechanics of Structures, by S.B. Junnarkar, Charotar Publishing House, Anand, Gujrat.

II Year B.Tech - II Semester

HYDRAULICS AND HYRAULIC MACHINERY

UNIT – I

OPEN CHANNEL FLOW: Types of flows - Type of channels – Velocity distribution – Energy and momentum correction factors – Chezy's, Manning's; and Bazin formulae for uniform flow – Most Economical sections.

Critical flow: Specific energy-critical depth – computation of critical depth – critical sub-critical and super critical flows.

OPEN CHANNEL FLOW II:Non uniform flow-Dynamic equation for G.V.F., Mild, Critical, Steep, horizontal and adverse slopes-surface profiles-direct step method- Rapidly varied flow, hydraulic jump, energy dissipation.

UNIT - II

HYDRAULIC SIMILITUDE : Dimensional analysis-Rayleigh's method and Buckingham's pi theorem-study of Hydraulic models – Geometric, kinematic and dynamic similarities-dimensionless numbers – model and prototype relations.

UNIT – III

BASICS OF TURBO MACHINERY : Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for work done and efficiency-Angular
momentum principle, Applications to radial flow turbines.

UNIT -IV

HYDRAULIC TURBINES – I&II: Layout of a typical Hydropower installation – Heads and efficiencies-classification of turbines-pelton wheel-Francis turbine-Kaplan turbine-working, working proportions, velocity diagram, work done and efficiency, hydraulic design, draft tube – theory and function efficiency.

HYDRAULIC TURBINES – II - Governing of turbines-surge tanks-unit and specific turbines-unit speed-unit quantity-unit power-specific speed performance characteristics-geometric similarity-cavitation.

UNIT – V

CENTRIFUGAL-PUMPS &RECIPROCATING PUMPS: Pump installation details-classification-work done- Manometric head-minimum starting speed-losses and efficiencies-specific speedmultistage pumps-pumps in parallel- performance of pumps-characteristic curves- NPSH-cavitation. Hydropower Engineering-Classification of Hydropower plants – Definition of terms – load factor, utilization factor, capacity factor, estimation of hydropower potential-Reciprocating Pumps.

TEXT BOOKS:

1.Open Channel flow by K,Subramanya . Tata Mc.Grawhill Publishers

2. A text of Fluid mechanics and hydraulic machines by Dr. R.K. Bansal - Laxmi Publications (P) ltd., New Delhi

3.Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house

REFERENCES :

1. Fluid mechanics and fluid machines by Narayana pillai, universities press.+

2. Elements of Open channel flow by Ranga Raju, Tata Mc.Graw Hill, Publications.

3. Fluid mechanics and fluid machines by Rajput, S.Chand &Co.

4. Open Channel flow by V.T.Chow, Mc.Graw Hill book company.

5. Hydraulic Machines by Banga & Sharma Khanna Publishers.

ENVIRONMENTAL SCIENCE

UNIT I: MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES AND NATURAL RESOURCES

Definition, Scope and Importance – Need for Public Awareness.

Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT II : ECOSYSTEMS & BIODIVERSITY AND ITS CONSERVATION

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-soports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT III: ENVIRONMENTAL POLLUTION, SOLID WASTE MANAGEMENT & SOCIAL ISSUES AND THE ENVIRONMENT

Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Causes**,** effects and control measures of urban and industrial waste – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Social issues and the environment From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT IV: HUMAN POPULATION AND THE ENVIRONMENT

Population growth, variation among nations. Population explosion–Family Welfare programme. Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

UNIT V: FIELD WORK

Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, birds – river, hill slopes, etc..

TEXT BOOKS :

1. Text book of Environmental Studies for Undergraduate Courses, Erach Bharucha for University Grants Commission, Univ. Press, 2001.
2. Environmental Studies by R.Rajagopalan, Oxford Univ.Press,2008.
3. Environmental Studies by Benny Joseph, Mc.Graw Hill Publications, 2007.

REFERENCES:

1. Text book of Environmental Sciences and Technology by M.Anji Reddy, BS Publication, 2008.
2. Comprehensive Environmental studies by J.P.Sharma, Laxmi publications, 2008.
3. Environmental sciences and engineering – J. Glynn Henry and Gary W. Heinke – Printice hall of India Private limited, 2004.
4. Introduction to Environmental engineering and science by Gilbert M. Masters and Wendell P. Ela - Printice hall of India Private limited, 1992.
5. Environmental Studies by Anindita Basak – Pearson education, 2009.

II Year B.Tech - II Semester

STRUCTURAL ANALYSIS – I

UNIT – I

PROPPED CANTILEVER &FIXED BEAMS – Introduction to statically indeterminate beams – propped cantilever and fixed beams with U.D.load central point load, eccentric point load. Number of point loads, uniformly varying load, couple and combination of loads shear force and Bending moment diagrams-Deflection of fixed beams -effect of sinking of support, effect of rotation of a support.

UNIT – II

CONTINUOUS BEAMS:

Slope-Deflection Method: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports.

MOMENT DISTRIBUTION METHOD: Introduction, application to continous beams with and without settlement of supports

UNIT – III

ENERGY THEOREMS : Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces - Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – IV

MOVING LOADS : Introduction maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads-Equivalent uniformly distributed load-Focal length.

INFLUENCE LINES- Definition of influence line for SF, Influence line for BM- load position for maximum SF at a section-Load position for maximum BM at a sectionsingle point load, U.D.load longer than the span, U.D.load shorter than the span- Influence lines for forces in members of Pratt and Warren trusses.

UNIT -V

INDETERMINATE STRUCTURAL ANALYSIS : Indeterminate Structural Analysis –Determination of static and kinematic indeterminacies –Solution of trusses with upto two degrees of internal and external indeterminacies –Castigliano's theorem

TEXT BOOKS:

1. Analysis of Structures-Vol I & Vol II by V.N. Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
2. Structural Analysis by V.D.Prasad Galgotia publications, 2nd Editions.
3. Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi
4. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan & Dr. P.Perumal- Laxmi publications pvt. Ltd., New Delhi
5. Basic structural Analysis by C.S. Reddy, Tata Mcgrawhill, New Delhi

REFERENCES:

1. Mechanics of Structures by S.B.Junnarkar, Charotar Publishing House, Anand, Gujrat
2. Theory of Structures by Gupta, Pandit & Gupta; Tat Mc.Graw – Hill Publishing Co.Ltd., New Delhi.
3. Theory of Structures by R.S. Khurmi, S. Chand Publishers
4. Strength of Materials and Mechanics of Structures- by B.C.Punmia, Khanna Publications, New Delhi.
5. Introduction to structural analysis by B.D. Nautiyal, New age international publishers, New Delhi

II Year B.Tech - II Semester

Surveying -II

UNIT -I

THEODOLITE SURVEY

Thedolite and types-Fundamental axes and parts of a transit theodolite, Uses of theodolite, Temporary adjustments of a transit thedolite, -Measurement of horizontal angles – Method of repetitions and reiterations, Measurements of vertical angles, Prolonging a straight line by a theodolite in adjustment and theodolite not in adjustment Interrelationship between fundamental axes for instrument to be in adjustment and step by step procedure of obtaining permanent adjustments

UNIT II

TRIGONOMETRIC LEVELING

Determination of elevation of objects when the base is accessible and inaccessible by single plane and double plane method Distance and difference in elevation between two inaccessible objects by double plane method. Salient features of Total Station, Advantages of Total Station over conventional instruments, Application of Total Station.

UNIT III

TACHEOMETRY

Basic principle, Types of tachometric survey Tachometric equation for horizontal line of sight and inclined line of sight in fixed hair method Analytic lens in external focusing telescopes Reducing the Constants in internal focusing telescope, Moving hair method and tangential method, Substance bar, Beam an stadia arc

UNIT IV

CURVE SETTING

Curves – Necessity – Types, Simple curves Elements Designation of curves, Setting out simple curves by linear methods Setting out curves by Rankines deflection angle method - Compound curves Elements Design of compound curves Setting out of compound curves Reverse curve between two parallel straights (Equal radius and unequal radius). Transition curves Characteristics Length of Transition curve setting out cubic Parabola and Bernoulli's Lemniscates, Vertical curves – Types – Simple numerical problems

UNIT V

AREAS AND VOLUMES

Calculation of area from cross staff surveying - Calculation of area of a closed traverse by coordinates method. - Planimeter – principle of working and use of planimeter to measure areas, digital planimeter - Computations of volumes by trapezoidal and prismoidal rule, Capacity contours

TEXT BOOKS:

1. 'Surveying' Vol 2 and Vol 3 - B. C. Punmia, Laxmi Publications
2. 'Plane Surveying' A. M. Chandra – New age international (P) Ltd
3. 'Higher Surveying' A.M. Chandra New age international (P) Ltd

REFERENCE BOOKS:

1. Fundamentals of Surveying - Milton O. Schimidt – Wong, Thomson Learning.
2. Fundamentals of Surveying - S.K. Roy – Prentice Hall of India
3. Surveying, Arther Bannister et al., Pearson Education, India

Surveying lab-II

LIST OF EXERCISES:

1. Study of theodolite in detail - practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.
3. Trigonometric Leveling - Heights and distance problem (Two Exercises)
4. Heights and distance using Principles of tacheometric surveying (Two Exercises)
5. Curve setting – different methods. (Two Exercises)
6. Setting out works for buildings & pipe lines.
7. Determine of area using total station
8. Traversing using total station
9. contouring using total station
10. Det of remote height using total station
11. State-out using total station
12. Distance, gradient, Diff, height between tow inaccessible points using total stations

LIST OF EQUIPMENT:

1. Theodolites, and leveling staffs.
2. Tachometers.
3. Total station.

II Year B.Tech - II Semester

FLUID MECHANICS AND HYDRAULIC MACHINERY LAB

SYLLABUS:

1. Calibration of Venturimeter & Orifice meter
2. Determination of Coefficient of discharge for a small orifice by a constant head method.
3. Determination of Coefficient of discharge for an external mouth piece by variable head method.
4. Calibration of contracted Rectangular Notch and /or Triangular Notch
5. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
6. Verification of Bernoulli's equation.
7. Impact of jet on vanes
8. Study of Hydraulic jump.
9. Performance test on Pelton wheel turbine
10. Performance test on Francis turbine.
11. Efficiency test on centrifugal pump.
12. Efficiency test on reciprocating pump.

LIST OF EQUIPMENT:

1. Venturimeter setup.
2. Orifice meter setup.
3. Small orifice setup.
4. External mouthpiece setup.
5. Rectangular and Triangular notch setups.
6. Friction factor test setup.
7. Bernoulli's theorem setup.
8. Impact of jets.
9. Hydraulic jump test setup.
10. Pelton wheel and Francis turbines.
11. Centrifugal and Reciprocating pumps.

B.Tech III – I Semester

BUILDING PLANNING AND DRAWING

L	T	P	C
3	1	0	3

Course Objective:

This subject provides the knowledge of building bye laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.

UNIT –I

Planning Of Buildings:- Types of buildings - types of residential buildings, site selection for residential building and orientation of buildings – aspect - Prospect- privacy-furniture requirements – grouping – circulation – sanitation – lighting – ventilation –cleanliness – flexibility – elegancy - Economy- practical considerations.

Building Byelaws And Regulations:- Introduction- Terminology; Objectives of building byelaws - Minimum plot sizes - Open space requirements - Plinth area, floor area, carpet area - Floor area ratio (FAR), Floor space Index (FSI) - areas for different units; Principles underlying building byelaws - built up area limitations – Height of Buildings, Wall thickness, lighting and ventilation requirement, safety from fire, drainage and sanitation; applicability of the bye-laws.

UNIT –II

Planning Of Residential Buildings:- Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings

Planning Of Public Building:- Planning of Educational institutions, Hospitals, Office buildings, Banks, Industrial buildings, Hotels and Motels, Hostels, Bus Station.

UNIT -III

Buildings: Safety And Comfort: aspects of safety-structural, health, fire and constructional safety. Components of building automation system - HVAC, electrical lighting, Security, fire-fighting, communication etc. design for thermal comfort, ventilation comfort, air conditioning comfort, lighting comfort, noise and acoustic comfort.

UNIT -IV

Sign Conventions and Bonds: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminium alloys etc., Lead, Zinc, tin, and white lead etc., Earth, Rock, Timber and Marble, English bond & Flemish bond, odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

Doors Windows, Ventilators and Roofs: Panelled Door – panelled and glazed door; glazed windows – panelled windows; Swing ventilator – Fixed ventilator; Couple roof – Collar roof - Kind Post truss – Queen post truss.

UNIT –V

Given line diagram with specification to draw plan, section and elevation of

1. Residential Building
2. Hospital
3. Schools
4. Post office
5. Corporate Office Building
6. Hotels
7. Bank buildings
8. Bus stations
9. Industrial buildings

TEXT BOOKS

1. Building drawing – M.G.Shah, C.M.Kale, S.Y Patki
2. Planning and Designing and Scheduling – Gurucharan singh and Jagadish singh- Standard publishers.
3. Planning and Designing of Buildings – Y.S.Sane

REFERENCE

1. A‘ Series & _B‘ Series of JNTU Engineering College, Anantapur,
2. Building by laws bye state and Central Governments and Municipal corporations.
3. Building planning and design – N.Kumara swamy and A.Kameswara rao. Charitor publications.

B.Tech. III – I Semester

DESIGN OF REINFORCED CONCRETE STRUCTURES

L	T	P	C
3	1	0	3

Course Objective:

To knowledge on the design of structures for its safety and serviceability as the structural elements are subjected to different loading to with stand the structures for external loading.

UNIT –I

Introduction: Introduction to Materials, Constituents of concrete, recommendation in IS 456 – 2000, grades of concrete, working stress method, design constants; singly reinforced beam.

UNIT –II

Limit State Design: Concepts of limit state design – Comparison between two methods- Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design –stress - block parameters – limiting moment of Resistance-Limit state design of singly reinforced, doubly reinforced.

UNIT –III

Beams:, T and L beam sections.

Shear, Torsion, Bond, & Serviceability: Limit state design of section for shear and torsion – concept of bond, anchorage and development length, Limit state design of serviceability for deflection, cracking and codal provision

UNIT – IV

Columns & Footings

Short and long columns – under axial loads, uni-axial bending and biaxial bending, Braced columns - I S Code provisions. Different types of footings – Design of isolated, square, rectangular and circular footings

UNIT –V

Slabs:, Design of one way slab - Two-way slab, continuous slab Using I S Coefficients.

TEXT BOOKS

1. Reinforced concrete design by S.Unnikrishna Pillai & Devdas Menon, Tata Mc.Graw Hill, New Delhi.
2.Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCE

1. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
2. Limit state designed of reinforced concrete – P.C.Varghese, Prentice Hall of India, New Delhi
3. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.Ltd., New Delhi
4. Reinforced concrete structures – I.C. Syal & A.K.Goel, S.Chand Publishers
5. Design of concrete structures – Arthus H.Nilson, David Darwin, and Chorles W. Dolar, Tata Mc.Graw-Hill, 3rd Edition, 2005.
6. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers

7. Reinforced concrete design by N. Krishna Raju and R.N. Pranesh, New age International Publishres, New Delhi
8. Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
Fundamentals of Reinforced concrete design by M.L. Gambhir, Printice Hall of India Private Ltd., New Delhi.
9. Design of concrete structures by J.N.Bandopadhyay – PHI Publications, New Delhi.
10. Relevant IS codes such as IS 456 – 2000 etc.

Codes/Tables: IS 456-2000,SP16 Hand book to be permitted in to the examinations Hall.

B.Tech III – I Semester

CONCRETE TECHNOLOGY

L	T	P	C
3	1	0	3

Course Objective:

Lot of advances is taking place in the concrete technology as par with development taking place in the engineering. The present day industry needs the knowledge of concrete technology thoroughly. The subject is designed to give the basic knowledge as well as latest developments in concrete technology

UNIT - I

Cement, Concrete & Its Components: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures- aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – II

Concrete And Its Testing : Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.- Water / Cement ratio – Abram‘s Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Curing- Compression tests – Tension tests – – Strength in tension & compression – Factors affecting strength– Relation between compressive & tensile strength– Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – III

Elasticity, Creep & Shrinkage : Modulus of elasticity – Dynamic modulus of elasticity – Posisson‘s ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – IV

Mix Design : Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

UNIT – V

Special Concretes: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – Bacterial concrete(self healing concrete)

TEXT BOOKS:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete Technology by M.S.Shetty. – S.Chand & Co.; 2004

REFERENCES:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi
3. Non-Destructive Test and Evaluation of materials by J.Prasad & C.G.K. Nair , Tata Mcgraw hill Publishers, New Delhi

B.Tech III – I Semester

WATER RESOURCES ENGINEERING-I

L	T	P	C
3	1	0	3

Course Objective:

To study the concepts of engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing. Irrigation Engineering – Water utilization for Crop growth, canals and their designs.

UNIT I

Introduction to Hydrology: Engineering hydrology and its applications; Hydrologic cycle; precipitation- types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.

Descriptive Hydrology: Evaporation- factors affecting evaporation, measurement of evaporation; Infiltration- factors affecting infiltration, measurement of infiltration, infiltration indices; Run off- Factors affecting run- off, Computation of run-off; Design Flood; Estimation of maximum rate of run-off; separation of base flow.

UNIT II

Hydrograph Analysis: Hydrograph; Unit Hydrograph- construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.

Ground Water: Introduction- Aquifer- Aquiclude – Aquifuge - aquifer parameters- porosity, Specific yield, Specific retention; Divisions of sub–surface water; Water table; Types of aquifers-storage coefficient-coefficient of permeability and transmissibility; well hydraulics-Darcy's law-Steady radial flow to a well –Dupuit's theory for confined and unconfined aquifers-Tube well-Open well-Yield of an open well–Constant level pumping test, Recuperation test.

UNIT III

Irrigation: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation water. Duty and delta; duty at various places, relation between duty and delta, factors affecting duty, methods of improving duty.

Water Requirement Of Crops: Types of soils, Indian agricultural soils, preparation of land for Irrigation; soil fertility; Soil-water-plant relationship; vertical distribution of soil moisture; soil moisture tension; soil moisture stress; various soil moisture constants; Limiting soil moisture conditions; Depth and frequency of irrigation; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; crop seasons and crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Assessment of Irrigation water. Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT IV

Channels – Silt Theories: Classification; Canal alignment; Inundation canals; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories– Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedy's theory; Lacey's regime theory- Lacey's theory applied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

Water Logging And Canal Lining: Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, advantages and disadvantages; Types of lining; Design of lined canal.

UNIT V

Diversion Head Works: Types of diversion head works; Diversion and Storage head works; weirs and barrages; Layouts of diversion head works; components; Causes and failure of hydraulic structures on permeable foundations; Bligh's creep theory; Khosla's theory; Determination of uplift pressure, impervious floors using Bligh's and Khosla's theory; Exit gradient.

Canal outlets: Introduction; types of outlet; flexibility, proportionality, setting ,hyper proportional outlet, sub-proportional outlet, sensitivity, efficiency of an outlet, drowning ratio, modular limit; pipe outlet; kennedy's gauge outlet; gibb's module; canal escape.

TEXT BOOK

1. Irrigation & water power engineering by Punmia & Lal,Laxmi publications pvt. Ltd., Delhi
2. Engineering Hydrology by Srinivasan ,Oxford Pubilishers, New Delhi
3. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCE

1. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
3. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.
4. Irrigation Water Management by D.K. Majundar, Printice Hall of India.

B.Tech III – I Semester

STRUCTURAL ANALYSIS- II

L	T	P	C
3	1	0	3

Course Objective

Indeterminate structures are subjected to different loading with different supported conditions; hence it is necessary for students to study the behavior of the structures.

UNIT – I

Slope Deflection Method:-Analysis of single bay, single storey, portal frame including side sway.

Moment Distribution Method – Stiffness and carry overfactors – Distribution factors – Analysis of single storey portal frames –including Sway - Substitute frame analysis by two cycle method.

UNIT-II

Kani`s Method:-

Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway by Kani‘s method.

UNIT – III

Flexibility Methods:-

Flexibility methods, Introduction, application to continuous beams including support settlements.

Stiffness Method :-

Introduction, application to continuous beams including support settlements.

UNIT IV

Arches : Three hinged arches, Elastic theory of arches – Eddy‘s theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature.

Two Hinged Arches: Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

UNIT – V

Plastic Analysis:

Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

TEXT BOOKS

1. Analysis of Structures – Vol. I & 2 by Bhavikatti, Vikas publications
2.Strength of Materials and mechanics of solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi

REFERENCE

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Theory of structures by Ramamuratam,jain book depot , New Delhi.
3. Structural analysis – Hibbler, 6th edition – Pearson publilcation.
4. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
5. Analysis Of Structures By Dev Das Menon – John wiley pubilication
6.Analysis of structures by Vazrani & Ratwani – Khanna Publications
7.Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan & Dr. P.Perumal- Laxmi publications pvt. Ltd., New Delhi
8.Structural Analysis by D.S.Prakasha Rao, Univ.Press, Delhi.Structural Analysis by C.S. Reddy, Tata Macgrawhill, New Delhi

B.Tech III – I Semester

HIGHWAY ENGINEERING

L	T	P	C
3	1	0	3

Course Objective:

Dealing with different components of transportation engineering like highway Engineering. Emphasis is a geometric design of different elements in highway engineering.

UNIT I

HIGHWAY DEVELOPMENT AND PLANNING:

Highway development in India – Necessity for Highway Planning- Different Road Development Plans- Classification of Roads- Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II

HIGHWAY GEOMETRIC DESIGN:

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- Vertical curves.

UNIT – III

TRAFFIC ENGINEERING:

Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relation – Highway capacity and level of service concept – factors affecting capacity and level of service - Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams.

TRAFFIC REGULATION AND MANAGEMENT:

Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Specifications - Design of Traffic Signals –Webster Method –Saturation flow – phasing and timing diagrams – Numerical problems.

UNIT – IV

INTERSECTION DESIGN:

Conflicts at Intersections- Channelisation: Objectives –Traffic Islands and Design criteria- Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT – V

PAVEMENT DESIGN :

Types of pavements – Difference between flexible and rigid pavements – Pavement Components – Sub grade, Sub base, base and wearing course – Functions of pavement components – Design Factors – Flexible pavement Design methods – G.I method, CBR Method, (as per IRC 37-2002) –Design of Rigid pavements – Critical load positions - Westergaard's stress equations – computing Radius of Relative stiffness and equivalent radius of resisting section – stresses in rigid pavements – Design of Expansion and contraction joints in CC pavements. Design of Dowel bars and Tie bars.

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna & C.E.G.Justo, Nemchand & Bros., 7th edition (2000).
2. Highway Engineering Design – L.R.Kadiyali and Lal- Khanna Publications.

REFERENCES:

1. Text book of Highway Engineering by R.Srinivasa Kumar, Universities Press, Hyderabad.
2. Traffic Engineering and Transportation planning by L.R.Kadiyali and Lal- Khanna Publications.
3. A Text book of Transportation Engineering by S.P.Chandola, S.Chand Publications, New Delhi.

Course outcomes:

On completion of the course, the students will be able to:

1. carry out surveys involved in planning and highway alignment
2. design cross section elements, sight distance, horizontal and vertical alignment
3. implement traffic studies, traffic regulations and control, and intersection design
4. determine the characteristics of pavement materials
5. design flexible and rigid pavements as per IRC

B.Tech III – I Semester

HIGHWAY MATERIALS LAB

L	T	P	C
0	0	3	2

Course Objective:

To have knowledge on various highway materials like aggregate, bitumen, mechanical properties of the materials and their usage in the field.

Note: Minimum of eight experiments is to be executed

I. Tests on Aggregates

1. Aggregate Crushing Value Test
2. Los Angeles Abrasion Test
3. Aggregate Impact Value Test
4. Aggregate shape Test (Flakiness & Elongation)
5. Specific Gravity of Aggregate Test
6. Water Absorption of Aggregate Test
7. Soundness Test

II. Tests on Bitumen

1. Penetration Test
2. Ductility Test
3. Softening Point Test
4. Specific Gravity Test
5. Viscosity Test
6. Flash and Fire Point Test

III. Tests on Bituminous Mixes

1. Marshall Stability Test

IV. Miscellaneous Tests

1. Determination of CBR (California Bearing Ratio)
2. Preparation of Representative Sample by Coning and Quartering
3. Benkelman Beam Test
4. Bitumen Extraction Test
5. Stripping Value Test
6. Stone Polishing Value Test.

B.Tech III – I Semester

CONCRETE TECHNOLOGY LAB

L	T	P	C
0	0	3	2

Course Objective:

To have knowledge on building materials like fine aggregate, coarse aggregate, cement, their mechanical properties and their applications.

Note: Minimum of eight experiments is to be executed

Tests on Cement

1. a) Determination of Specific Gravity of Cement
   b) Determination of Unit Weight or Bulk Density of Cement
2. Determination of Normal Consistency of Cement
3. a) Determination of Initial Setting Time of Cement
   b) Determination of Final Setting Time of Cement
4. a) Preparation of Mortar Cubes for Compressive Strength
   b) Test on Mortar Cubes for Compressive Strength
5. a) Fineness of Cement by sieving method.
   b) Fineness of Cement by Air Permeability Method
6. a) Determination of Specific Gravity of Fine Aggregate
   b) Determination of Bulk Density of Fine Aggregate
7. a) Determination of Specific Gravity of Coarse Aggregate
   b) Determination of Bulk Density of Coarse Aggregate
8. Tests on Bulking of Sand
   a. Laboratory Method
   b. Field Method
9. Determination of Fineness Modulus of Fine Aggregate
10. Determination of Fineness Modulus of Coarse Aggregate

Tests on Concrete

1. Tests on Workability of Concrete
   a. Slump Test
   b. Compaction Factor Test
2. Tests on Hardened Concrete
   a. Compressive Strength
   b. Flexural Strength
   c. Split tensile strength.
3. Non-Destructive Testing of Concrete Structures (only demonstration).

List Of Equipment

1. Pycnometers.
2. Slump cone
3. Vicat‘s apparatus
4. Specific gravity bottle.
5. Lechatlier‘s apparatus.
6. Compaction factor setups
7. Longitudinal compressometer and
8. Rebound hammer, Pulse velocity machine.
9. Relevant IS Codes

B.Tech. III –I SEM (CE)

ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS (AELCS) LAB

L	T	P	C
0	0	3	0

Introduction:

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

Objectives:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

Syllabus:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

UNIT-I: Communicative Competency

1. Reading Comprehension – Techniques-Book Review
2. Listening comprehension – Video Talks-Eminent speeches
3. Verbal Competency - Vocabulary - Spotting Errors- Aptitude Tests

UNIT-II: Technical Writing

1. Essentials of writing -Technical Paper/ Report writing-Concise writing
2. Administrative / Business Documentation – Circular Writing -Meeting – Agenda – Minutes-Resolutions
3. Project Writing – Framing Outline – Finding Problem- Documentation-Citation

UNIT-III: Presentational Skills

1. Oral presentations – Public Speaking –Paper & Seminar Presentation
2. Digital Presentations -Power point - Video Presentation -Poster presentation
3. Stage Dynamics – Body Language – Para Language

UNIT-IV: Corporate Skills

1. Etiquettes -Dress - Dining – Net Etiquettes
2. Telephonic skills –Mobile Etiquettes
3. Soft Skills – Intra – Inter Personal Skills

UNIT-V: Getting Ready For Job

1. Before Interview -Curriculum vitae/ Resume-Covering letter-E-mail writing
2. During Interview – G.D-Mock Interviews– Psychometric Tests – Follow up
3. After interview - Excelling in Profession– Team spirit– Work culture

Learning Outcomes

- Acquiring extensive range of vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects / Employability skills /developing organizational abilities in tune with corporate requirement
- Effective Speaking Abilities

Minimum Requirement

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids /LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

Suggested Software

The software consisting of the prescribed topics elaborated above should be procured and used.

1. **K-VAN SOLUTIONS-Advanced communication lab**
2. **DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.**
3. **TOEFL & GRE**(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
4. **Train2success.com**

Books Recommended

1. **Objective English for Competitive Exams**, Hari Mohana Prasad, 4th edition, Tata Mc Graw Hill.
2. **Effective Technical Communication,** Ashrif Rizvi, TataMcGrahill, 2011.
3. **Technical Communication**, Meenakshi Raman & Sangeeta Sharma, O U Press 2009.
4. Books on **TOEFL/GRE/GMAT/CAT/IELTS**, Barron's/DELTA/Cambridge University Press.2012.
5. **Soft Skills for Everyone,** Butterfield Jeff, Cengage Publications, 2011.
6. **Ultimate Psychometric Tests**: Mike Bryon,Vinod Vasishtha for Kogan Page India Pvt. Ltd, New Delhi.
7. **Soft Skills-** Know Yourself And Know The World, Dr.K.Alex, Chand Publications ,Third revised edition 2014.
8. **Management Shapers Series** , Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
9. **Word Power Made Handy,** Shalini Verma, S Chand Publications, 2011.

B.Tech III – II Semester

DESIGN OF STEEL STRUCTURES

L	T	P	C
3	1	0	3

Course Objective:

To understand design specifications, loading and design procedures of different steel structures as per BIS specifications**.**

UNIT -I

Introduction and Design of Connections: Introduction-concept of limit state design of steel structures- Classification of cross sections –plastic-compact-semi compact and Slender sections For Axial loads Bolted Butt Joints, Lap joints – Failure of joints – Efficiency of joint- strength of weld- Butt and Fillet Welds

UNIT-II

Design of Tension and Compression Members

Design of tension members- strength of member in yielding – Rupture strength – Block shear strength – design of ties

Design of compression members: - Buckling classification- Design of compression strength – Effect of slenderness – Design of angled struts-Design of lacing and Bulletining

UNIT - III

Design of Flexural Members

Plastic section modulus of different cross sections – Design bending strength – Laterally supported and unsupported Beam

Design of Built-up Flexural Members – Welded plate girders – Design of Stiffeners

UNIT – IV

Design of Eccentric connections

Design of framed connections – seated connections – un stiffened – stiffened – Bolted and Welded connections – Designed Splices in column – combined Shear force and Moments, Shear & Tensile

UNIT – V

Design of Foundation and Roof trusses

Foundation Design – Slab base, Gusseted base for axial and eccentric load

Design of Roof trusses: Loads on trusses - Design of members of trusses- Support design for truss

TEXT BOOKS

1 Structural Design and Drawing by N.Krishna Raju, University Press, Hyderabad
2. Steel Structures by Subramanyam.N, Oxford Higher Education, New Delhi
3. Limit State Design of steel structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.

REFERENCE

1. Comprehensive Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
2. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi
3. Design of Steel Structures by P.Dayaratnam; S. Chand Publishers
4. Design of Steel Structures by M.Raghupathi, Tata Mc. Graw-Hill
5. Design of Steel Structures by Edwin Gaylord,Charles Gaylord,James Stallmeyer, Tata Mc.Graw-Hill, New Delhi.
4. Design of Steel Structures by K.S.Sai Ram , Pearson Pubilishers.
5. Design of steel structures by Bhavikatti.

Codes/Tables:

IS Codes:

1) IS -800 – 2007
2) IS – 875 – Part III.II,I
3) Steel Tables.
4) Railway Design Standards Code and steel tables to be permitted into the examination hall.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
योगः कर्मसु कौशलम्
ENGINEERING COLLEGE PULIVENDULA

B.Tech III – II Semester

SOIL MECHANICS

L	T	P	C
3	1	0	3

Course Objective:

The objective of this course is to make the student know various soil zones and to understand the behavior of soil under different loads and different conditions. This is necessary because the safety of any structure depends on soil on which it is going to be constructed.

UNIT-I

Introduction:- Scope Of Geotechnical Engineering - Origin Of Soils and their Formation – Maps of India representing different soil zones.

Basic Definitions And Functional Relations:- Soil as a Three Phase System and in terms of void ratio and porosity - Basic Definitions - Volumetric Relationship – Water content - Volume-Mass Relationship - Volume-Weight Relationship - Specific Gravity - Functional Relations In Terms Of Volume, Mass And Weight.

Physical Properties Of Soils:- Determination Of Specific Gravity, Water content, Insitu Density And Relative Density – Grain Size Analysis By Sieve And Hydrometer – Grain Size Distribution Curve – Gradation Characteristics Of Soils – Consistency – Determination Of Consistency Limits – Plasticity, Liquidity And Consistency Indices – Flow Index – Toughness Index – Use Of Consistency Limits.

UNIT-II

Soil Mineralogy And Structure:- Structural units of clay and clay minerals – Soil Fabric And Structure – Diffuse Double Layer – Effect Of Soil Structure On Soil Properties – Structure Of Coarse Grained Soils.

Soil Classification:- Particle Size Classification – AASHTO Classification – Unified Soil Classification System – Indian Standard Classification System – Plasticity Charts – Field Identification Tests – Suitability Of Soil Groups For Various Engineering Purpose – Cause And Effects Of Swelling In Expansive Soils – Identification Of Expansive Soils

UNIT-III

Stresses In Soils:- Total, Neutral And Effective Stress In Soil Deposits – Unsaturated, Saturated And Submerged Soils – Soil Deposits Subjected To Capillary Action - Boussinesq's Theory – Vertical Stress Due To A Concentrated Load – Isobar Diagram – Pressure Bulb – Vertical Stress Due To Live Load And Strip Load – Vertical Stress Below Uniformly Loaded Circular And Rectangular Areas – Equivalent Point Load Method – Newmark's Influence Chart – Westergaard's Theory – Comparison Of Boussinesq's Theory And Westergaard's Theory – Approximate Method – Contact Pressure Beneath Foundations.

UNIT-IV

Permeability:- Darcy's Law – Factors Affecting Permeability – Laboratory Methods For Determination Of Permeability – Average Permeability Of Stratified Soils – Construction Of Flow Nets By Graphical Method – Calculation Of Seepage Quantity Using Flow Nets – Seepage Pressure – Critical Hydraulic Gradient – Quick Sand Condition – Phreatic Line In Earth Dams With D/S Toe Filter.

Compaction:- Theory Of Compaction – Optimum Moisture Content – Standard Proctor's Test , Modified Proctor's Test – Compaction Of Sands – Factors Affecting Compaction – Effect Of Compaction On Soil Properties – Field Compaction Equipment – Compaction Control.

UNIT-V

Consolidation:- Mechanism Of Consolidation – Pressure-Void Ratio Curve – Consolidation Settlement – Terzaghi's Theory Of 1-D Consolidation – Laboratory Consolidation Tests – Coefficient Of Consolidation – Time Fitting Method – Initial And Primary Compression –

Secondary Consolidation – Compression Ratio – Normal And Over Consolidated Soils – Determination Of Preconsolidation Pressures – Consolidation Period Correction.

Shear Strength:- Mohr's Failure Theory – Mohr-Coulomb Failure Criterion – Shear Parameters – Direct Shear Test – Triaxial Compression Test – Types Of Shear Tests Based On Drainage Conditions – Unconfined Compression Test – Vane Shear Test – Shear Strength Characteristics Of Cohesive And Cohesionless Soils – Critical Void Ratio – Liquefaction Of Sands – Dilatancy – Pore Pressure Parameters.

TEXT BOOKS

1. Soil Mechanics and Foundation Engg. K.R. Arora, Standard Publishers & Distributors, Delhi.
2. Soil Mechanics and Foundation by by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCE

1. Soil Mechanics and Foundation Engineering by Purushotham Raj, Pearson Pubilications
2. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special Indian Edition
3. Soil Mechanics – T.W. Lambe and Whitman, Mc-Graw Hill Publishing Company, Newyork.
4. Geotechnical Engineering by Brije.M.Das, Cengage Publications, New Delhi.
5. Geotechnical Engineering by IQBAL H.KHAN, PHI pubilishers.
6. Basic and Applied Soil Mechanics by Gopal Ranjan & ASR Rao, New age International Pvt Ltd,New Delhi.

B.Tech III – II Semester

ENVIRONMENTAL ENGINEERING

L	T	P	C
3	1	0	3

Course Objective:

This subject provides the knowledge of water sources, water treatment, design of distribution system waste water treatment, and safe disposal methods. The topics of characteristics of waste water, sludge digestion are also included.

UNIT – I

Introduction :– Protected water supply – Population forecasts, design period – water demand – factors affecting – fluctuations – fire demand – water quality and testing – drinking water standards - Waterborne diseases - Comparison from quality and quantity and other considerations – intakes – infiltration galleries.

UNIT-II

Water Treatment : Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation flocculation clarifier design – coagulants – feeding arrangements–Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices

UNIT-III

Water Distribution Network Analysis : Distribution systems – Requirements, Layout of Water distribution systems – Design procedures- Hardy Cross and equivalent pipe methods service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house.

UNIT IV

Waste Water Collection and Characteristics:

Conservancy and water carriage systems – sewage and storm water estimation – time of concentration – characteristics of sewage– decomposition of sewage, B.O.D. – C.O.D. equations – House plumbing– Design of sewers – shapes and materials – inverted siphon – catch basins – flushing tanks– ejectors, one pipe& two pipe systems of plumbing – ultimate disposal of sewage – sewage farming – dilution.

UNIT – V

Waste Water Treatment : Layout and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – biological treatment – trickling filters – Construction and design of Oxidation ponds – Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff -Tanks working principles and design – soak pits.

TEXT BOOKS

1. Water supply and sanitary Engineering by G.S. Birdi, Dhanpat Rai & Sons Publishers.
2. Water supply and sanitary Engineering by S.A.Garg,

REFERENCS

1. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.
2. Water and Waste Water Technology by Steel
3. Water and Waste Water Engineering by Fair Geyer and Okun
4. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
5. Waste water Engineering by Metcalf and Eddy.

6. Unit operations in Environmental Engineering by R. Elangovan and M.K. Saseetharan, New age International
7. Environmental Engineering by georad.Kiely TMH Pubilications.
8. Introduction to Environmental Engineering by Mackenzie, Devis and David.A.Cornwell, TMH Publications, New Delhi.
9. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, Ashok Jain & Arun Jain, Laxmi Publications Pvt.Ltd,New Delhi
10. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers.

B.Tech III – II Semester

WATER RESOURCE ENGINEERING – II

L	T	P	C
3	1	0	3

Course Objective:

To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, designs, etc.

UNIT I

Canal Regulation Works: Canal falls: Necessity and location of falls; Types of falls; Classification of falls; cistern design; roughening devices; design of sarada type fall. Canal regulators: off-take alignment; head regulators and cross-regulators; design of cross-regulator and distributary head regulator.

Cross Drainage Works: Introduction; types of cross drainage works; selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

UNIT II

Stream Gauging: Necessity; Selection of gauging sites; methods of Discharge Measurement Area-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method, Ultrasonic method; Measurement of depth –Sounding rod, Echo-sounder;

Measurement of velocity: Floats – Surface floats, Sub–surface float or Double float, Velocity rod; Pitot tube; Current meter- rating of current meter, measurement of velocity; chemical method; Measurement of stage-Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage discharge curve.

River Engineering: Classification of rivers; Meandering; Causes of meandering; Basic factors controlling process of meandering; Aggrading type of river; Degrading type of River; River training: objectives, Classification of river training works; Types of River training works : Guide banks, Marginal embankments, Groynes or spur, levees, bank protection, pitched islands.

UNIT III

Reservoir Planning: Introduction; Investigations for reservoir planning; Selection of site for a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curve and demand curve; Calculation of reservoir capacity for a specified yield from the mass inflow curve; Determination of safe yield from a reservoir of a given capacity; Sediment flow in streams: Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Flood routing; Methods of flood routing- Graphical Method (Inflow – storage discharge curves method).

Dams: Introduction; Classification according to use; classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-advantages and disadvantages; Physical factors governing selection of type of dam; selection of site for a dam.

UNIT IV

Gravity Dams: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams; Design of gravity dams–single step method; Galleries; Stability analysis of non–overflow section of Gravity dam.

Earth Dams: Introduction; Types of earth dams; Causes of failure of earth dams; Criteria for safe design of earth dams; Section of an earth dam; Design to suit available materials; Seepage control measures; Slope protection. Seepage through earth dam – graphical method

UNIT V

Spillways: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates-Types and description only.

Water Power Engineering: Development of hydro power in India; Classification of hydraulic plants: runoff river plants, storage plants and pumped storage plants; low, medium and high head schemes ; Investigation and planning; components of hydel schemes – fore bay, intake structure, surge tanks, penstocks ,power house, turbines-selection of suitable type of turbine, Scroll casing. draft tube and tail race; assessment of available power; definition of gross head ,operating head ,effective head; Flow duration curve; Power duration curve; Load duration curve; Load curve ; primary power and secondary power; installed capacity, dependable capacity; firm power, secondary power; power factor ;load factor, capacity factor ,utilization factor and Diversity factor.

TEXT BOOKS

1. Irrigation and Water Power Engineering by Dr. B.C.Punmia & Dr. Pande B.B. Lal; Laxmi
2. Publications pvt. Ltd., New Delhi. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers, Delhi.
3. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication,NewDelhi.

REFERENCE

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Theory and Design of Hydraulic structures by Varshney, Gupta & Gupta
3. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers
4. Irrigation Engineering by R.K. Sharma and T.K. Sharma, S. Chand Publishers
5. Irrigation and Water Power Engineering by Punmia and Lal, Laxmi Publications, New Delhi

B.Tech III – II Semester

ENGINEERING GEOLOGY

L	T	P	C
3	1	0	3

Course Objective:

- This course explores the fundamentals of geology applied to Civil engineering problems.
- To prepare the students on the geological factors affecting the location, design, construction, operation and maintenance of engineering works.
- To educate civil engineering students in rock engineering concepts and approaches in the design and construction of underground openings.
- Have knowledge of design and construction procedures required to safely control rock behavior in underground openings.

UNIT I

Introduction: Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

Weathering Of Rocks : Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like "Granite"

Mineralogy : Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite ,Hornblende , Muscovite, Biotite, Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT II

Petrology: Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

Structural Geology: Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT III

Ground Water, Earth Quake &Land Slides: Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT IV

Geophysical Studies: Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT V

Geology Of Dams, Reservoirs And Tunnels: Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factors Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS

1. Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2. Engineerring geology by vasudev kanthi, Universities press, Hyderabad.
3. Engineering Geology by D.Venkata Reddy, Vikas Publications, New Delhi.

REFERENCE

1. Engineerring geology by Prabin singh, Katson Pubilcations
2. Engineering Geology by Subinoy Gangopadhyay, Oxford University press.
3. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
4. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992
5. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,
6. Engineering Geology by Mukarjee, World Press.
7. Foundations of Engineering Geology by Tony Waltham, Special Indian Edition, CRC Press New Delhi.

B.Tech. III –II Semester

NANOMATERIALS AND ENGINEERING APPLICATIONS

(Choice Based Credit Course Inter Department)

(Common to all branches)

L	T	P	C
3	1	0	3

Objectives:

i) to be able to critically evaluate nanotechnology concepts and therefore be equipped to develop deeper into research.

ii) Acquire knowledge of basic significance of TEM, Nanosemiconductors, nanopolymers and nanocomposites towards Engineering applications.

iii) Understand and describe the use of unique properties of nanoscale structures for various applications.

iv) Understand the physical and chemical properties of carbon based nanostructures.

UNIT -1: Nano Structures: Zero, one –two and three dimensional structures , size control of metal nano particles and their properties- optical, electronic, magnetic properties- surface Plasmon resonance- change of band gap-applications, catalysis, electronic devices

UNIT-II: Carbon Nanostructures: DLCs, fullerences, C-60, C-80, single walled nanotube (SWNT) and Multi Walled nanotuebs (MWNT) properties-mechanical, optical and electrical properties.

UNIT-III: Thermo electric materials (TEM): concept of phonon, thermal conductivity, specific heat, exothermic and endothermic processes. Bulk TEM properties, different types of TEM; one dimensional TEM; composite TEM; applications.

UNIT-IV: Nano semiconductors: Nanoscale electronic devices including CMOS, potentiometric sensors etc., MRAM devices, spintronic devices including spin values.

UNIT-V: Nanopolymers; preparation of and characterization of diblock Copolymer based nanocomposites, nanoparticles polymer ensembles; applications of nanopolymers in catalysis. Nano Composites: metal-metal nano composites, polymer-metal nanocomposites, ceramic nanocomposites: Dielectric and CMR based nanocomposites.(one example for each type)

TEXT BOOKS

1. Physics of Magnetism – S. Chikazumi and S. H. Charap., John Wiley and Sons, 1964.
2. Physical Properties of Carbon nanotube - R. Satio, 5th Edition, Imperial College Press,2004. ISBN-13: 978-1860942235
3. Nanoscale materials – Liz Marzan and Kamat, Springer, 2003, ISBN 978-0-306-48108-6.

REFERENCES:

1. Novel nanocrystalline Alloys and Magnetic nanomaterials – Brain Cantor, 1st Edition, CRC Press, 2004, ISBN-13: 978-0750310024
2. Polymer nanocomposites: Edited by Yiu-Wing Mai and Zhong, Znen Yu, 1st edition, Woodhead Publishing Limited and CRC Press LLC, USA.2006,
3. Physics of Magnetism – S. Chikazumi and S. H. Charap., John Wiley and Sons, 1964.
4. Magnetostriction and Magnetomechanical Effects – E. W. Lee, IOP Science, Rep. Prog. Phys. 18 184 doi:10.1088/0034-4885/18/1/305 1955.
5. Carbon Nanotubes: Properties and Applications – Michael J. O'Connel, 1st Edition, Taylor & Francis, 2006.
6. Carbon nanotechnology – Liming Dai, Science Direct. ISBN: 978-0-444-51855-2
7. Nanotubes and Nanowires – CNR Rao and A Govindaraj, 2nd Edition, RSC Publishing, 2011.
8. CRC Handbook of thermoelectric, Ed. Cr Rowe., 1st Edition, CRC Press, 2001.

Outcomes:

- Students will have a sound knowledge in multidisciplinary areas of nanotechnology.
- The necessary foundation for future nanomaterials engineering.
- Recognize the role of carbon based nanomaterials, TEM, Nanosemiconductors, nanopolymers and nanocomposites towards Engineering applications.
- Techniques to characterize, design and validate nano devices

B.Tech. III –II Semester

GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objectives:

- Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products.
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

UNIT 1: Principles and Concepts Of Green Chemistry

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling.

UNIT 2: Catalysis and Green Chemistry

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, Asymmetric Catalysis, Heterogenising the Homogenous catalysts, Phase transfer catalysis: Hazard Reduction, C–C Bond Formation, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples.

UNIT 3: Organic Solvents: Environmentally Benign Solutions

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbondioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalyst and solvent

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UNIT 4: Emerging Greener Technologies and Alternative Energy Sources

Biomass as renewable resource, Energy: Fossil Fuels, Energy from Biomass, Solar Power, Other Forms of Renewable Energy, Fuel Cells, Chemicals from Renewable feedstocks: Chemicals from Renewable Feedstocks: Chemicals from Fatty Acids, Polymers from Renewable Resources, Some Other Chemicals from Natural Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency: Photochemical Reactions: Advantages of and Challenges Faced by Photochemical Processes, Examples of Photochemical Reactions, Chemistry Using Microwaves: Microwave Heating, Microwave-assisted Reactions, Sonochemistry: Sonochemistry and Green Chemistry, Electrochemical Synthesis: Examples of Electrochemical Synthesis. Industrial applications of alternative environmentally benign catalytic systems for carrying out the important reactions such as selective oxidation, reduction and C-C bond formations (specific reactions).

UNIT 5: Green Processes for Green Nanoscience

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing Green Nanoscience. Green Synthesis of Nanophase Inorganic Materials and Metal Oxide Nanoparticles: Hydrothermal Synthesis, Reflux Synthesis, Microwave-Assisted Synthesis, Other methods for Green synthesis of metal and metal oxide nanoparticles, Green chemistry applications of Inorganic nanomaterials

TEXT BOOKS :

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition, Oxford University Press, USA

REFERENCES :

1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and Ackmez Mudhoo, CRC Press, 2010.
2. Edited by Alvise Perosa and Maurizio Selva , Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013.

Course Outcomes:

Upon completion of this course the students should recognize and acquire green chemistry concepts and apply these ideas to develop respect for the inter connectedness of our world and an ethic of environmental care and sustainability.

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B.Tech. III –II Semester

INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objectives:

- To understand the principles of different instruments
- To apply the instruments for analysis of various species in different matrices
- To apply instrumental methods for framing project works

UNIT – I: Molecular Spectrophotometry

Absorption spectra, Lamberts Law, Beer's Law - Combined law equation; Derivations from Beer's Law. Block diagram of a uv- visible spectrophotometer – quantitative analysis ; Direct method for the determination of metal ions; Chromium, Manganese, Iron etc in alloys.

UNIT – II: Infrared Spectroscopy

Interaction of infra-red radiation with molecules, Sources of IR Radiation ; Spectral regions; Block diagram of IR Spectrometer , Function of each component; Sampling Techniques; Application of IR Spectroscopy to functional group analysis (-OH, $-NH_2$, -CHO, -CO-R, -CONH).

UNIT III: Chromatography

Gas Chromatography: Principles of Gas Chromatography, block diagram of gas chromatograph, Function of each component, Detectors (FID, ECD), stationary phase for column, mobile phase, chromatogram, qualitative analysis, quantitative analysis, retention time, retention volume, capacity factor, area., normalization method. Analysis of gaseous and volatile impurities.

HPLC: Principles of high performance liquid chromatography, Block diagram of HPCL, Systems, functions of each component, stationary phases, eluting solvents, pumps, detectors, quantitative applications of HPLC for environmental analysis.

UNIT IV: Atomic Spectrophotometry

Principle of atomization, atomic absorption spectrometer, applications for metal ions, Atomic emission, application and principle of ICP-OES, X-ray fluorescence spectrometry- Applications

UNIT V: Thermal methods of analysis

TGA- Thermo Gavimetry – Principle, instrumentation and applications

DTA- Differential Thermal Analysis- Principle, instrumentation and applications

DSC- Differential Scanning Coulometry- Principle, instrumentation and applications

TEXT BOOK:

1. Principles of Instrumental Analysis, 6th Edition, Douglas A. Skoog, James Holler. J, Stanley R. Crouch, Cengage Learning, New Delhi, 2014.
2. Instrumentaiotn methods of analysis, Chatwal & Anand, Himalaya Publ;ications, 2003

REFERENCES:

1.Instrumental methods of analysis, Willand merrit and dean, caps publications & Distribution, 1999.
2.Vogels Text book of Quantitative chemical analysis, 6th edition ,Mendham J, Denny R.C,Barnes J.D, Thomas M.J.K, pearson education, 2002.
3.Modern Analytical Chemistry, 1St edition, David Harvey, McGraw-Hill Higher Education, 2010.

Course Outcomes: Upon successful completion of this course, the students will be able to:

1. Differentiate between classical and instrumental methods of Chemical analysis.
2. Apply different types of Instrumental methods for analysis of various samples in water and other environmental samples

CHEMISTRY OF NANOMATERIALS AND APPLICATIONS
(Choice Based Credit Course Inter Department)

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- And also characterisae the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

UNIT I:

Introduction**:**Scope of nanoscience and nanotecnology, nanoscience in nature, classification of nanostructured materials, importance of nano materials.

Synthetic Methods**:** Bottom-Up approach**:-** Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

UNIT-II

Top-Down approach**:-** Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling.

UNIT-III

Techniques for characterization**:** Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterilas, BET method for surface area analysis, dynamic light scattering for particle size determination.

UNIT-IV

Studies of Nano-structured Materials**:** Synthesis, properties and applications of the following nanomaterials, fullerenes, carbon nanotubes, core-shell nanoparticles, nanoshells, self-assembled monolayers, and monolayer protected metal nanoparticles, nanocrystalline materials, magnetic nanoparticles and important properties in relation to nanomagnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals.

UNIT.V

Engineering Applications of Nanomaterials

TEXT BOOKS:

1. **NANO: The Essentials :** T Pradeep, MaGraw-Hill, 2007.
2. **Textbook of Nanoscience and nanotechnology:** B S Murty, P Shankar, Baldev Rai, BB Rath and James Murday, Univ. Press, 2012.

REFERENCE BOOKS:

1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, Wiley-VCH, 2011.
2. **Nanostructures & Nanomaterials; Synthesis, Properties & Applications:** Guozhong Cao, Imperial College Press, 2007.
3. **Nanomaterials Chemistry**, C. N. R. Rao, Achim Muller, K.Cheetham, Wiley-VCH, 2007.

Course Out Come

At the end of the course, the student will be able to:

- Understand the state of art synthesis of nano materials
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry.
- Analyze nanoscale structure in metals, polymers and ceramics
- Analyze structure-property relationship in coarser scale structures
- Understand structures of carbon nano tubes

B.Tech. III –II Semester

MATHEMATICAL MODELING AND SIMULATION
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objectives:

- This course aims at providing the basic knowledge to understand a Mathematical model and formulate a Mathematical model related to a real word problems of engineering, biological science etc.

Prerequisite: Instructor's permission

UNIT – I

Mathematical Model, types of Mathematical models and properties, Procedure of modeling,

UNIT – II

Graphical method: Barterning model, Basic optimization, Basic probability: Monte-Carlo simulation,

UNIT – III

Approaches to differential equation: Heun method, Local stability theory: Bernoulli Trials, Classical and continuous models, Case studies in problems of engineering and biological sciences.

UNIT – IV

General techniques for simulating continuous random variables, simulation from Normal and Gamma distributions, simulation from discrete probability distributions

UNIT – V

simulating a non – homogeneous Poisson Process and queuing system.

TEXT BOOKS:

1. Edward A. Bender.. An Introduction to Mathematical Modeling.
2. J. N. Kapoor.. Mathematical Modeling, Wiley eastern Limited.

REFERENCES:

1. A. C. Fowler.. Mathematical Models in Applied Sciences, Cambridge University Press.
2. S.M. Ross ..Simulation, India Elsevier Publication.
1. A.M.Law and W.D.Kelton.. Simulation Modeling and Analysis, T.M.H. Edition.

Outcomes: The student will be able to analyze the real word problem through the technique of modeling of that problem to have better insight of the real word problem.

OPTIMIZATION TECHNIQUES
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objectives:

- This course aims at providing the student with the basic concepts and several methods of optimization .

Prerequisite: Instructor's permission

UNIT – I

Convex sets and functions, constrained optimization methods: Introduction, Kuhn-Tucker conditions, convex optimization, Lagrange multipliers.

UNIT – II

Non-linear programming: One-dimensional minimization method, seach method, unconstrained and constrained optimization theory and practices.

UNIT – III

Reliability: Basic concepts, conditional failure rate function, Failure time distributions, Certain life models, Reliability of a system in terms of the reliability of it's components, series system, Parallel system.

UNIT – IV

Dynamic Programming: Multistage decision problems, computation procedure and case studies.

UNIT – V

Fundamentals of queuing system, Poisson process, the birth and death process, special queuing methods.

TEXT BOOKS:

1. S.S Rao.. Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.
2. Chong, E.K.P.and Zak, S. H.. An Introduction to Optimization, John Wiley & Sons, N.Y.
3. Peressimi A.L., Sullivan F.E., Vhl, J.J..Mathematics of Non-linear Programming, Springer – Verlag.

Outcomes: The student will be able to analyze optimization problems in engineering and technology using various elegant optimization technique.

CAMPUS RECRUITMENT TRAINING & SOFT SKILLS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objectives:

1. To develop awareness in students of the relevance and importance of soft skills.
2. To provide students with interactive practice sessions to make them internalize soft skills.
3. To prepare the students for placements.
4. To train students to use language appropriately for interviews, group discussion and public speaking
5. To help the students to understand interpersonal skills.
6. To support them in building interpersonal skills.
7. To better the ability to work with others

Outcome:

After completing this course,

- The students would have Understood of what Soft Skills is,
- Understood the significance of soft skills in the working environment
- Turning out engineering students with a clear concept of soft skills and equipping them with readiness to implement them at work place.

SYLLABUS:

UNIT I: Interview Dynamics-Preparation-Power Selling- Cracking the top Questions- Stress Control.

UNIT II: Intra Personal Skills: Knowing Strengths & Weaknesses – Goal Setting-Quotient Skills- Positive thinking- Problem Solving-analytical Skills.

UNIT III: Intra Personal Skills: Managerial Skills, Group dynamics- Negotiation Skills- Time Management.

UNIT IV: Verbal Skills: Dynamics of listening, Speaking, Reading & Writing skills- Email writing.

UNIT V: Non Verbal Skills: Body Language-Body Posture, Gestures, Eye Contact, Facial Expressions,Appearance, Space Distance /Proxemics , Touch/Haptics,. Para Language-Tone, Pace, Pause, Volume , Quality**.**

Reference books:

1. M. Ashraf Rizvi: Effective Technical Communication, Tata McGraw Hill, New Delhi, 2014.
2. Alex.k, soft skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
3. Technical Communication, Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009.
4. Sherfield, M. Robert at al Cornerstone Developing Soft Skills, 4th ed. Pearson Publication,

New Delhi, 2014.

5. Shalini Varma, Body Language for your success mantra, 4th ed, S. Chand Publication, New Delhi, 2014.

B.Tech. III –II Semester

COMPETITIVE & SPOKEN ENGLISH.
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objectives:

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To train students to use language appropriately for interviews, group discussion and public speaking
- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

Expected Outcomes:

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students.
- Speaking with clarity and confidence thereby enhancing employability skills of the students.
- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities.

SYLLABUS:

UNIT I: Creating the unknowing passage-Reading Comprehension- Listening Comprehension.

UNIT II: Correction of the Sentences Nouns – Pronouns – Verbs- Tenses- Articles- Prepositions- Sentences.

UNIT III: Competitive Vocabulary – Word Building – Memory techniques

UNIT IV: Functional English – Sentences – Construction – Neutralization of accent – Intonation.

UNIT V: Dynamics of Speaking – Communication Skills – Speech Preparation – Speaking Practices.

Reference books:

1. M. Ashraf Rizvi: **Effective Technical Communication**, Tata McGraw Hill, New Delhi, 2014.
2. Wren and Martin, **High School English Grammar and Composition,**S. Chand Publication, New Delhi, 2014.
3. Hari Mohan Prasad, **Objective English for Competitive Examination,**Tata McGraw Hill, New Delhi, 2014.
4. R.S. Aggarwal , **Objective General English**, S. Chand Publication, New Delhi.
5. R.K Bansal, **Spoken English : Manual of Speech and Phonetics**,4th Edition, Orient Black swan Pvt Ltd.-New Delhi, 2013.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR योगः कर्मसु कौशलम् ENGINEERING COLLEGE PULIVENDULA

B.Tech III – II Semester

GREEN BUILDINGS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

To enable the students learn to reduce the overall impact of the built environment on human health and natural environment. Student will able to learn how to reduce waste, pollution and environmental degradation and also to understand how to use effectively energy, water and other resources.

Unit I Introduction :Concept of Green Building, Need for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

Unit-II Green Building Concepts and Practices Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation;

Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

Unit-III Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

Unit IV Air Conditioning Introduction,CII Godrej Green business centre,Design philosophy,Design interventions,Energy modeling, HVAC System design,Chiller selection,pump selection,Selection of cooling towers,Selection of air handing units,Precooling of fresh air,Interior lighting system,Key feature of the building. Eco-friendly captive power generation for factory,Building requirement.

Unit-V Material Conservation Handling of non process waste, waste reduction during construction,materials with recycled content,local materials,material reuse,certified wood ,Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,

Text Books:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.
2. Green Building Hand Book by Tomwoolley and Samkimings, 2009.

Reference Books:

1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009

B.Tech III – II Semester

DISASTER MANAGEMENT AND MITIGATION
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

To know the various types of disaster caused by the nature and disaster prone areas in India. To have knowledge about the response of the structure for various disasters. To obtain a brief knowledge about the planning and preparedness for a disaster. To have knowledge about the various modern materials and tools in disaster reduction.

UNIT I - Introduction To Disaster :Meaning, Nature, Importance of Hazard, Risk, Vulnerability and Disaster- Dimensions & Scope of Disaster Management - India's Key Hazards – Vulnerabilities - National disaster management framework - Disaster Management Cycle.

UNIT II - Natural Disaster : Natural Disasters- Meaning and nature of natural disaster; their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

UNIT III - Anthropogenic Disaster :Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation and industrial waste water pollution.

UNIT IV - Approaches In Disaster Management :Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting & warning - Preparing disaster preparedness plan - Land use zoning - Preparedness through Information, education. Emergency Stage - Rescue training for search & operation - Immediate relief - Assessment surveys. Post Disaster stage – Rehabilitation - Social Aspect - Economic Aspect and Environmental Aspect.

UNIT V - Disaster Mitigation : Meteorological observatory - Seismological observatory - Hydrology Laboratory and Industrial Safety inspectorate. Technology in Disaster Management - Emergency Management Systems (EMS) in the Disaster Management Cycle - Remote Sensing and Geographic Information Systems(GIS) in Disaster Management. 2

Text book:

Sharma.S.R, "Disaster management", A P H Publishers, 2011.

REFERENCES

1. VenuGopalRao.K, "Geoinformatics for Disaster Management", Manglam Publishers and Distributors, 2010.
2. Singh.R.B, "Natural Hazards and Disaster Management: Vulnerability and Mitigation", Rawat Publications, 2006.
3. Gupta.H.K, "Disaster Management", University Press, India, 2003.
4. Gupta.M.C, "Manuals on Natural Disaster management in India", National Centre for Disaster Management,IIPA, New Delhi, 2001.

B.Tech III-II Semester

RENEWABLE ENERGY SOURCES
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course objectives:

1. To understand processing and limitations of fossil fuels (coal, petroleum and natural gas)
2. To know the necessity of harnessing alternate energy resources such as solar, wind, nuclear, geothermal, tidal and biomass.
3. To understand and practice various characterization techniques for different renewable fuels.
4. To do the design and analysis practice for solar, wind systems.

UNIT-I:

Photo voltaic power generation ,spectral distribution of energy in solar radiation, solar cell configurations, voltage developed by solar cell, photo current and load current, practical solar cell performance, commercial photo voltaic systems, test specifications for PV systems, applications of super conducting materials in electrical equipment systems.

UNIT-II:

Principles of MHD power generation, ideal MHD generator performance, practical MHD generator, MHD technology.

Wind Energy conversion: Power from wind, properties of air and wind, types of wind Turbines, operating characteristics.

UNIT-III:

Tides and tidal power stations, modes of operation, tidal project examples, turbines and generators for tidal power generation.

Wave energy conversion: properties of waves and power content, vertex motion of Waves, device applications. Types of ocean thermal energy conversion systems Application of OTEC systems examples,

UNIT-IV:

Miscellaneous energy conversion systems: coal gasification and liquefaction, biomass conversion, geothermal energy, thermo electric energy conversion, principles of EMF generation, description of fuel cells, Co-generation and energy storage, combined cycle co-generation, energy storage.

Global energy position and environmental effects: energy units, global energy position.

UNIT-V:

Types of fuel cells, H_2-O_2 Fuel cells, Application of fuel cells – Batteries, Description of batteries, Battery application for large power. Environmental effects of energy conversion systems, pollution from coal and preventive measures steam stations and pollution, pollution free energy systems.

TEXT BOOKS:

1. "Energy conversion systems" by Rakosh das Begamudre, New age International publishers, New Delhi - 2000.
2. "Renewable Energy Resources" by John Twidell and Tony Weir, 2nd Edition, Fspon & Co

B.Tech III-II Semester

POWER ELECTRONICS

(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objective:

With the advent of semiconductor devices, revolution is taking place in the power transmission distribution and utilization. This course introduces the basic concepts of power semiconductor devices, converters and choppers and their analysis.

UNIT – I Power Semi Conductor Devices

Semiconductor Power Diodes, Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power Transistor - Power Mosfet – Power IGBT - TRIACs, GTOs - Characteristics and Principles of Operation and other Thyristors – Basic Theory of Operation of SCR – Static Characteristics – Turn On and Turn Off Methods- Dynamic Characteristics of SCR - Two Transistor Analogy – Triggering Circuits—– Series and Parallel Connections of SCR's – Snubber Circuits – Specifications and Ratings of SCR's, BJT, IGBT - Numerical Problems –Commutation Circuits.

UNIT – II Phase Controlled Converters

Phase Control Technique – Single Phase Line Commutated Converters – Mid Point and Bridge Connections – Half Controlled Converters, Fully Controlled Converters with Resistive, RL Loads and RLE Load– Derivation of Average Load Voltage and Current – Line Commutated Inverters -Active and Reactive Power Inputs to the Converters without and with Free Wheeling Diode, Effect of Source Inductance – Numerical Problems.

Three Phase Line Commutated Converters – Three Pulse and Six Pulse Converters – Mid Point and Bridge Connections - Average Load Voltage with R and RL Loads – Effect of Source Inductance–Dual Converters (Both Single Phase and Three Phase) - Waveforms –Numerical Problems.

UNIT – III Dc – Dc Converters

Buck converters, boost converters and buck boost converters. Steady state analysis, voltage and current ripple, design of inductor and capacitor values.

UNIT – IV Inverters

Inverters – Single Phase Inverter – Basic Series Inverter – Basic Parallel Capacitor Inverter Bridge Inverter – Waveforms –sine-triangle PWM, Three Phase VSI in 120^0 And 180^0 Modes of Conduction. unipolar, bipolar inverter PWM techniques selective harmonic elimination - Voltage Control Techniques for Inverters Pulse Width Modulation Techniques – Numerical Problems,

UNIT – V AC Voltage Controllers & Cyclo Converters

AC Voltage Controllers – Single Phase Two SCR's in Anti Parallel – With R and RL Loads – Modes of Operation of Triac – Triac with R And RL Loads – Derivation of RMS Load Voltage, Current and Power Factor Wave Forms –Firing Circuits -Numerical Problems - Thyristor Controlled Reactors; Switched Capacitor Networks.

Cyclo Converters – Single Phase Mid Point Cyclo Converters With Resistive and Inductive Load (Principle of Operation only) – Bridge Configuration Of Single Phase Cyclo Converter (Principle of Operation only) – Waveforms

Text Books:

1. Power Electronics – by M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing company, 1998.
2. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998

Reference Books:

1. Power Electronics – by P.S.Bimbra, Khanna Publications.
2. Power electronics, Essentials and applications – L.Umanand Wiley Publications
3. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
4. Power Electronics - by V.R.Murthy , 1st edition -2005, OXFORD University Press
5. Power Electronics-by P.C.Sen,Tata Mc Graw-Hill Publishing.
6. The power electronics (hand book) : Timothy L.Skgarnina

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR ENGINEERING COLLEGE PULIVENDULA

B.Tech III-II Semester

ELECTRICAL ENERGY MANAGEMENT AND CONSERVATION
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course objectives:

1. To Understanding, analysis and application of electrical energy systems
2. To acquire the knowledge regarding energy conservation methods and its management.
3. Able to calculate Energy Efficiency, Energy accounting, monitoring and control.
4. To do Specific Energy Consumption; ECO assessment and Evaluation methods, Case study.

UNIT-I

Induction Motors – Three Phase - Cage motors - Equivalent circuit - Speed - torque characteristics - Performance characteristics - voltage unbalance - over motoring - slip ring induction motor characteristics multi speed motors - Single Phase Induction Motors - Starting & running performance - Split phase - Capacitor type motors - Characteristics - Reluctance motors – Universal motors – Stepper motor – Servo motor – Characteristics - Applications

UNIT-II

Energy Efficient Motors - Constructional details - Factors affecting efficiency - Losses distribution - Characteristics - Calculation of R.M.S rating - Power Factor – Causes and disadvantages of low power factor – Methods to improve p.f – Economics of power factor improvement - Simple pay back method - Return on investment - Life cycle analysis.

UNIT-III

Energy efficient lighting - Terminology - Cosine law of luminance - Types of lamps - Characteristics - Design of illumination systems - Good lighting practice - Lighting control - Steps for lighting energy conservation.

UNIT-IV

Economics of Electrical Energy Generation, Audit and Distribution: Definitions - Connected load, Maximum demand - Demand factor – Diversity factor – Significance - Load curve – Load sharing between base load and peak loads - Electrical Energy Audit: Check List – Data Collection – Data Analysis – Case Studies - Electrical Distribution: Electrical load analysis - types of consumers & tariffs - line losses - corona losses - types of distribution system - Kelvin's law - loss load factor.

UNIT-V

Economics Of Electrical Drives - Selection of motors - types of loads - Energy Consumption during starting of a.c and d.c motors - Braking of d.c and a.c motors - Plugging - Regenerative braking – Applications of different electric drives.

TEXT BOOKS:

1. Energy Efficient Electrical motors / John C.Andreas / Marcel Dekker Inc.
2. Generation,Distribution&Utilization of Electrical Energy /CLWadhwa /Wiley Eastern ltd

REFERENCE BOOKS:

1. Electrical Machines /Bimbra / Khanna Publishers
2. Electrical Machinery / Fitzgerland, Kingsley, Kusko / Mc Graw Hill Ltd
3. Electrical Machines/ S.K.Bhattacharya
4. Electrical Machines /I.J.Nagarath and D.P.Kothari / TMH
5. Electrical Technology/ Edward Hughes / ELBS.

Energy Management and good lighting practice: Fuel Efficiency Booklet 12 / EEO

III B.Tech II Semester

ROBOTICS

(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course objectives

- To design, develop and complete robotic activities and challenges
- This course aims at providing the students the fundamental knowledge of the various subscriptions such as kinematics, Dynamics, controls, sensors, actuators, etc.
- It is aimed to provide adequate background in both analysis and design of robots.

UNIT – I

Fundamentals of Robots: Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots. Introduction to matrix representation of a point in a space a vector in space, a frame in space, Homogeneous transformation matrices, representation of a pure translation, pure rotation about an axis.

UNIT – II

Kinematics of robot: Forward and inverse kinematics of robots- forward and inverse kinematic equations for position and orientation, Denavit-Hartenberg(D-H) representation of forward kinematic equations of robots, The inverse kinematic of robots, Degeneracy and Dexterity, simple problems with D-H representation.

Differential motions and Velocities: Introduction, differential relationship, Jacobian, differential motions of a frame-translations, rotation, rotating about a general axis, differential transformations of a frame. Differential changes between frames, differential motions of a robot and its hand frame, calculation of Jacobian, relation between Jacobian and the differential operator, Inverse Jacobian.

UNIT – III

Control of Manipulators: Open- and Close-Loop Control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID Control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

UNIT – IV

Robot Vision: Industrial applications of vision-controlled robotic systems, process of imaging, architecture of robotic vision system, Image acquisition, description of other components of vision system, image representation, image processing.

UNIT – V

Robot Cell Design and Programming: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work cell design, Work cell control, Inter locks, Error detection, Work cell controller.

Methods of robot programming, WAIT, SIGNAL, and DELAY commands, Robotic languages, VAL system.

TEXT BOOKS

1. Industrial Robotics – Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey – Mc Graw Hill, 1986.
2. Robotics and control – R K Mittal and I J Nagrath, - Tata Mc Graw Hill

REFERENCES

1. Introduction to Robotics – Analysis, System, Applications by Saeed B. Niku, PHI Publications
2. Robot Analysis and Control - H. Asada and J.J.E. Slotine John Willey & Sons.
3. Fundamentals of Robotics: Analysis and control, Robert J. Schilling, Prentice Hall, 1990.
4. A robot Engineering text book – Mohsen shahinpoor, Harper & Row Publishers,1987
5. Introduction to Robotics: Mechanics and Control, John.J.Craig, Addison- Wesley, 1999
6. Robotics: Control, sensing, vision, and intelligence – K.S. FU, R.C. Gonzalez and C.S.G Lee. Mc Graw Hill, 1987.
7. Robotic Engineering an integrated approach- Richard D. Klafter Thomas – PHI publications

Course outcomes

By studying this course, students will be

- Familiar with the history, concept development and key components of robotics technologies.
- Understand basic mathematic manipulation of spatial coordinate representation and transformation.
- Understand and able to solve basic robot forward and inverse kinematic problems.
- Understand and able to solve robotic dynamics, path planning and control problems.
- Able to undertake practical robotics experiments that demonstrate the above skills.

III B.Tech II Semester

MECHANICAL MANUFACTURING PROCESSES
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Objectives:
The objectives of this course are to introduce to demonstrate the various manufacturing processes. To develop knowledge and importance of surface treatment, processing of powder metals, glass, ceramics plastics. To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes and acquire knowledge on advanced manufacturing processes.

UNIT – I
Surface treatment: Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

UNIT – II
Processing of Powder metals, Glass and Superconductors: Introduction, production of metal powders, compaction of metal powders, sintering, secondary and finishing operations, design considerations for powder metallurgy, Process capabilities, economics of powder metallurgy, forming and shaping of Glass, techniques for strengthening and treating Glass, design considerations for Glass, processing of superconductors.
Processing of ceramics: Applications, characteristics, classification .Processing of particulate ceramics, Powder preparations, consolidation, Drying , sintering, Hot compaction, Area of application , finishing of ceramics.

UNIT – III
Fabrication of Microelectronic devices: Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in microelectronics, surface mount technology, Integrated circuit economics. E-Manufacturing, nanotechnology, and micromachining, High speed Machining
UNIT – IV
Processing Of Plastics, injection and blow moulding, calendaring, thermo forming, compression moulding, transfer moulding, High energy rate forming methods Rapid manufacturing: - Introduction - concepts of rapid manufacturing, information flow for rapid prototyping, classification of rapid prototyping process, sterer holography fused deposition modeling, selective laser sintering, Applications of rapid prototyping process

UNIT – V
Processing of Composites: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

TEXT BOOKS:

1. Manufacturing Engineering and Technology, Schmid and kalpakjin, Pearson Education.
2. Manufacturing Technology, Foundry forming and welding, Vol I , P.N. Rao,TMH
3. Rapid Prototyping Principles and Applications, RafiqNoorani, Wiely Pub

REFERENCE BOOKS:

1. Production Technology, R.K. Jain, Khanna Publishers,17th edition, 2012
2. Process and materials of manufacturing -Lindberg, PE
3. Principles of Metal Castings, Rosenthal.
4. Welding Process, Parmar, Khanna publication.
5. Manufacturing Technology, R.K. Rajput, Laxmi Pub

Course Outcomes:

After completion of this course student will be able to

- Understand the principles of processing of various powder metals, glass, ceramics and semiconductors.
- Understand the applications of rapid prototyping and processing of plastics

SUGGESTED LINKS:

- www.casde.iitb.ac.in/store/events/2003/IAT-Pune.../DFMA.ppt
- www.rose-hulman.edu/~stienstr/ME470/DFA.ppt
- www.design4manufacturability.com/DFM_article.htm
- http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv234-Page1.htm

III B.Tech II Semester

NON-CONVENTIONAL SOURCES OF ENERGY
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

- To explain concept of various forms of renewable energy
- To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications
- To analyse the environmental and cost economics of using renewable energy sources compared to fossil fuels.

UNIT - I

Principles Of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage and Applications :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III

Wind Energy : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

BIO-MASS : Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engineoperation and economic aspects.

UNIT-IV

Geothermal Energy : Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC.

Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects.Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

TEXT BOOKS

1. Renewable energy resources, Tiwari and Ghosal, Narosa.
2. Non-Conventional Energy Sources ,G.D. Rai

REFERENCES

1. Renewable Energy Sources, Twidell& Weir
2. Solar Energy, Sukhatme
3. Solar Power Engineering,B.S.Magal Frank Kreith&J.F.Kreith.
4. Principles of Solar Energy, Frank Krieth& John F Kreider.
5. Non-Conventional Energy, Ashok V Desai, Wiley Eastern 6. Non-Conventional Energy Systems, K Mittal , Wheeler.

Course Outcome:

At the end of the course the student will

1. Have knowledge about various renewable energy sources
2. Be able to choose the appropriate renewable energy as an alternate for conventional power in any application.

III B.Tech II Semester

FUNDEMENTALS OF COMMUNICATION SYSTEMS

(Choice Based Credit Course Inter Department)

(QUALITATIVE TREATMENT ONLY)

L	T	P	C
3	1	0	3

Course Objectives:

1. To study the fundamental concept of the analog communication systems.
2. To analyze various analog modulation and demodulation techniques.
3. To know the working of various transmitters and receivers.
4. To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.

Learning Outcomes:

This course provides the foundational education in Analog Communication systems, and applications. The students are provided the learning experience through class room teaching and solving assignment & tutorial problems. At the end of course, students should be able to:

a. Acquire knowledge on the basic concepts of Analog Communication Systems.
b. Analyze the analog modulated and demodulated systems.
c. Verify the effect of noise on the performance of communication systems.
d. Know the fundamental concepts of information and capacity.

UNIT- I

Elements of communication systems, need for Modulation, Modulation Methods, Baseband and carrier communication, Amplitude Modulation (AM), Generation of AM signals, Rectifier detector, Envelope detector, sideband and carrier power of AM, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Single sideband (SSB) transmission, VSB Modulation.

UNIT- II

Angle Modulation &Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Pre-emphasis, & De-emphasis, Illustrative Problems.

UNIT -III

Pulse Analog Modulation Techniques

Pulse analog modulation techniques, Generation and detection of Pulse amplitude modulation, Pulse width modulation, Pulse position modulation.

Multiple Access Techniques

Introduction to multiple access techniques, FDMA, TDMA, CDMA, SDMA: Advantages and applications.

UNIT IV

Digital Communication (Qualitative Approach only)

Pulse Code Modulation, DPCM, Delta modulation, Adaptive delta modulation, Overview of ASK, PSK, QPSK, BPSK and M- PSK techniques

UNIT -V

Modern Communication Trends (Qualitative Approach only)

Basics of Spectrum utilizations, Comparison of 2G, 3G, Types of Ethernet, Modems – Types of Modems, 100Mbps, 1Gbps modems, Role of IPV6 in Present trends.

TEXT BOOKS:

1. B. P. Lathi, "Modern Digital and Analog Communication Systems," Oxford Univ. press, 3rd Edition, 2006.
2. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
3. Electronic Communications System: Fundamentals Through Advancedby 2nd editions By Wayne Tomasi
4. Simon Hakin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.

REFERENCES:

1. A. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", McGraw-Hill International Edition, 5th Edition, 2010.
2. Simon Haykin, "Communication Systems", Wiley-India edition, 3rd edition, 2010.
3. Herbert Taub & Donald L Schilling, "Principles of Communication Systems", Tata McGraw-Hill, 3rd Edition, 2009.

III B.Tech II Semester

FUZZY LOGIC & NEURAL NETWORKS

(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

UNIT-I

Neural Networks Characteristics: History of Development in neural networks, Artificial neural net terminology, model of a neuron, Topology, Types of learning. Supervised, Unsupervised learning. Basic Learning laws, Hebb's rule, Delta rule, widrow and Hoff LMS learning rule, correlation learning rule instar and ouster learning rules.

UNIT-II

Unsupervised Learning: Competitive learning, K-means clustering algorithm, Kohonen's feature maps. Radial Basis function neural networks- recurrent networks, Real time recurrent and learning algorithm. Introduction to Counter propagation Networks- CMAC Network, ART networks, Application of NN in pattern recognition, optimization, Control, Speech and decision making.

UNIT-III

Neural Network models: neural network models, layers in neural network and their connections. Instar, outstar, weights on connections, threshold function, application- Adaline and madaline. Back propagation: feed forward back propagation network- mapping, layout, training, BPN applications

UNIT-IV

Fuzzy Logic: Basic concepts of Fuzzy logic, Fuzzy vs Crisp set, Linguistic variables, membership functions, operations of Fuzzy sets, Fuzzy if-then rules, Variables inference techniques, defuzzification techniques, basic Fuzzy interference algorithm, application of fuzzy logic , Fuzzy system design implementation , useful tools supporting design.

UNIT-V

Bidirectional Associative Memory (BAM), inputs and outputs, weights and training. FAM-fuzzy associative memory, association, FAM neural networks, encoding Adaptive Resource theory-network for ART, processing in ART

Text Books:

1. Berkin Riza C and Trubatch, " Fuzzy System design principles- Building Fuzzy IF-THEN rule bases", IEEE Press.
2. Yegna Narayanan, "Artificial Neural Networks". 8th Printing. PHI(2003)
3. Patterson Dan W, "Introduction to artificial Intelligence and Expert systems", 3rd Ed., PHI
4. Simon Haykin, "Neural Networks" Pearson Education.
5. Yen and Langari, "Fuzzy Logic: Intelligence, Control and Information", Pearson Education.
6. Jacek M Zaurada, "Introduction to artificial neural Networks Jaico Publishing Home, Fourth Impression.

III B.Tech II Semester

INDUSTRIAL ELECTRONICS

(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

1. To get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
2. To study the characteristics of AC to DC converters.
3. To know about the practical applications Electronics in industries.

Learning Outcome:

After completion of the course the students will be able to

a. Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
b. Understand the characteristics of AC to DC converters.
c. Understand about the practical applications Electronics in industries.

UNIT – I :

Semiconductor Devices: Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open-circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes (LED)

UNIT – II:

Junction Transistors: Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

UNIT – III :

AC To DC Convertors: AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

UNIT – IV: Industrial Applications – I

Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding.

Induction heating: Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating

Dielectric heating: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

UNIT – V: Industrial Applications - II

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasoni8c waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

TEXT BOOKS:

1. G. K. Mithal, “Industrial Electronics”, Khanna Publishers, Delhi, 2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, “Industrial Electronics”, Anuradha Publications, 2011.

REFERENCE BOOKS:

1. F. D. Petruzulla, “Industrial Electronics”, McGraw Hill, Singapore, 1996.
2. M. H. Rashid, “power Electronics Circuits, Devices and Application”, PHI, 3rd edition, 2004.
3. G. M. Chute and R. D. Chute, “Electronics in Industry”, McGraw Hill Ltd, Tokyo, 1995.

III B.Tech II Semester

OPERATING SYSTEMS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications

Course Outcomes

- Understand what makes a computer system function and the primary PC components.
- Understand past and current trends in computer technology.
- Use basic software applications.
- Add functionality to the exiting operating systems
- Design new operating systems

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open- Source Operating Systems

Operating System Structure: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

UNIT II

Threads: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

Process Synchronization: The critical-section problem, Peterson‘s Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple-Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

UNIT III

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory-Mapped Files, Allocating Kernel Memory

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

UNIT IV

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

UNIT V

I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability-Based systems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

TEXT BOOKS:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

REFERENCE BOOKS:

1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.

III B.Tech II Semester

DATABASE MANAGEMENT SYSTEMS
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

- To create database and query it using SQL queries, design forms and generate reports.
- Learn to use integrity constraints, referential integrity constraints, triggers, assertions

Course Outcomes

- Design databases
- Retrieve information from data bases
- Use procedures to program the data access and manipulation
- Create user interfaces and generate reports

UNIT I

The Worlds of Database Systems -The Evolution of Database Systems - Overview of a Database Management System - Outline of Database System Studies.

The Entity-Relationship Model – Elements of E/R Model – Design Principles – The Modeling of Constraints – Weak Entity Sets.

The Relational Data Model – Basics of the Relational Model – From E/R Diagrams to Relational Designs – Converting Subclass Structures to Relations.

UNIT II

Relational Algebra and Calculus – Preliminaries, Relational algebra: Selection and Projection , Set Operations, Renaming, Joins, Division - Relational Calculus – Expressive power of Algebra and Calculus.

The Database Language SQL – Simple Queries in SQL – Queries Involving More than One Relation – Subqueries – Full Relation Operations – Database Modifications – Defining a Relation Schema in SQL – View Definitions

UNIT III

Constraints and Triggers – Keys and Foreign keys – Constraints on Attributes and Tuples, Schemalevel

Constraints and Triggers.

Functional Dependencies– Rules about Functional Dependencies -- Design of Relational Database Schemas, Normal Forms based on FDs – Multivalued Dependencies, 4NF, 5NF

UNIT IV

Transaction Management : Transactions, ACID properties, Serializability, Other isolation levels.

Concurrency Control – Serial and Serializable Schedules – Conflict Serializability – Enforcing Serializability by Locks – Locking Systems with Several Lock Modes - Concurrency Control by Timestamps – Concurrency Control by Validation.

UNIT V

Index Structures – Indexes on Sequential Files – Secondary Indexes – B-Trees, B+ Trees – Hashing.

Introduction to Query Optimization.

Failures and Recovery: System Failures – Issues and Models for Resilient Operation – Undo Logging – Redo Logging – Undo/Redo Logging – Protecting Against Media Failures.

TEXT BOOKS:

1. **"Database Systems, The Complete Book",** Hector Garcia-Molina, Jeffrey D. Ullman and Jennifer Widom, 6th impression, 2011, Pearson.
2. **"Data base Management Systems",** Raghu Rama Krishnan, Johannes Gehrke, 3rd Edition, 2003, McGraw Hill.

REFERENCE BOOKS:

1. "Fundamentals of Database Systems", Elmasri Navrate, 6th edition, 2013, Pearson.
2. "Data base Systems design", Implementation, and Management, Peter Rob & Carlos Coronel 7th Edition.
3. "Introduction to Database Systems", C.J.Date, Pearson Education.
4. "Data base System Concepts", Silberschatz, Korth, McGraw Hill, V edition.

(refer Raghu Rama Krishnan text book latest version and frame new syllabus)

III B.Tech II Semester

JAVA PROGRAMMING
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objectives:
- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

Course Outcomes:
- Solve problems using object oriented approach and implement them
- Ability to write Efficient programs that handle exceptions
- Create user friendly interface

UNIT I

The History and Evolution of Java: Java's Lineage, The Creation of Java, How Java Changed the Internet, Java's Magic: The Bytecode, Servlets: Java on the Server Side, The Java Buzzwords, The Evolution of Java, Java SE 8, A Culture of Innovation.

An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries.

UNIT II

Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings, A Note to C/C++ Programmers About Pointers.

Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses.

Control Statements: Java's Selection Statements, Iteration Statements, Jump Statements.

UNIT III

Introducing Classes: Class Fundamentals,Declaring Objects, Assigning Object Reference Variables ,Introducing Methods,Constructors,The this Keyword, The finalize( ) Method, A Stack Class.

A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, Introducing Nested and Inner Classes, Exploring the String Class, Using Command-Line Arguments, Varargs: Variable-Length Arguments.

UNIT IV

Inheritance: Inheritance Basics, Using super, Creating a Multilevel Hierarchy, When Constructors Are Executed**,** Method Overriding, Dynamic Method Dispatch,Using Abstract Classes, Using final with Inheritance, The Object Class.

Packages and interfaces: Packages, Access Protection, Importing Packages, Interfaces,Default Interface Methods,Use static Methods in an Interface, Final Thoughts on Packages and Interfaces.

Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch,Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java's Built-in Exceptions,

Creating Your Own Exception Subclasses, Chained Exceptions, Three Recently Added Exception Features, Using Exceptions.

UNIT V

Multithreaded Programming: The Java Thread Model, The Main Thread, Creating a Thread, Creating Multiple Threads, Using isAlive( ) and join( ), Thread Priorities, Synchronization, Interthread Communication, Suspending, Resuming, and Stopping Threads. Obtaining A Thread's State, Using Multithreading.

Enumerations, Autoboxing, and Annotations (Metadata): Enumerations, Type Wrappers, Autoboxing, Annotations (Metadata), Type Annotations, Repeating Annotations.

Text Book:

JAVA the Complete Reference 9th edition, Herbe

III B.Tech II Semester

IMMUNOLOGY

(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

This course aims to familiarize the students to mechanisms associated with immune system, any abnormalities which could lead to disease development.

Course Outcome:

Students will be able to distinguish between innate & acquired immunity, they should also be able to demonstrate and identify immune cells specific functions. They can correlate between immune/disease developments.

UNIT I: Basics of immunology

Immunity: Types of immunity, Innate & Adaptive; Cells of immune system, Organs of the immune system, Primary lymphoid organs (bone marrow, Thymus), Secondary lymphoid organs (Spleen, Lymphnode, MALT, CALT), Immunogen, Antigen and their chemical nature, Factors that influence immunogenicity, epitopes, properties of "B" cell epitopes & "T" cell epitopes, haptens & adjuvants.

UNIT II: Immunoglobulin's: structure & function

Basic & fine structure of Immunoglobulin classes & their functions, isotopes, allotypes & idiotypes, Monoclonal antibodies: production of Monoclonal antibodies and their uses.

UNIT III: Complement system & its path ways, antigen- antibody interactions & immune assays.

UNIT IV: Humoral immunity & cell mediated immunity

MHC, Antigen processing and, Antigen presentation cells, structure & functions of TCR, T-cell maturation, activation & differentiation of T cell. T cell subclasses & linkage. Activation of B cells, proliferation by thymus dependent & thymus independent antigens. B cell differentiation, class switching & generation of plasma & memory cells. Primary immune response & secondary immune responses.

UNIT V: Hyper sensitivity & Auto immune disease & tumor immunology

Hypersensitivity & its types, autoimmunity, autoimmune disorders, transplantation, tumor Transplantation, mechanism of graft rejection, immuno suppressive drugs.

TEXT BOOKS:

1. E. Roitt Essential Immunology, Vaccines conventional, subunit and recombinant, antidiotypic vaccine, Blackwell Scientific publications, Oxford,1991.
2. Kuby Immunology, 5th Edition. Richard A Goldsby, Thomas J Kindt Barbara A Osborne. W H Freeman and Company, 2006.

REFERENCES:

1. Benjamin E and Leskowitz S, immunology A short Course. Wiley LISS NY, 1991. ELISA Immunological Techniques. DNA vaccines Immunotechnology.

2. Cellular Molecular Immunology. Abul Abbas and Litchman, 2003.

III B.Tech II Semester

DOWNSTREAM PROCESSING
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:
This course aims to introduce the students to different steps of downstream processing including cell disruption, separations, extractions, fractionations & Concentrations.

Course Outcome:
At the end of the course the students will be able to differentiate between different separation techniques and design a combination of downstream techniques for a given process. They will be able to analyze scientific results from real examples and calculate operating parameters for a particular operation.

UNIT I: Role of Downstream Processing In Biotechnology
Role and importance of downstream processing in biotechnological processes. Problems and requirements of bio product purification. Economics of downstream processing in Biotechnology, cost-cutting strategies, characteristics of biological mixtures, process design criteria for various classes of bio products (high volume, low value products and low volume, high Value products)

UNIT II: Primary Separation And Recover Process
Cell disruption methods for intracellular products, removal of insoluble, biomass (and particulate debris) separation techniques, flocculation and sedimentation, centrifugation and filtration methods.

UNIT III: Membrane Separations
Introduction, Principles & theory, Requirements of membranes, Structure of membranes, Membrane types and their preparation, Membrane modules, flow patterns in membrane modules, Membrane fouling, Membrane separation process: Types Principles, driving forces and applications

UNIT IV: Enrichment Operations
Precipitation methods (with salts, organic solvents, and polymers, extractive separations, aqueous two-phase extraction, supercritical extraction), in situ product removal, integrated bioprocessing.

UNIT V: Electrophoresis & Product Resolution / Fractionation
Introduction, Principles and theory, Electrophoresis equipment, Gel electrophoresis, SDS Page, Isoelectric focusing, 2D Gel Electrophoresis, Pulse field Electrophoresis
Chromatographic techniques- Paper, TLC, Adsorption, Ion exchange, Gel filtration, affinity chromatographic separation processes, GC, HPLC, FPLC, Chromatofocusing electrophoretic separations.

TEXT BOOKS:
1. Wankat PC. Rate controlled separations, Elsevier, 1990.
2. Ajay Kumar and Abhisek Awasthi " Bioseparation Engineering" I.K. International publicationsm, 2007.

REFERENCES:
1. Product Recovery in Bioprocess Technology, BIOTOL.' Series, VCH, 1990.
2. Asenjo J.M. Separation processes in Biotechnology, 1993, Marcel Dekkere Inc.
3. M.R.Ladisch, Bioseparation engineering: Principles, Practice and Economics, Wiley Interscience, 2001.
4. Belter PA and Cussler E. Bioseparations, Wiley, 1985.

III B.Tech II Semester

TRANSPORT PHENOMENA IN BIOPROCESSES
(Choice Based Credit Course Inter Department)

L	T	P	C
3	1	0	3

Course Objective:

This course will provide the fundamentals to solve real life problems involving transports of momentum, energy and mass in biological, mechanical and chemical systems using a unified approach.

Course Outcomes:

- Understanding of transport processes.
- Ability to do heat, mass and momentum transfer analysis.
- Ability to analyze industrial problems along with appropriate boundary conditions.
- Ability to develop steady and time dependent solutions along with their limitations

UNIT I: Momentum Transport

Mechanism of Momentum Transport: Newton's Law of Viscosity, Non- Newtonian fluids, theory of viscosity of liquids, time dependant viscosity, viscosity measurement (cone-and-plate viscometer, coaxial cylinder rotary viscometer, impeller viscometer), use of viscometers with biological reaction fluids, rheological properties of fermentation broth, factors affecting broth viscosity (cell concentration, cell morphology, osmotic pressure, product and substrate concentration), Velocity distribution in laminar flow and turbulent flow

UNIT II: Shell Momentum balances and Mixing of Fluids

Flow of Falling Film, Flow through circular tube, Flow through the annulus, Flow of two adjacent immiscible fluids

Introduction to turbulent flow, time smoothening, mixing, mixing mechanism, power requirements in ungassed Newtonian and Non Newtonian fluids, gassed fluids, interaction between cell and turbulent Eddies, operating conditions for turbulent shear damage.

UNIT III: Energy Transport

Thermal conductivity and the mechanisms of energy transport- measurement of thermal conductivity, Fourier's law, steady state conduction, analogy between heat and momentum transfer

UNIT IV: Mass Transport & Shell Mass Balances

Theory of Diffusion and estimation of Diffusion coefficient for gases, liquids, in colloidal a polymers suspensions in polymers. shell mass balances: Diffusion through a stagnant gas film, diffusion with in a heterogeneous and homogeneous chemical reaction. Diffusion and chemical reaction inside a porous catalyst.

UNIT V: Oxygen Transport

Oxygen uptake in cell cultures, Factors affecting cellular oxygen demand, oxygen transfer from gas bubbles to aerobic culture, oxygen transfer in fermentors- bubbles, factors affecting oxygen transport- sparging, stirring, medium properties, antifoam agents, temperature, mass transfer correlations, measurements of kLa - oxygen balance method, dynamic method.

Note: In all units relevant basic numerical problems should be practiced

TEXT BOOKS:

1. R.B.Bird, W.E.Stewart, E.N.Lightfoot, Transport Phenomena, John wiley and sons, Singapore , 1994.

2. P.M.Doran, Bioprocess Principles, Academic Press, 1995.

3.Harvey W. Blanch, Douglas S. Clark Biochemical Engineering, Marcecel, Dekker, 2007.

REFERENCES:1. M.L.Shuler and F. Kargi, Bioprocess Engineering: Basic concepts, 2nd edition, Prentice Hall of India, 2003.

B.Tech III – II Semester

ENGINEERING GEOLOGY LAB

L	T	P	C
0	0	3	2

Course Objective:

- To prepare the students to engineering practice for the purpose of design, construction, operation and maintenance of engineering structures.
- Identification and examine the samples of minerals and rocks, their physical and chemical properties.
- Interpretation and drawing of sections for geological maps showing tilted beds ,folds, faults, uniformities etc.,
- Evaluate simple strike and dip for structural formations.

LIST OF EXERCISES:

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Inter pretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

TEXT BOOKS:

1. Elementary Exercises in Geology by CVRK Prasad, Universities press

B.Tech III – II Semester

ENVIRONMENTAL ENGINEERING LAB

L	T	P	C
0	0	3	2

Course Objective:

The laboratory provides knowledge of estimating various parameters like PH, Chlorides, sulphates and nitrates in water. For effective water treatment, the determination of optimum dosage of coagulant and chloride demand is also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.

List of Experiments

1. Determination of pH and Turbidity
2. Determination of Conductivity and Total dissolved solids.
3. Determination of Alkalinity/Acidity.
4. Determination of Chlorides.
5. Determination and Estimation of total solids, organic solids and inorganic solids.
6. Determination of iron.
7. Determination of Dissolved Oxygen.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of B.O.D
11. Determination of C.O.D
12. Determination of Optimum coagulant dose.
13. Determination of Chlorine demand.
14. Presumptive coliform test.

NOTE: At least 8 of the above experiments are to be conducted.

List of Equipment

1) pH meter,
2) Turbidity meter,
3) Conductivity meter,
4) Hot air oven,
5) Muffle furnace,
6) Dissolved Oxygen meter,
7) U – V visible spectrophotometer,
8) Reflux Apparatus,
9) Jar Test Apparatus,
10) BOD incubator.
11) COD Extraction apparatus

TEXT BOOKS:

1. Chemistry for Environmental Engineering by Sawyer and Mc. Carty
2. Standard Methods for Analysis of water and Waste Water – APHA
3. Environmental Engineering Lab Manual by Dr.G.Kotaiah and Dr.N.Kumara Swamy, Charotar Publishers, Anand.

REFERENCE

1. Relevant IS Codes.

B.Tech IV – I Semester

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

Course Objectives:

1. To enhance the knowledge of the students regarding importance of management and Managerial problems with optimum solutions.
2. To develop the concepts viz., Consumer Behaviour and demand-supply concept.
3. To introduce the concept of Demand Forecasting-methods.
4. To provide the knowledge regarding production and cost and Break-Even Analysis.
5. To share the concepts like market structures and Business Organization.
6. To discuss the contemporary practices-which influences the organization?
7. To provide awareness regarding Capital Budgeting decisions(Long term Investment decisions)
8. To introduce the concepts- Financial Accounting and Financial Analysis.
9. To give an idea of practicing technique of Ratio Analysis.
10. To provide the basic concepts which are related to managerial?

Learning Outcomes:

Expected to achieve the overall course objective to understand and enhancing the knowledge regarding managerial concepts and obtaining optimal solutions. And to get an idea of analysis of firm's financial position with the techniques of financial analysis and ratio analysis.

MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

UNIT I

Introduction to Managerial Economics & Demand Analysis: Definition of Managerial Economics, Characteristics and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics.

Demand Analysis: Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions.

Elasticity of Demand & Theory of Production and Cost Analysis: Definition -Types of Elasticity of demand - Measurement of price elasticity of demand: Total outlay method, Point method and Arc method- Significance of Elasticity of Demand.

UNIT-II

Demand Forecasting: Meaning - Factors governing demand forecasting - Methods of demand forecasting - Forecasting demand for new products- Criteria of a good forecasting method.

Theory of Production and Cost Analysis: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

UNIT-III

Introduction to Markets & Pricing Policies: Market structures**:** Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing.Internet Pricing Models:

Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

UNIT-IV

Types of Industrial Organization & Introduction to business cycles: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

Introduction to business cycles: Meaning - Features of business cycles.

Capital and Capital Budgeting: Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

UNIT V

Introduction to Financial Accounting: Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

Interpretation and analysis of Financial Statement: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

TEXT BOOKS:

1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011
2. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011

REFERENCES:

1. **A R Aryasri -** Managerial Economics and Financial Analysis, TMH 2011
2. **Suma damodaran**- Managerial Economics, **Oxford** 2011
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.

B.Tech IV – I Semester

CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT

L	T	P	C
3	1	0	3

Course Objective:

To make the student know the fundamentals of construction, preparatory work of construction activities and representing them by bar charts and mile stone charts and to know the elements of work and planning for network construction.

UNIT I

Fundamentals Of Construction Technology:

Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations.

Preparatory Work and Implementation

Site layout – Infrastructure Development – Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – False work and Temporary Works.

UNIT II

Earthwork :

Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging.Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting.

UNIT III

Project Management, Bar Charts and Milestone Charts:

Introduction – Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT net work problems.

UNIT IV

Elements Of Network And Development Of Network:

Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems – Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems.

UNIT V

Pert and Cpm: Time Computations & Network Analysis

Introduction – Uncertainties : Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems -Earliest expected time – Formulation for TE - Latest allowable occurrence time – Formulation for TL - Combined tabular computations for TE and TL problems, Introduction -

Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for TE and TL - Start and finish times of activity – Float – Critical activities and critical path – Illustrative examples Problems

TEXT BOOKS :

1. Construction Technology by Subir K.Sarkar and Subhajit Saraswati – Oxford Higher Education- Univ.Press, Delhi.
2. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi.
3. Construction project management by Jha ,Pearson pubilications,New Delhi.

REFERENCES:

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003.
2. Operations research by P.Sankar Iyer,TMH Pubilications,New Delhi.
3. Operations research by N.Ramanathan,TMH Pubilications,New Delhi.
4. Total Project management , the Indian context- by : P.K.JOY- Mac Millan Publishers India Limited.

B.Tech IV – I Semester

FOUNDATION ENGINEERING

L	T	P	C
3	1	0	3

Course Objective:

To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically, knowledge of the subject is essential.

UNIT -I:

Lateral Earth Pressure:- Active And Passive Earth Pressure – Earth Pressure At Rest – Rankine's Theory – Active Earth Pressure For Cohesionless And Cohesive Soils – Coulomb's Earth Pressure Theory – Rebhann's And Culmann's Graphical Method - Poncelet's Construction – Culmann's Graphical Method.

UNIT-II:

Stability Of Slopes:- Types Of Slope Failures – Factor Of Safety Of Infinite Slopes – Stability Analysis Of Infinite Slopes – Swedish Circle Method – Bishop's Simplified Method Of Slices – Stability Analysis Of Slope Of Earth Dams – Friction Circle Method – Taylor's Stability Number – Improving Stability Of Slopes.

UNIT-III:

Retaining Walls:- Types Of Retaining Walls – Stability Of Retaining Walls.

Soil Exploration:- Need – Methods Of Soil Exploration – Boring And Sampling Methods – Field Tests – Penetration Tests – Plate Load Test – Pressure Meter – Planning Of Programme And Preparation Of Soil Investigation Report.

UNIT-IV:

Bearing Capacity Of Soils:- Types – Choice Of Foundation – Location Of Depth - Definition Of Bearing Capacity – Theories Of Terzaghi, Meyerhoff, Vesic, Hansen For Bearing Capacity – Bearing Capacity Of Square, Circular And Rectangular Footings – Effect Of Water Table On Bearing Capacity – Is Code Method For Bearing Capacity – Bearing Capacity And Settlements From Plate Load Test - Allowable Settlements Of Structures – Settlement Analysis.

UNIT-V:

Pile Foundation:- Classification Of Piles – Pile Driving Methods – Load Carrying Capacity Of Single Pile – Dynamic Formulae – Static Formulae As Per Is 2911 – Load Tests On Pile – Pile Groups – Spacing Of Pile – Terzaghi's Block, Shear Failure Criterion – Negative Skin Friction – Settlement Of Pile Groups.

Well Foundations:- Types – Different Shapes Of Wells – Components Of Wells - Functions And Design Criteria – Sinking Of Wells – Tilts And Shifts.

TEXT BOOKS:

1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications.
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCE BOOKS:

1. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
2. Das, B.M., - (1999) Principles of Foundation Engineering –6th edition (Indian edition) Thomson
Engineering
3. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
4. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
5. Bowles, J.E., (1988) Foundation Analysis and Design – 4th Edition, McGraw-Hill Publishing company, New York.
6. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

B.Tech IV – I Semester

ADVANCED STRUCTURAL DESIGN

L	T	P	C
3	1	0	3

Course Objective:

To make the student more conversant with the design principles of multistoried buildings, roof system, foundation and other important structures.

1. (A) Design of a flat slab(Interior panel only) ,
   (B) Design of grid floor

2. (A) Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos,
   (B) Design of concrete chimney

3. Design of Intz water tank excluding staging

4. (A)Design of circular and rectangular water tank resting on the ground,
   (B) Design of cantilever and counter forte retaining wall with horizontal back fill

5. (A) Design of slab less tread – riser stair case.
   (B) Design of Cinema balcony

TEXT BOOKS : 1. Advanced R.C.C by Krishnam Raju, CBS Publishers & distributors , New Delhi.
2. Structural Design and drawing (RCC and steel) by Krishnam Raju, Univ.Press , New Delhi
3. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi
4. Advanced RCC by Varghese , PHI Publications, New Delhi.
5. Design of RCC structures by M.L.Gambhir P.H.I. Publications, New Delhi.

REFERENCES :

1. R.C.C Designs by Sushil kumar , standard publishing house.
2. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications, New Delhi.

B.Tech IV – I Semester

GROUND IMPROVEMENT TECHNIQUES
(CBCC-I)

L	T	P	C
3	1	0	3

Course Objective:

To have knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils.

UNIT I

Dewatering: Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis .

Grouting: Objectives of grouting- grouts and their properties- grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.

UNIT II

Densification Methods

Granular Soils:-In – situ densification methods in granular Soils:– Vibration at the ground surface, Impact at theGround Surface, Vibration at depth, Impact at depth.

Cohesive Soils:– In – situ densification methods in Cohesive soils:– preloading or dewatering, Vertical drains – SandDrains, Sand wick geo-drains – Stone and lime columns – thermal methods.

UNIT III

Stabilisation: Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum

UNIT IV

Reinforced Earth: Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls.

Geosynthetics : Geo-textiles- Types, Functions and applications – geogrids and geomembranes – functions and applications.

UNIT V

Expansive Soils: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

TEXT BOOKS:

1. Haussmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition.
2. Dr.P.Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi / University science press, New Delhi
3. Nihar Ranajan Patra. Ground Improvement Techniques, Vikas Publications, New Delhi

REFERENCE BOOKS:

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons, New York, USA.
3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jersey, USA

B.Tech IV – I Semester(CE)

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
(CBCC-I)

L	T	P	C
3	1	0	3

Course Objective:

To make the student aware of the earthquakes, factors causing them, calculation of its magnitude and to design the structures resisting the earth quakes.

UNIT – I

Introduction to Structural Dynamics : – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT – II

Earthquake Analysis : - Introduction – Rigid baseexcitation – Formulation of equations of motion for SDOF System – Earthquake response analysis of single and multi-storyed buildings – Use of response spectra.

Codal Design Provisions : - Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings –Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT – III

Earthquake Engineering : - Engineering Seismology –Earthquake phenomenon – Causes and effects of earthquakes – Faults –Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams.

UNIT – IV

Codal Detailing Provisions : - Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

Shear walls : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

UNIT – V

Aseismic Planning : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity -Proximity of Adjacent Buildings.

.**TEXT BOOKS:**

!. Earthquake Resistant Design of Structures – Pankaj Agarwal &Manish Shrikhande – Printice Hall of India, New Delhi@. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, New Delhi

REFERENCES:

1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.
2. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur.
3. Structural Dynamics by Mario Paaz.
4. Earthquake Hazardous Mitijation by R.Ayothiraman and Hemanth Hazarika, I.K.International Publishing House Pvt.Ltd., New Delhi.
5. Dynamics of Structures – Clough & Penzien, McGraw Hill –International Edition

Codes/Tables:

IS Codes: IS:1893, IS:4326 and IS:13920 to be permitted into the examinations Hall.

B.Tech IV – I(CE) Semester

PRESTRESSED CONCRETE
(CBCC-I)

L	T	P	C \
3	1	0	3

Course Objective:

To have knowledge on prestressing, design and deflection of prestressed concrete beams.

UNIT – I

Introduction:

Historic development – General principles of prestressing, pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

UNIT – II

Methods Of Prestressing:-

Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing – Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel and wobble frictional losses.

UNIT – III

Analysis & Design of Sections For Flexure;-

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT – IV

Design Of Shear :

Shear and Principal Stresses – Design for Shear in beams – Analysis of stress – General designs considerations.

UNIT – V

Deflections Of Prestressed Concrete Beams:

Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long termdeflections.

TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju; - Tata Mc.Graw Hill Publications.
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications.
3. Prestressed Concrete by Ramamrutham,Dhanpatrai Publications

REFERENCE:

1. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
2. Pre stressed concrete by E.G.Nawy

Codes/Tables:

Codes: BIS code on prestressed concrete, IS 1343 to be permitted into theexamination Hall.

B.Tech IV – I Semester

ARCHITECTURE AND TOWN PLANNING
(CBCC-II)

L	T	P	C
3	1	0	3

Course Objective:

To make the student aware of the Principles of architectural Design, Functional planning of buildings, Building services, Town planning theory.

UNIT I

Principles of architectural Design: Definition of architecture: factors influencing architectural developmentcharacteristic features of a style-historical examples. Creative principles: function/strength, aesthetics - deciding the space and form - detailed analysis of factors influencing the space - activity space, circulation space and tolerance space - Factors influencing form- form perception - form expressive of functionform related with material and Structural system. Design principles - elements of composition - point, line, plane, texture, colour etc. - mass and scale, proportion, rhythm, balance and unity - iconic, canonic and analogic design - consideration of comfort factors such as acoustics, lighting, ventilation and thermal aspects.

UNIT II

Functional planning of buildings: Occupancy classification of buildings'-general requirements of site and building - building codes and rules - licencing of building works. Functional planning of building such as residential, institutional, public, commercial, industrial buildings - the process of identifying activity areas and linkages - drawing built diagrams - checking for circulation, ventilation, structural requirements and other constraints preparing sketch plan and working drawings - site plans. Kerala Municipal acts – planning regulations of corporations and developmental authorities – Kerala building bye laws.

UNIT III

Building services: Vertical Transportation: stairs - layout and details of different types of timber - masonry, steel and concrete stairs - pre-cast concrete stairs, elevators - types - traction, hydraulic operation - passenger, service goods elevators - design considerations of passenger elevators - handling capacity - arrangement of lifts - positioning, escalators, features- operation arrangement - ramps. Ventilation and air conditioning - ventilation requirements -natural and mechanical ventilation - air movement - cross ventilation - effect of orientation - radiation - evaporation, calculation of air conditioning load - summer and winter air conditioning. Plumbing services: typical details of water supply and sewage disposal arrangements for residence, hospitals and hostel buildings - standard requirements.

UNIT IV

Town planning theory: Evolution of towns: problems of urban growth - beginning of planning acts - ideal town - garden city movement - concept of new towns and conservative theory - comprehensive planning of towns- Survey and analysis of town: fare maps - land use classification - transportation network - housing demographic arid social surveys - economic studies - environmental aspects. Theories of land use planning, transportation planning and housing development. Urban area lineation: urban influence zone - urban region concept of regional planning.

UNIT V

Planning Process: Concept of master plan: structural plan, detailed town planning scheme and act. Estimating future needs: planning standards for different land use allocation for commerce, industries, public amenities, open areas etc. planning standard for density distributions-density zone, planning standards for traffic networks - standards of roads and paths - provision for urban growth-growth models. Plan implementation: town planning legislation and municipal acts - planning control development schemes - urban financing - land aquisitions - slum clearance schemes - pollution control aspects.

REFERENCES

1. Banister Fletcher, History of World Architecture, Taraporevalas.
2. Broadbent, Theory of Architecture Design, John Wiley Sons
3. Gallien, Urban Pattern, D.Van Nostrand CD. Inc.
4. Nelson P. Low's, Planning to Modern City
5. Rangwala, Town Planning, Charotar Publishing House.
6. S.C Agarwala, Architecture and Town Planning, Dhanpatrai &sons

B.Tech IV – I Semester

TRANSPORTATION ENGINEERING
(CBCC-II)

L	T	P	C
3	1	0	3

Course Objective:

Dealing with different components of transportation engineering like highway, Railway & Airport Engineering. Emphasis in a geometric design of different elements in transportation engineering.

UNIT-I:

TRAFFIC ENGINEERING:- Introduction – Road Users And Vehicle Traffic Studies – Speed And Delay Studies – Spot Speed Studies,Traffic Volume Count,Origin And Destination Surveys – Parking Surveys – Accident Studies – Pedestrian Survey – Pedestrian Facilities.

UNIT-II:

GEOMETRIC DESIGN OF STREETS AND HIGHWAYS:- Introduction – Classification Of Streets And Highways – Parameters Controlling Geometric Design,Horizontal Alignment,Vertical Alignment,Sight Distances,Cross Sectional Elements,Grade Separators(Interchanges).

UNIT-III:

TRAFFIC CONTROL AND MANAGEMENT:- Introduction – Traffic Control Devices – Signs,Markings,Delineators,Signals – Highway Capacity Concepts – Elements Of Traffic Stream,Speed – Density – Flow,Level Of Services,Design Service Volumes,Parkin Control And Regulations,One Way Streets,Bus Priorities – High Occupancy Vehicles,Lanes And Traffical Signal Desgn.

UNIT-IV:

RAILWAY TRACK AND ITS COMPONENTS:- Requirements Of An Ideal Permanent Way – Gauges In India – Selection Of Gauge – Rails – Functions And Requirements,Corrugated Or Roaring Rails,Hogged Rails,Kinks In Rails,Buckling Of Rails,Wear On Rails – Coning Of Wheels,Sleepers – Functions And Requirements,Types Of Sleepers,Spacing Of Sleepers And Sleeper Density,Ballast - Functions And Requirements,Types,Subgrade,Functions Of Subgrade Or Formation,Subgrade Materials And Their Importance.

UNIT-V:

TRACK ALIGNMENT AND GEOMETRIC DESIGN OF TRACK:- Basic Requirements – Factors Controlling Alignment,Gradients,Types Of Gradients,Grade Compensation On Curves,Speed Of The Train – Speed On Curves – Radius Or Degree Of Curvature,Superelevation Or Cant – Types Of Transition Curves – Length Of Transition Curves – Widening Of Gauge On Curves – Shifts.

INTRODUCTION TO AIR PORT ENGINEERING:- Factors Affecting Airport Site Selection – Surveys For Site Selection –Aircraft Characteristics And Their Influence On Design Elements – PlanningOf Terminal Area – Typical Air Port Layouts.

TEXT BOOKS:

1. A Text Book Of Railway Engineering-S.C.Saxena And S.Arora, Dhanpatrai And Sons, New Delhi.
2. A Text Book Of Transportation Engineering – S.P.Chandola – S.Chand & Co. Ltd. – (2001).

REFERENCE BOOKS:

1. Highway, Railway, Airport And Harbour Engineering – K.P. Subramanian, Scitech Pubilishers.
2. Satish Chandra And Agarwal, M.M. (2007) “Railway Engineering” Oxford Higher Education, University Press New Delhi 3. Railway Track Engineering By J.S.Mundrey

B.Tech IV – I Semester

REHABILITATION AND RETROFITING OF STRUCTURES
(CBCC-II)

L	T	P	C
3	1	0	3

Course Objective:

To have knowledge on the deterioration of structures, causes of corrosion, inspection, testing, repair of structures and their health monitoring.

UNIT I

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention.Mechanism of Damage – Types of Damage

UNIT II

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT III

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

UNIT IV

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

TEXT BOOKS:

1. Concrete Technology by A.R. Santakumar, Oxford University press
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications**.**

REFERENCE BOOKS:

1. Defects and Deterioration in Buildings, EF & N Spon, London
2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981)
4. Building Failures : Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson,

B.Tech IV – I Semester

CAD LAB

L	T	P	C
0	0	3	2

Course Objective:

To make the student know how to design various elements of building.

CAD:

Software:

1. STAAD PRO or Equivalent

Excercisies:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

TEXT BOOK:

1.Computer Aided Design Lab Manual by Dr. M. N. Sesha Prakash And Dr. C. S. Suresh

B.Tech IV – I Semester

GEOTECHNICAL ENGINEERING LAB

L	T	P	C
0	0	3	2

Course Objective:

To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.

List Of Experiments:

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method.
3. Grain size analysis.
4. Permeability of soil constant and variable head test.
5. Compaction test.
6. CBR Test.
7. Consolidation test.
8. Unconfined compression test.
9. Tri-axial Compression test.
10. Direct shear test.
11. Vane shear test.

List Of Equipment:

1. Casagrande's liquid limit apparatus.
2. Apparatus for plastic and Shrinkage limits
3. Field Density apparatus for a) Core cutter method
   b) Sand Replacement method
4. Set of sieves: 4.75mm, 2mm, 1mm, 0.6mm, 0.42mm, 0.3mm, 5.15mm, and 0.075mm.
5. Hydrometer
6. Permeability Apparatus for a) Constant Head test
   b) Variable Head test
7. Universal Auto compactor for I.S light and heavy compaction tests.
8. Apparatus for CBR test
9. Sampling tubes and sample extractors.
10. 10 tons loading frame with proving rings of 0.5 tons and 5 tons capacity
11. One dimensional consolation test apparatus with all accessories.
12. Tri-axial cell with provision for accommodating 38 mm dia specimens.
13. Box shear test apparatus
14. Laboratory vane shear apparatus.
15. Hot Air ovens (Range of Temperature 50-1500C
16. Moisture cans – 2 dozens.
17. Electronic balances 500 g capacity with 0.01g least count and 5 kg capacity with least count of1gm
18. Measuring Jars - 1000CC- 6- 100CC- 4
19. Mercury - 500 g
20. Rammers – 2 Crow bars - 2

TEXT BOOKS:

1. Soil Testing Lab Manual by K.V.S. Appa Rao & V.C.C.Rao,University Science Press , Laxmi Publication.
2. Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, New Delhi.
3. Relevant IS Codes.

B.Tech IV – II Semester

ESTIMATION, COSTING AND VALUATION

L	T	P	C
3	1	0	3

Course Objective:

The objective of the course is to make the student to understand about estimation and valuations of different types of structures and their valuation as per standard schedule of rates.

UNIT – I

Introduction: General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates –Approximate method of Estimating.

Estimation Of Buildings: Detailed Estimates of Buildings

UNIT – II

Earthwork Estimation: Earthwork for roads and canals.

UNIT – III

Reinforcement Estimation: Reinforcement bar bending and bar requirement schedules.

UNIT – IV

Rate Analysis: Working out data for various items of work over head and contigent charges.
Standards Specifications: Standard specifications for different items of building construction

UNIT – V

Contracts And Tenders: Contracts – Types of contracts –Contract Documents –Conditions of contract – Types of Tenders –Requirement of Tendering.
Valuation: Valuation of buildings.
.

TEXT BOOKS

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Estimating and Costing by G.S. Birdie
3. Contracts and estimations by B.S.Patil, Univ.Press, New Delhi.

REFERENCES :

1. Standard Schedule of rates and standard data book by public works department.
2. I. S. 1200 (Parts I to XXV – 1974/ method of measurement of building and Civil Engineering works – B.I.S.)
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.
4. National Building Code

Note : Standards scheduled of rates is permitted in the examination hall.

B.Tech IV – II Semester

DESIGN AND DRAWING OF IRRIGATION STRUCTURES

L	T	P	C
3	1	0	3

Course Objective:

To know various irrigation structures and make the student capable to design and draw them.

Design and drawing of the following irrigation structures.

1.Surplus weir
2. Tank sluice with tower head
3. Trapezoidal notch fall.
4. Canal regulator.
5. Sloping glacis weir.

Final Examination pattern: Any two questions of the above five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

TEXT BOOKS:

1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard Book House.

R15 REGULATIONS

COURSE STRUCTURE

FOR

B.TECH –CIVIL ENGINEERING
w.e.f.

2015 ADMITTED BATCH



DEPARTMENT OF CIVILENGINEERING

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

PULIVENDULA-516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA

COURSE STRUCTURE OF R15 REGULATIONS FOR B.TECH IN CIVIL ENGINEERING

I Year I Semester

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	15AHS01	Functional English	3+1	-	3
2	15ABS06	Mathematics - I	3+1	-	3
3	15ACS01	Computer Programming	3+1	-	3
4	15ABS03	Engineering Chemistry	3+1	-	3
5	15ABS05	Environmental Studies	3+1	-	3
6	15AME02	Engineering Mechanics	3+1	-	3
7	15AHS02	English Language Communication Skills Lab	-	3	2
8	15ACS02	Computer Programming Lab	-	3	2
9	15ABS04	Engineering Chemistry Lab	-	3	2
		Total	25	09	24

I Year II Semester

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	15AHS03	English for Professional Communication	3+1	-	3
2	15ABS07	Mathematics - II	3+1	-	3
3	15ABS01	Engineering Physics	3+1	-	3
4	15AME01	Engineering Drawing	3+1	-	3
5	15ACE01	Strength of Materials -I	3+1	-	3
6	15ACE03	Building Materials and Construction	3+1	-	3
7	15ACE02	Strength of Materials Lab	-	3	2
8	15ABS02	Engineering Physics Lab	-	3	2
9	15AME03	Engineering and IT Workshop	-	3	2
		Total	**24**	**09**	**24**

II Year I Semester

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/ Lab	Credits
1	15ABS08	Mathematics - III	3+1	-	3
2	15ACE04	Surveying-I	3+1	-	3
3	15AME06	Fluid Mechanics	3+1	-	3
4	15ACE06	Engineering Geology	3+1	-	3
5	15ACE08	Strength of Materials -II	3+1	-	3
6	Choice based credit course of inter department ANNEXURE-I		3+1	-	3
7	15ACE05	Surveying –I Lab	-	3	2
8	15ACE07	Engineering Geology Lab	-	3	2
9	15AHS04	Human Values and Professional Ethics(Audit Course)	2		
		Total	**26**	**06**	**22**

ANNEXURE-I

Choice Based Credit Course of Inter Department offered in

B.TECH II YEAR I SEMESTER

BRANCH	SUBJECT CODE	SUBJECT NAME
PHYSICS	15ABS12	Basics of Nano Science and Nano Technology
MATHEMATICS	15ABS14	Set Theory and Mathematical Logic
	15ABS23	Mathematical Modeling
CHEMISTRY	15ABS15	Green Chemistry and Catalysis for Sustainable Environment
	15ABS16	Instrumental Methods of Chemical Analysis
	15ABS17	Chemistry of Nano Material and Application
ENGLISH	15AHS08	Campus Recruitment Training & Soft Skills
	15AHS09	Competitive & Spoken English
CE	15ACE09	Green Buildings
	15ACE10	Disaster Management and Mitigation
	15ACE11	Water Harvesting and Conservation
ECE	15AEC08	Basic Electronics
	15AEC09	Fundamentals of Digital Electronics
	15AEC10	Electronic Measurements & Instrumentation
ME	15AME11	Robotics
	15AME12	Mechanical Manufacturing Process
	15AME13	Non-Conventional Sources of Energy
EEE	15AEE08	Principles of electrical engineering
	15AEE01	Electrical engineering materials
	15AEE09	Electrical measuring instruments
CSE	15ACS04	Data Structures
	15ACS11	Object oriented Programming
	15ACS08	Operating Systems

II Year II Semester

S.No.	Course Code	Subject Name	Theory/Tutorial	Drawing/Lab	Credits
1	15ABS09	Probability and Statistics	3+1	-	3
2	15AME14	Hydraulics and Hydraulic Machinery	3+1	-	3
3	15ACE12	Surveying-II	3+1	-	3
4	15ACE14	Structural Analysis-I	3+1	-	3
5	15ACE15	Building Planning and Drawing	3+1	-	3
6	15ACE16	Hydrology and Water Resource Engineering	3+1	-	3
7	15AME23	Fluid Mechanics, Hydraulics and Hydraulic Machinery Lab		3	2
8	15ACE13	Surveying-II Lab	-	3	2
9	15ACE17	Comprehensive Online Examination	-		1
		Total	26	06	23

III YEAR I SEMESTER

S.No.	Course Code	Subject Name	Theory /Tutorial	Drawing /Lab	Credits
1	15AHS05	Managerial Economics & Financial Analysis	3+1	-	3
2	15ACE18	Structural Analysis–II	3+1	-	3
3	15ACE19	Concrete Technology	3+1	-	3
4	15ACE20	Design of Reinforced Cement Concrete Structures	3+1	-	3
5	15ACE21	Geotechnical Engineering – I	3+1	-	3
6	15ACE22	Environmental Engineering –I	3+1	-	3
7	15ACE23	Concrete Technology Lab	-	3	2
8	15ACE24	Geotechnical Engineering Lab	-	3	2
		TOTAL	24	06	22

III YEAR II SEMESTER

S.No.	Course Code	Subject Name	Theory /Tutorial	Drawing /Lab	Credits
1	15ACE31	Design of Steel Structures	3+1	-	3
2	15ACE32	Geotechnical Engineering–II	3+1	-	3
3	15ACE33	Highway Engineering	3+1	-	3
4	15ACE34	Environmental Engineering–II	3+1	-	3
5		**MOOC-I**	3+1	-	3
6	**Annex-II**	**Choice Based Credit Course (Inter Department)**	3+1	-	3
7	15ACE38	Environmental Engineering Lab	-	3	2
8	15ACE39	Highway Engineering Lab	-	3	2
9	15AHS06	Advanced Communication Skills Lab (Audit Course)	-	3	-
10	15ACE40	Comprehensive Online Examination	-	-	1
		TOTAL	24	09	23

ANNEXURE-II

CHOICE BASED CREDIT COURSE OF INTER DEPARTMENT

Branch	Subject Code	Subject Name
MATHEMATICS	15ABS18	FUZZY SETS AND APPLICATIONS
	15ABS19	OPTIMIZATION TECHNIQUES
CHEMISTRY	15ABS20	CHEMISTRY ENERGY MATERIALS
	15ABS21	CHEMISTRY OF LIFE
	15ABS22	CHEMISTRY OF POLYMERS AND THEIR APPLICATIONS
CE	15ACE35	REMOTE SENSING & GIS
	15ACE36	ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT
	15ACE37	FINITE ELEMENT METHODS
EEE	15AEE19	POWER ELECTRONICS
	15AEE34	RENEWABLE ENERGY SOURCES
	15AEE35	UTILIZATION OF ELECTRICAL ENERGY
ME	15AME35	OPTIMIZATION TECHNIQUES BY MATLAB
	15AME36	MECHATRONICS & MEMS
	15AME37	AUTOMOTIVE ELECTRONICS
ECE	15AEC34	FUNDAMENTALS OF COMMUNICATION SYSTEMS
	15AEC35	INDUSTRIAL ELECTRONICS
	15AEC36	NEURAL NETWORKS & FUZZY LOGIC
CSE	15ACS35	MOBILE COMPUTING
	15ACS36	OPTIMIZATION TECHNIQUES
	15ACS37	MACHINE LEARNING

IV YEAR I SEMESTER

S.No.	Course Code	Subject Name	Theory/ Tutorial	Drawing /Lab	Credits
1	15AHS07	Management Science	3+1	-	3
2	15ACE51	Advanced Structural Engineering	3+1	-	3
3	15ACE52	Bridge Engineering	3+1	-	3
4		**MOOC-II**	3+1	-	3
5	**Choice Based Credit Course(Department Specific)**		3+1	-	3
	15ACE53	Ground Improvement Techniques			
	15ACE54	Earth Quake Resistant Design Of Structures			
	15ACE55	Prestressed Concrete			
6	**Choice Based Credit Course (Department Specific)**		3+1	-	3
	15ACE56	Architecture And Town Planning			
	15ACE57	Retrofitting And Rehabilitation Of Structures			
	15ACE58	Transportation Engineering			
7	15ACE59	CAD Lab	-	3	2
8	15ACE60	Survey Camp	-	3	2
		TOTAL	24	06	22

IV YEAR II SEMESTER

S.No	Course Code	Subject Name	Theory/ Tutorial	Drawing /Lab	Credits
1	15ACE81	Estimating Costing And Valuation	3+1	-	3
2	15ACE82	Design And Drawing Of Irrigation Structures	3+1	-	3
3	15ACE83	Construction Technology And Project Management	3+1	-	3
4		**MOOC-III**	3+1	-	3
5	15ACE99	Seminar and Project Work	-	20	10
		TOTAL	16	20	22

I B.Tech I Sem

15AHS01-FUNCTIONAL ENGLISH
(Common For All Branches)

L	T	P	C
3	1	0	3

1. Introduction:

English is an international language as well as a living and vibrant one. People have found that knowledge of English is a passport for better career, better pay, and advanced knowledge and for communication with the entire world. As it is a language of opportunities in this global age, English is bound to expand its domain of use everywhere. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The texts prescribed for detailed study focus on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. Objectives:

1. To enable the students to communicate in English for academic and social purpose.
2. To enable the students to acquire structure and written expressions required for their profession.
3. To develop the listening skills of the students.
4. To inculcate the habit of reading and critical thinking skills.
5. To enhance the study skills of the students with emphasis on LSRW skills.

3. SYLLABUS:

UNIT –I

Reading: What Is My Name? —P Sathyavathi
Writing: Paragraph writing
Listening: Listening for sounds, stress
Functional English: Greeting, taking leave and introducing oneself and others
Grammar: Nouns -classification
Vocabulary: Homonyms
Non Detailed Study: Listening Skills from English and Soft Skills

UNIT-II

Reading : SWOT Analysis of the Indian software Industry (from Mindscapes)
Writing : Essay Writing
Listening : Listening for theme -1
Functional English: Making requests
Grammar: Pronouns
Vocabulary : Homophones
Non detailed Study: Teamwork Skills

verified / checked

UNIT-III

Reading : How To Regain Green Cover? (From Mindscapes)
Writing Descriptive essays
Listening :Listening for theme -2
Functional English : Asking for the time and directions
Grammar: Articles
Vocabulary : Homographs
Non detailed Study : Emotional Intelligence Skills

UNIT-IV

Reading : The Kitchen — Vimala
Writing Narrative essays- Expository essays - Argumentative essays
Listening: Listening for main ideas
Functional English: Inviting -Apologizing
Grammar: Kinds of verbs – Auxiliaries- Adjectives
Vocabulary : Synonyms - Antonyms.
Non detailed Study : Assertive Skills

UNIT-V

Reading: Adivasis — Kancha Ilaiah
Writing: Letter Writing –official letters-business letters
Listening: Listening for details
Functional English: Interrupting - Asking for and giving opinions
Grammar: Tenses -Adverbs
Vocabulary: Prefixes -Suffixes
Non detailed Study: Learning Skills

Prescribed Text books:

Detailed text: **English for Fluency**, K Purushottam, Orient Black Swan,2013.
Non detailed text: **English and Soft Skills**, S P Danavel, Orient Black Swan 2013Edition.

References:

1. Mindscapes, English For Technologists And Engineers, Orient Black Swan,2012.
2. A Practical Course in Effective English Speaking Skills. J.K.Gangal, PHI, New Delhi.2012
3. Fundamentals of Technical Communication, Meenakshi Raman, Oxford University Press,2015.
4. Spoken English, R.K. Bansal & JB Harrison, Orient Longman,2013, 4Th edition.
5. Murphy's English Grammar with CD, Murphy, Cambridge University Press,3 Rd edition.
6. Advanced English Grammar , Martin Hewings Cambridge University Press 2007

Expected Outcomes:

At the end of the course, students would be expected to:

1. Have improved communication in listening, speaking, reading and writing skills in general.
2. Have developed their oral communication and fluency in group discussions and interviews.
3. Have improved awareness of English in science and technology context.
4. Have achieved familiarity with a variety of technical reports.

I B.Tech I Sem

15ABS06-MATHEMATICS – I
(Common For All Branches)

L	T	P	C
3	1	0	3

Objectives

- To train the students thoroughly in Mathematical concepts of ordinary differential equations and their applications.
- To prepare students for lifelong learning and successful careers using mathematical concepts of differential and Integral calculus, ordinary differential equations and vector calculus.
- To develop the skill pertinent to the practice of the mathematical concepts including the students' abilities to formulate and modeling the problems, to think creatively and to synthesize information.

UNIT – I

Exact, linear and Bernoulli equations, Applications to first order equations; Orthogonal trajectories, Simple electric circuits, Non-homogeneous linear differential equations of second and higher order with constant coefficients with RHS term of the type e^{ax}, sin ax, cos ax, polynomials in x, e^{ax} V(x), xV(x), Method of variation of parameters.

UNIT – II

Linear equations with variable coefficients: Euler-Cauchy Equations, Legendre's linear equation. Applications of linear differential equations- Mechanical and Electrical oscillatory circuits.

UNIT – III

Functions of Severable Variables:

Functions of severable variables, level curves, Limits, Continuity, Partial derivatives, chain Rule, Directional derivative, gradient vectors, Tangent planes & normal line, Maximum, Minimum & Saddle points of functions of two or three variables, Constrained Maxima & Minima, Method of Lagrange multipliers.

UNIT – IV

Multiple Integrals:

Double Integrals, Area, Change of integrals to Polar Coordinates, Change of order of integration, Triple Integrals in Cartesian, Cylindrical and Spherical Coordinates.

UNIT – V

Vector Calculus:

Line integral, work, circulation, flux, path independence, potential function, conservative fields; Green's theorem in the plane (without proof), Surface area & Surface Integral; Stokes theorem, Gauss divergence theorem (without proof) and simple problems.

2.7.2018

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Weir, MD, Hass J, Giordano FR: Thomas' Calculus Pearson education 11th ED, 2008.(Unit-III, IV & V)

References:

1. Engineering Mathematics-I, E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.

Outcomes: At the end of the course, the student will be able to attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications, using Ordinary Differential Equations, Multiple Integrals and Vector Calculus.

2.7.2018

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR ENGINEERING COLLEGE PULIVENDULA

I B.Tech I Sem

15ACS01-COMPUTER PROGRAMMING
(Common For All Branches)

L	T	P	C
3	1	0	3

Course Objectives:

- To make the student understand problem solving techniques
- Students will be able to understand the syntax and semantics of C programming language and other features of the language

Course Outcomes:

- Student can effectively apply problem solving techniques in designing the solutions for a wide-range of problems
- Student can choose appropriate data structure and control structure depending on the problem to be solved
- Student can modularize the problem and also solution

UNIT –I

Fundamentals of Computers: What is Computer, Applications of Computers, Evaluation of Computers, Generations of Computers, Basic I/O Devices, Computer Software, Types of computer, Software Development Methodology, Top-Down Vs Bottom –Up Approaches, Problem Solving, Fundamental Techniques to Solve The Problem, Representation of a solution to a Problem, Developing a computer program, Number Systems.

Fundamentals of C: An Overview of C, A Brief History of C , C Is a Middle-Level Language , C Is a Structured Language ,C Is a Programmer's Language Compilers Vs. Interpreters , The Form of a C Program, The Library and Linking, Separate Compilation, Compiling a C Program, C's Memory Map.

UNIT –II

Expressions: The Basic Data Types, Modifying the Basic Types, Identifier Names, Variables, The Four C Scopes, Type Qualifiers, Storage Class Specifiers,, Variable Initializations, Constants.

Operators: The Assignment Operator, Arithmetic Operators, The Increment and Decrement Operators, Relational and Logical Operators, Bitwise Operators, The ? Operator, The & and * Pointer Operators, The Compile-Time Operator sizeof, The Comma Operator, The Dot (.) and Arrow (–>) Operators, The [ ] and ( ) Operators, Precedence Summary, Expressions, Statements.

Conditional, unconditional and Iteration Statements: Selection Statements, Iteration Statements, Jump Statements, Expression Statements

UNIT –III

Arrays and Strings: Single-Dimension Arrays, Generating a Pointer to an Array, Passing Single Dimension Arrays to Functions , Strings, Two-Dimensional Arrays, Multidimensional Arrays, Indexing Pointers, Array Initialization, Variable-Length Arrays, A Tic-Tac-Toe Example.

Console I/O: Reading and Writing Characters, Reading and Writing Strings. Formatted Console I/O: printf( ), scanf( ), Suppressing Input.

Functions: The General Form of a Function, Understanding the Scope of a Function, Function Arguments, argc and argv— Arguments to main( ), The return Statement ,What Does main( ) Return? , Recursion, Function Prototypes, Declaring Variable Length Parameter Lists, The "Implicit int" Rule, Old Style Vs. Modern Function Parameter Declarations, The inline Keyword.

UNIT-IV

Pointers: What Are Pointers?, Pointer Variables, The Pointer Operators, Pointer Expressions, Pointer Assignments, Pointer Conversions, Pointer Arithmetic, Pointer Comparisons, Pointers and Arrays, Arrays of Pointers, Multiple Indirection, Initializing Pointers, Pointers to Functions, C's Dynamic Allocation Functions, Dynamically Allocated Arrays, restrict-Qualified Pointers, Problems with Pointers.

Structures, Unions, Enumerations, and typedef: Structures , Arrays of Structures, A Mailing List Example, Passing Structures to Functions, Structure Pointers, Arrays and Structures within Structures.

Unions, Bit-Fields , Enumerations, Using sizeof to Ensure Portability, typedef.

UNIT –V

File I/O: Standard C Vs. Unix File I/O, Streams and Files, File System Basics, fread( ) and fwrite(), Using fread( ) and fwrite( ), fseek( ) and Random-Access, fprintf( ) and fscanf( ), The Standard Streams, The Console I/O Connection, Using freopen( ) to Redirect the Standard Streams.

The Preprocessor and Comments: The Preprocessor, #define, #error, #include, Conditional Compilation Directives, #undef, Using defined, #line . #pragma, The # and ## Preprocessor Operators,Predefined Macro Names,Comments, Single-Line Comments.

Text book:

1. **"Computer Fundamentals and C Programming"** :Dr. P. Chenna Reddy, Professor of CSE, JNTUA College of Engg, Pulivendula, YSR District, Andhra Pradesh, INDIA. (unit-I)
2. **"The Complete Reference C":** Fourth Edition Herbert Schildt Osborne/McGraw-Hill.(Unit-2,3,4,5).

References:

1. "Programming in C", Pradip Dey, Manas Ghosh, Oxford Higher Education
2. "Programming in C and Data Structures", Hanly, Koffman, Kamthane, Ananda Rao, Pearson.
3. "Programming in C", Reema Thareja, Oxford Higher Education.
4. "Computer Fundamentals and C Programming", First Edition, Dr.P.Chenna Reddy, Available at: www.pothi.com.
5. "Data Structure and Program Design in C", Second Edition, Kruse, Tondo, Leung, Mogalla, Pearson.
6. "Programming with C", R.S. Bichkar, University Press.
7. "Computer Science A Structured Programming Approach Using C", Third Edition, Fourouzan & Gilberg, Cengage Learning
8. "Programming with C", Byron Gottfried, Third Edition, Schaum's Outlines, 3rd edition, 2010, Mc Graw Hill.

R-15

I B.Tech I Sem

15ABS03-ENGINEERING CHEMISTRY

(Common for CE & ME)

L	T	P	C
3	1	0	3

Course Objectives :

- The Engineering Chemistry course for undergraduate students is framed to strengthen the fundamentals of chemistry and then build an interface of theoretical concepts with their industrial/engineering applications.
- The course main aim is to impart in-depth knowledge of the subject and highlight the role of chemistry in the field of engineering.
- The lucid explanation of the topics will help students understand the fundamental concepts and apply them to design engineering materials and solve problems related to them. An attempt has been made to logically correlate the topic with its application.
- The extension of fundamentals of electrochemistry to energy storage devices such as commercial batteries and fuel cells is one such example.
- After the completion of the course, the student would understand about the concepts of chemistry in respect of Electrochemical cells, fuel cells, mechanism of corrosion and factors to influence, polymers with their applications, engineering materials and water chemistry.

UNIT-I: Water Treatment

Impurities in water, Hardness of water and its Units, Disadvantages of hard water, Estimation of hardness by EDTA method, Numerical problems on hardness, Estimation of dissolved oxygen, Alkalinity, acidity and chlorides in water, Water treatment for domestic purpose (Chlorination, Bleaching, ozonisation, U.V. treatment)

Industrial Use of water:

For steam generation, troubles of Boilers: Scale & Sludge, Priming and Foaming, Caustic Embrittlement and Boiler Corrosion.

Treatment of Boiler Feed water:

Internal Treatment: Colloidal, Phosphate, Carbonate, Calgon and sodium aluminate treatment.

External Treatment: Ion-Exchange and Permutit processes.

Demineralisation of brackish water: Reverse Osmosis and Electrodialysis

UNIT-II: Electrochemistry

i).Review of electrochemical cells, Numerical calculations, Batteries: Rechargeable batteries (Lead acid, Ni-Cd, Lithium Ion Batteries),Fuels cells: (Hydrogen-Oxygen and Methanol-Oxygen)

ii). Voltammetry: Basic Principles and applications (Ferrous/Ferric System)

Electrochemical sensors: Potentiometric Sensors and voltammetric sensors. Examples : analysis of Glucose and urea

iii).Corrosion: Electrochemical Theory of corrosion, Factors affecting the corrosion. Prevention: Anodic and cathodic protection and electro and electroless plating.

UNIT-III: Polymers

i). Introduction: Basic concepts of polymerisation, Types of poloymerisation (Chain Growth (Addition), Step growth (Condensation)), Mechanism: cationic, anionic, free radical and coordination covalent, Polydispercity Index.

Plastomers: Thermosetting and Thermoplatics, Preparation, properties and Engineering applications, PVC, Bakelite, nylons, Polyester Elastomers (rubbers) Natural Rubber; Processing of natural rubber, Compounding of Rubber

Synthetic Rubber: Preparation, properties and engineering applications of Buna-S, buna-N, Polyurethene, Polysulfide (Thiokol) rubbers

ii).Conducting polymers: Mechanism, synthesis and applications of polyacetyline, polyaniline.

iii).Liquid Crystals: Introduction, classification and applications

iv).Inorganic Polymers: Introduction, Silicones, Polyphospazins (-(R)2-P=N-), applications

UNIT-IV: FUEL TECHNOLOGY

Classifications of Fuels – Characteristics of Fuels- Calorific Value – Units, Numerical Problems.

i). Solid Fuels–Coal, Coke: Manufacture of Metallurgical Coke by Otto Hoffmann's by product oven processes.

ii).Liquid Fuels:

Petroleum: Refining of Petroleum, Gasoline: Octane Number, Synthetic Petrol: Bergius Processes, Fischer Troph's synthesis

Power Alcohol: Manufacture, merits and demerits of Power Alcohol

iii). Gaseous Fuels: Origin, Production and uses of Natural gas, Producer gas, Water gas, Coal gas and Biogas. Flue Gas analysis by Orsat's apparatus, Solving of problems on Combustion.

iv). Bio Fuels: Biogas, Biodiesel and their significance

UNIT-V: CHEMISTRY OF ENGINEERING MATERIALS

i).Semiconducting and Superconducting materials-Principles and some examples

ii).Magnetic materials – Principles and some examples

iii).Cement: Composition, Setting and Hardening (Hydration and Hydrolysis)

iv).Refractories: Classification, properties and applications

v).Lubricants: Classification and characteristics of lubricants, Theory of lubrication.

Expected Outcomes (EO): The student is expected to:

- Understand the electrochemical sources of energy
- Understand industrially based polymers, various engineering materials.
- Differentiate between hard and soft water. Understand the disadvantages of using hard water domestically and industrially. Select and apply suitable treatments domestically and industrially.

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, New Delhi, Foruth Edition, 2013.
2. A Text Book of Engineering Chemistry, Jain and Jain, Dhanapath Rai Publishing Company, New Delhi, 15th Edition, 2012.

References:

1. A Text book of Engineering Chemistry by S.S Dhara, S.S.Umare, S. Chand Publications, New Delhi, 12th Edition, 2010.
2. Engineering Chemistry, K. Sesha Maheswaramma and Mrudula Chugh, Pearson Education, First Edition, 2013.
3. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH, Publications India Pvt Limited, Chennai, 2nd Edition, 2012.
4. Concepts of Engineering Chemistry- Ashima Srivastavaf and N.N. Janhavi, Acme

I B.Tech I Sem

15ABS05-ENVIRONMENTAL STUDIES

(Common for CE & ME)

L	T	P	C
3	1	0	3

Objectives

- To investigate the relationship between human life and environment from scientific prospective
- To help you apply the fundamentals of Environmental science to important local, regional, national and global environmental problems and potential issues

UNIT-I:

i) Multidisciplinary nature of environmental studies

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

ii) Natural Resources:

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

UNIT-II:

i) Ecosystems

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem: -

a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

ii) Biodiversity and its Conservation

Introduction-Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation.

Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III: Environmental Pollution:

Definition - Causes, effects and control measures of: -

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution

e. Noise pollution f. Thermal pollution g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes.

Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

UNIT-IV: Social Issues and the Environment

From Unsustainable to Sustainable development. Urban problems related to energy.

Water conservation, rain water harvesting, watershed management.

Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.

Wasteland reclamation.

Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.

Issues involved in enforcement of environmental legislation. Public awareness.

UNIT-V:

i) Human Population and the Environment

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. - Women and Child Welfare. Role of information Technology in Environment and human health.

- Case Studies.

ii) Field Work

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Expected Outcome:

- **Describe the structure and function of significant environmental systems**
- **Use scientific reasoning to identify and understand environmental problems and evaluate potential solutions**
- **Critically evaluate arguments regarding environmental issues**

Text Books:

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4th edtion, 2014

2. De A.K., Environmental Chemistry, Wiley Eastern Ltd , 2012

Reference Books

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad -380013, India, Email: mapin@icenet. net (R).

2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.

3. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.

I B.Tech I Sem

15AME02-ENGINEERING MECHANICS

(Common for CE & ME)

L	T	P	C
3	1	0	3

Objective:

Through this course students will advance their development of the following specific capabilities:

1. Ability to utilise scalar and vector analytical techniques for analysing forces in statically determinate structures.
2. Ability to apply fundamental concepts of kinematics and kinetics of particles to the analysis of simple, practical problems.
3. This course will serve as a basic course by introducing the concepts of basic mechanics which will help as a foundation to various courses.

UNIT I

Introduction of Engineering Mechanics - Basic concepts - System of Forces - Moment of Forces and its Application - Couples and Resultant of Force System - Equilibrium of System of Forces - Degrees of Freedom - Free body diagrams -Types of Supports - Support reactions for beams with different types of loading - concentrated, uniformly distributed and uniformly varying loading.

UNIT II

Friction: Types of friction- laws of Friction - Limiting friction- Cone of limiting friction- static and Dynamic Frictions - Motion of bodies - Wedge, Screw jack and differential Screw jack.

UNIT III

Centroid and Center of Gravity: Centroids of simple figures - Centroids of Composite figures - Centre of Gravity of bodies - Area moment of Inertia - Parallel axis and perpendicular axis theorems - Moments of Inertia of Composite Figures.

Mass Moment of Inertia: Moment of Inertia of Simple solids - Moment of Inertia of composite masses.(Simple problems only)

UNIT IV

Kinematics: Rectilinear and Curvilinear motion - Velocity and Acceleration - Motion of A Rigid Body - Types and their Analysis in Planar Motion.

Kinetics: Analysis as a particle and Analysis as a Rigid Body in Translation - Central Forces of motion - Equations of Plane Motion - Fixed Axis Rotation - Rolling Bodies - Work Energy Method - Equation for Translation - Work Energy application to Particle Motion, Connection System - Fixed axis Rotation and Plane Motion.

UNIT V

Analysis of Perfect Frames: Types of frames - cantilever frames and simply supported frames - Analysis of frames using method of joints, method of sections and tension coefficient method for vertical loads, horizontal loads and inclined loads.

Head
Mechanical Engineering Department,
JNTUA College of Engineering,
PULIVENDULA - 516 390.

Mechanical Vibrations: Definitions, Concepts-Simple Harmonic motion-Free vibrations-Simple Compound and Torsional pendulum- Numerical problems

Text Books:

1. Engineering Mechanics by Bavikatti - Pearson Education.
2. Engineering Mechanics by A.Nelson.
3. Engineering Mechanics - B. Bhattacharyya, Oxford University Publications.

Reference Books:

1. Engineering Mechanics by Fedrinand L.Singer - Harper Collings Publishers.
2. Engineering Mechanics by Seshigiri Rao, Universities Press, Hyderabad.
3. Engineering Mechanics (Statics and Dynamics) by Hibller and Gupta; Pearson Education.
4. Engineering Mechanics by S.Timoshenko, D.H.Young and J.V.Rao, Tata McGraw-Hill Company.
5. Engineering Mechanics by Chandramouli, PHI publications.
6. Engineering Mechanics -Arthur P. Boresi and Richard J. Schmidt. - Brooks/Cole - Cengage Learning.

Course outcomes:

After learning this course, Students will be able to

- Solve for the resultants of any force systems
- Determine equivalent force systems
- Determine the internal forces in plane frames, simple span trusses and beams
- Solve the mechanics problems associated with friction forces
- Obtain the centroid, first moment and second moment of an area .
- Describe the motion of a particle in terms of its position, velocity and acceleration in different frames of reference
- Analyze the forces causing the motion of a particle

Head
Mechanical Engineering Department,
JNTUA College of Engineering,
PULIVENDULA - 516 390.

I B.Tech I Sem

15AHS02-ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

(Common For All Branches)

L	T	P	C
0	0	3	2

The **Language Lab** focuses on the production and practice of sounds of language and familiarizes the students with the use of English in everyday situations and contexts.

Objectives:

- To enable students to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence
- To train students to use language appropriately for interviews, group discussion and public speaking

Syllabus:

UNIT-I

1. Phonetics -importance
2. Introduction to Sounds of Speech
3. Vowels and consonants sounds
4. Phonetic Transcription

UNIT-II

5. Word Stress
6. Strong and weak forms
7. Sentence stress and Intonation

UNIT-III

8. Communication skills –process & barriers
9. Role Plays & JAM
10. Describing people/objects/places

UNIT-IV

11. Debates & Group Discussions
12. Speeches for Special Occasions
13. Group Discussions
14. Interview skills

UNIT-V

15. Writing video speeches
16. Book reviews -oral and written

Minimum Requirement For Elcs Lab:

The English Language Lab shall have two parts:

1. Computer Assisted Language Learning (CALL) Lab: The Computer aided Language Lab for 60 students with 60 systems, one master console, LAN facility and English language software for self- study by learners.
2. The Communication Skills Lab with movable chairs and audio-visual aids with a P.A. system, Projector, a digital stereo-audio & video system and camcorder etc.
   System Requirement (Hardware component):
   Computer network with Lan with minimum 60 multimedia systems with the following specifications:
   i) P – IV Processor
      a) Speed – 2.8 GHZ
      b) RAM – 512 MB Minimum
      c) Hard Disk – 80 GB
   ii) Headphones of High quality

Suggested Software:

1. Clarity Pronunciation Power – Part I (Sky Pronunciation)
2. Clarity Pronunciation Power – part II
3. K-Van Advanced Communication Skills
4. Walden InfoTech Software.

Reference Books:

1. Spring Board Success, Sharada Kouhik, Bindu Bajwa, Orient Blackswan, Hyderbad, 2010.
2. Technical English – Dr. M. Sambaiah- Wiley India Pvt. Ltd..NewDelhi. 2014.
3. A Textbook of English Phonetics for Indian Students 2nd Ed T. Balasubramanian. (Macmillian),2012.
4. A Course in Phonetics and Spoken English, Dhamija Sethi, Prentice-Hall of India Pvt.Ltd
5. Speaking English Effectively, 2nd Edition Krishna Mohan & NP Singh, 2011. (Mcmillan).
6. A Hand book for English Laboratories, E.Suresh Kumar, P.Sreehari, Foundation Books,2011

Expected Outcomes:

- Become active participants in the learning process and acquire proficiency in spoken English.

Speak with clarity and confidence thereby enhance employability skills.

verified

I B.Tech I Sem

15ACS02-COMPUTER PROGRAMMING LAB

(Common For All Branches)

L	T	P	C
0	0	3	2

WEEK	LIST OF EXPERIMENTS
1	Practice DOS Commands necessary for design of C Programs.
2	Practice LINUX Commands necessary for design of C Programs.
3	Practice the Raptor Tool
4	a. Write a program to perform arithmetic operations. b. Write a program to exchange two numbers without using temporary variable c. Write a program to exchange two numbers with temporary variable d. Write a program to find the maximum of three numbers
5.	a. Write a program for s=ut+1/2at^2 b. Write a program to find area of square, circle and rectangle. c. Write a program to find the maximum of two numbers using ternary operator. d. Write a program for sum of first N natural numbers.
6	a. Write a program to compute the factorial of a given number. b. Write a program to check whether the number is prime or not. c. Write a program to check for number palindrome. d. Write a program to generate Fibonacci numbers in the given range.
7	a. Write a program to find the sum of the digits of a number. b. Write a program to find the sum of positive and negative numbers in a given set of numbers. c. Write a program to perform the operations addition, subtraction, multiplication of complex numbers. d. Write a program to find the sum of first and last digit numbers in a given number.
8	a. Write a program to read two matrices and print their sum and product in the matrix form. b. Write a program to find the maximum of a set of numbers. c. Write a program to read matrix and perform the following operations. a. Find the sum of Diagonal Elements of a matrix. b. Print Transpose of a matrix. c. Print sum of even and odd numbers in a given matrix.
9	a. Write a program to accept a line of characters and print the count of the number of Vowels, Consonants, blank spaces, digits and special characters. b. Write a program to insert a substring in to a given string and delete few characters from the string. Don't use library functions related to strings. c. Write a program to read two strings and perform the following operations without using built-in string Library functions and by using your own implementations of functions. i. String length determination ii .Compare Two Strings iii. Concatenate them, if they are not equal iv. String reversing
10	a. Write programs using recursion for Factorial of a number, GCD, LCM, Towers of Hanoi. b. Write a program for tic-tac-toe game. c. Write a program to implement numerical methods Lagrange's interpolation, Trapezoidal rule.

11	a. Write a program to exchange two numbers using pointers. b. Write a program to calculate the length of string using pointers. c. Write a program to using pointers to read in an array of integers and print its elements in reverse order. d. Write a program to generate pseudo random generator.
12	a. Write a program to evaluate the sum of the following series up to 'n' terms $e^x=1+x+x^2/2!+x^3/3!+x^4/4!+$-------- b. Write a program that prints a triangle of stars. Print 1 star in row 0, 3 stars in row 1, 5 stars in row 2, and so on. Here is what this looks like: For the non-star characters, use dot or space. .....*..... .....***..... .....*****..... .....*******..... .....*********..... c. Write a program to read student records into a file. Record consists of rollno, name and marks of a student in six subjects and class. Class field is empty initially. Compute the class of a student. The calculation of the class is as per JNTUA rules. Write the first class, second class, third class and failed students lists separately to another file.
13	a. Write a program to read last n characters of the file using appropriate file function. b. Write a program to copy the contents one of one file into another file using fgetc and fputc functions. c. A file consists of information about employee salary with fields employee id, name, Basic, HRA, DA, IT, other-deductions, Gross and Net salary. Initially only employee id, name, and basic have valid values. HRA is taken as 10% of the basic, DA is taken as 80% of basic, IT is 20% of the basic, other deductions is user specified. Compute the Gross and Net salary of the employee and update the file.
14	a. Write a program to perform Base (decimal, octal, hexadecimal, etc) conversion b. Write a program to read a set of strings and sort them in alphabetical order. c. Write a program to Convert Decimal to Hexa Decimal? d. Write a program to Convert Binary to Decimal? e. **Write a Program to Add two numbers using Command Line Arguments.**

NEW PROGRAMS:

1. Write a program to implement magic square.
2. Write a program to print 50 students details using structures.
3. Write a program to create one structure and declare it inside union then accept values for structure members and display them.
4. Write a program to find the speed of ordinary, express, super luxury buses based on their distance and time.
5. Write c Program to accept N integer numbers and store even and odd integers in separate arrays.
6. Write a c program to input real numbers and find the mean, variance and standard deviation.

I B.Tech I Sem

15ABS04-ENGINEERING CHEMISTRY LAB

(Common for CE & ME)

L	T	P	C
0	0	3	2

Programme Objective:

- Will learn practical understanding of the redox reaction
- Will able to understand the function of fuel cells, batteries and extend the knowledge to the processes of corrosion and its prevention
- Will learn the preparation and properties of synthetic polymers and other material that would provide sufficient impetus to engineer these to suit diverse applications
- Will also learn the hygiene aspects of water would be in a position to design methods to produce potable water using modern technology

List Of Experiments

1. Determination of total hardness of water by EDTA method.
2. Determination of Copper by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method
4. Determination of Manganese by colorimetry.
5. Estimation of iron (II) using diphenylamine indicator (Dichrometry – Internal indicator method).
6. Determination of Alkalinity of Water
7. Determination of acidity of Water
8. Preparation of Phenol-Formaldehyde (Bakelite)
9. Determination of Viscosity of oils using Redwood Viscometer I
10. Determination of Viscosity of oils using Redwood Viscometer II
11. Conductometric titration of strong acid Vs strong base (Neutralization titration).
12. Determination of Corrosion rate and inhibition efficiency of an inhibitor for mild steel in hydrochloric acid medium.
13. Estimation of Chloride ion using potassium Chromate indicator (Mohrs method)
14. Acid-Base neutralisation by pH method.

(Any 10 experiments from the above list)

Course Outcomes

- Would be confident in handling energy storage systems and would be able combat chemical corrosion
- Would have acquired the practical skill to handle the analytical methods with confidence.
- Would feel comfortable to think of design materials with the requisite properties
- Would be in a position to technically address the water related problems.

Text Books:

1. Vogel's Text book of Quantitative Chemical Analysis, J. Mendham et al, Pearson Education, Sixth Edition, 2012.

2. Chemistry Practical – Lab Manual by K.B.Chandra Sekhar, G.V. Subba Reddy and K.N.Jayaveera, SM Publications, Hyderabad, 3rd Edition, 2012.

I B.Tech II Sem

15AHS03-ENGLISH FOR PROFESSIONAL COMMUNICATION

(Common for all Branches)

L	T	P	C
3	1	0	3

1. Introduction:

English is a global language and has international appeal and application. It is widely used in a variety of contexts and for varied purposes. The students would find it useful both for social and professional development. There is every need to help the students acquire skills useful to them in their career as well as workplace. They need to write a variety of documents and letters now extending into professional domain that cuts across business and research also. The syllabus has been designed to enhance communication skills of the students of engineering and pharmacy. The prescribed books serve the purpose of preparing them for everyday communication and to face the global competitions in future.

The texts prescribed for detailed study focus on LSRW skills and vocabulary development. The teachers should encourage the students to use the target language. The classes should be interactive and learner-centered. They should be encouraged to participate in the classroom activities keenly.

In addition to the exercises from the text done in the class, the teacher can bring variety by using authentic materials such as newspaper articles, advertisements, promotional material etc.

2. Objectives:

1. To develop confidence in the students to use English in everyday situations.
2. To enable the students to read different discourses so that they appreciate English for science and technologies.
3. To improve familiarity with a variety of technical writings.
4. To enable the students to acquire structure and written expressions required for their profession.
5. To develop the listening skills of the students.

3. Syllabus:

UNIT –I

Reading : Lawley Road — R.K. Narayan
Writing: Emails - Application letters and curricula vitae
Listening: Listening for information
Functional English: Agreeing and disagreeing - Suggesting and advising
Grammar: Types Of sentences
Vocabulary: Compound words -Collocations
Non Detailed Study : Problem-Solving Skills

UNIT-II

Reading: Environmental Consciousness- Solution to Plastic Pollution-Soma Basu
Writing: Technical Note making -Memorandums – agenda-Official reports
Listening: Listening for facts

Functional English: Giving instructions - Asking for clarifications and permission
Grammar: Question tags
Vocabulary: Prepositions
Non Detailed Study: Interview Skills

UNIT-III

Reading: The Man Behind 'i'
Writing: Summaries –
Listening: Listening for the gist –
Functional English: Telephone skills
Grammar: Adjectives
Vocabulary: Conjunctions
Non Detailed Study: Adaptability Skills

UNIT-IV

Reading: The Bet — Anton Chekhov
Writing: Technical documentation-Concise writing-Paraphrases –
Listening: Listening for opinions -Presentations
Functional English: Individual Presentations
Grammar: Subject-verb agreement
Vocabulary: Phrasal verbs- Idioms.
Non Detailed Study: Non-Verbal Communication Skills

UNIT-V

Reading: The Gift of the Magi — O. Henry
Writing: Information transfer
Listening: Listening for opinions
Functional English: Group Presentations
Grammar: Active and passive voice
Vocabulary: Commonly confused words- One-word substitutes
Non Detailed Study: Written Communication Skills

Text books:

Detailed text: **English for Fluency** , K Purushottam,Orient Black Swan,2013.
Non detailed text: **English and soft skills**, S P Danavel, Orient Black Swan 2013Edition.

References:

1. **Mindscapes**, English For Technologists and Engineers, Orient Black Swan,2012.
2. **Effective Technical Communication,** Rizvi,Tata McGraw-Hill Education, 2007.
3. **Technical Communication,** Meenakshi Raman, Oxford University Press.2011.
4. **English Conversations Practice,** Grant Taylor, Tata Mc GrawHill publications,2013.
5. **Practical English Grammar.** Thomson and Martinet, OUP, 2010.

Expected Outcomes:

At the end of the course, students would be expected to:

1. Have acquired ability to participate effectively in group discussions.
2. Have developed ability in writing in various contexts.
3. Have acquired a proper level of competence for employability.

Verified

I B.Tech II Sem

15ABS07-MATHEMATICS – II

(Common for all Branches)

L	T	P	C
3	1	0	3

Objectives: Our emphasis will be more on conceptual understanding and applications of Fourier series, Laplace transforms, Fourier transforms, Z transforms and solutions of partial differential equations.

UNIT – I

Laplace transform of standard functions – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function.

Differentiation and integration of Laplace transforms – Applications of Laplace transform to ordinary differential equations of first and second order.

UNIT – II

Fourier Series: Determination of Fourier coefficients – Fourier series – Even and odd functions – Fourier series in an arbitrary interval – Even and odd periodic continuation – Half-range Fourier sine and cosine expansions- Parseval's formula- Complex form of Fourier series.

UNIT – III

Fourier integral theorem (only statement) – Fourier sine and cosine integrals. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – Finite Fourier transforms.

UNIT – IV

Formation of partial differential equations by elimination of arbitrary constants and arbitrary functions – Method of separation of variables – Solutions of one dimensional wave equation, heat equation and two-dimensional Laplace's equation under initial and boundary conditions.

UNIT – V

z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

Text Books:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.

References:

1. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S.Ranganatham and M.V.S.S.N.Prasad S. Chand publication.
3. Engineering Mathematics, Volume - II, E. Rukmangadachari, Pearson Publishers.

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Outcomes:

At the end of the course, the student will be able to attain the abilities to use mathematical knowledge to analyze, formulate and solve problems in engineering applications, using discrete and continuous transforms and partial differential equations.

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I B.Tech II Sem

15ABS01-ENGINEERING PHYSICS

(Common for CE & ME)

L	T	P	C
3	1	0	3

Objectives:

1. To evoke interest on applications of superposition effects like interference and diffraction, the mechanisms of emission of light, achieving amplification of electromagnetic radiation through stimulated emission, study of propagation of light through transparent dielectric waveguides along with engineering applications.
2. To enlighten the periodic arrangement of atoms in crystals, direction of Bragg planes, crystal structure determination by X-rays and non-destructive evaluation using ultrasonic techniques.
3. To get an insight into the microscopic meaning of conductivity , classical and quantum free electron model, the effect of periodic potential on electron motion, evolution of band theory to distinguish materials and to understand electron transport mechanism in solids.
4. To open new avenues of knowledge and understanding semiconductor based electronic devices , basic concepts and applications of semiconductors and magnetic materials have been introduced which find potential in the emerging micro device applications.
5. To give an impetus on the subtle mechanism of superconductors in terms of conduction of electron pairs using BCS theory, different properties exhibited by them and their fascinating applications. Considering the significance of microminiaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their synthesis, properties and applications in emerging technologies are elicited.

UNIT-I: Physical Optics, Lasers And Fibre Optics

Physical Optics: Interference (Review) – Interference in thin film by reflection –Newton's rings –Diffraction (Review) - Fraunhofer diffraction due to single slit, double slit and diffraction grating.

Lasers: Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients — Population inversion – Excitation mechanism and optical resonator – Nd:YAG laser - He-Ne laser – Semiconductor Diode laser - Applications of lasers

Fiber optics: Introduction - construction and working principle of optical fiber –Numerical aperture and acceptance angle – Types of optical fibers – Attenuation and losses in Optical fibers –Block diagram of Optical fiber communication system – Applications of optical fibers

UNIT-II: Crystallography And Ultrasonics

Crystallography: Introduction – Space lattice –Unit cell – Lattice parameters –Bravias lattice – Crystal systems – Packing fractions of SC, BCC and FCC - Directions and planes

in crystals – Miller indices – Interplanar spacing in cubic crystals – X-ray diffraction - Bragg's law – Powder method.
Ultrasonics: Introduction – Production of ultrasonics by piezoelectric method – Properties and detection – Applications in non-destructive testing.

UNIT-III: Quantum Mechanics And Electron Theory
Quantum Mechanics: Matter waves – de'Broglie hypothesis and properties - Schrodinger's time independent wave equations – Physical significance of wave function - Particle in one dimensional infinite potential well.
Electron theory: Classical free electron theory – Equation for electrical conductivity - Quantum free electron theory – Fermi-Dirac distribution – Source of electrical resistance – Kronig-Penny model (qualitative treatment) – Origin of bands in solids – Classification of solids into conductors, semiconductors and insulators.

UNIT-IV Semiconductors And Magnetic Materials
Semiconductors: Intrinsic and extrinsic semiconductors (Qualitative treatment) – Drift & diffusion currents and Einstein's equation – Hall effect - Direct and indirect band gap semiconductors – Formation of p-n junction.
Magnetic materials: Introduction and basic definitions – Origin of magnetic moments – Bohr magnetron – Classification of magnetic materials into dia, para, ferro, antiferro and ferri magnetic materials (Qualitative treatment) – Hysteresis - Soft and hard magnetic materials, applications of magnetic materials.

UNIT-IV: Superconductivity And Physics Of Nanomaterials
Superconductivity: Introduction - Effect of magnetic field - Meissner effect – Type I and Type II superconductors – Flux quantization – Penetration depth - BCS theory (qualitative treatment) — Josephson effects –Applications of superconductors.
Physics of Nanomaterials: Introduction - Significance of nanoscale and types of nanomaterials – Physical properties: optical, thermal, mechanical and magnetic properties – Synthesis of nanomaterials by Top down and bottom up approaches: ball mill, chemical vapour deposition, and sol gel –Applications of nanomaterials.

Text books:
1. Engineering Physics – K.Thyagarajan, 5th Edition, MacGraw Hill Publishers, NewDelhi, 2014.
2. Physics for Engineers - N.K Verma, 1st Edition, PHI Learning Private Limited, Delhi,2014.

Reference Books:
1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, 10th Edition, S.Chand and Company, New Delhi, 2014.
2. Engineering Physics – D K Pandey, S. Chaturvedi, 2nd Edition, Cengage Learning, New Delhi, 2013.

3. Engineering Physics – D.K Bhattacharya, Poonam Tandon, 1nd Edition, Oxford University Press, New Delhi, 2015.

Outcomes:

- The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics, lasers and fibre optics.
- The important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction are focused along with defects in crystals and ultrasonic non-destructive techniques.
- The discrepancies between the classical estimates and laboratory observations of physical properties exhibited by materials would be lifted through the understanding of quantum picture of subatomic world.
- The electronic and magnetic properties of materials were successfully explained by free electron theory and the bases for the band theory are focused.
- The properties and device applications of semiconducting and magnetic materials are illustrated.
- The importance of superconducting materials and nanomaterials along with their engineering applications are well elucidated.

I B.Tech II Sem

15AME01-ENGINEERING DRAWING

(Common for CE & ME)

L	T	P	C
3	1	0	3

Course Objective:

- By studying the engineering drawing, a student becomes aware of how industry communicates technical information. Engineering drawing teaches the principles of accuracy and clarity in presenting the information necessary about objects.
- This course develops the engineering imagination i.e., so essential to a successful design, By learning techniques of engineering drawing changes the way one things about technical images.
- It is ideal to master the fundamentals of engineering drawing first and to later use these fundamentals for a particular application, such as computer aided drafting. Engineering Drawing is the language of engineers, by studying this course engineering and technology students will eventually be able to prepare drawings of various objects being used in technology.

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance-Conventions in Drawing-Lettering - BIS Conventions. Curves used in Engineering Practice.

a) Conic Sections including the Rectangular Hyperbola- General method only,
b) Cycloid, Epicycloids and Hypocycloid
c) Involutes

UNIT II

Projection of Lines: Inclined to one or both planes, Problems on projections, Finding True lengths. **Projections of Planes**: Projections of regular plane surfaces/figures, Projection of lines and planes using auxiliary planes.

UNIT III

Projections of solids: Projections of regular solids inclined to one or both planes – Auxiliary Views. **Sections of Solids**: Section Planes and Sectional View of Right Regular Solids- Prism, cylinder, Pyramid and Cone. True shapes of the sections.

UNIT IV

Development of Surfaces: Development of Surfaces of Right Regular Solids-Prism, Cylinder, Pyramid, Cone and their Sectional Parts.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale-Isometric Views- Conventions- Isometric Views of lines, Planes Figures, Simple and Compound Solids-Conversion of isometric Projections/Views of Orthographic Views-Conventions.

Text Books:

1. Engineering Drawing, N.D. Bhat, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai

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Reference Books:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal/New age Publishers
4. Engineering Graphics, K.C. John, PHI,2013
5. Engineering Drawing, Basant Agarwal/ C.M.Agarwal

Suggestions:

1. Student is expected to buy a book mentioned under Text books " for better understanding.
2. Students can find the applications of various conics in engineering and application of involute on gear teeth. The innovation for drawing can be had on line from introduction to engineering drawing with tools-youtube http-sewor,Carleton.ca/-g,kardos/88403/drawings.html conic sections-online, red woods.edu

This subject also paves the way for learing Auto Cad, CAD / CAM, CATIA and Pro E which are advanced software packages needed for every mechanical engineer (To be taught & examined in First angle projection). The skill acquired by the student in this subject is very useful in conveying his ideas to the layman easily.

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I B.Tech II Sem

15ACE01-STRENGTH OF MATERIALS – I

L	T	P	C
3	1	0	3

Objective: The subject provide the knowledge of simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.

UNIT – I

Simple Stresses And Strains : – Deformable bodies - Elasticity and plasticity – Types of stresses and strains – Hooke's law – stress – strain diagram for mild steel – Working stress – Factor of safety – Lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of varying section – composite bars – Temperature stresses. Strain energy – Resilience – Gradual, sudden, impact and shock loadings – simple applications.

UNIT – II

Shear Force And Bending Moment: Definition of beam – Types of beams – Concept of shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and overhanging beams subjected to point loads, uniformly distributed load uniformly varying loads and combination of these loads – Point of contra flexure – Relation between S.F., B.M and rate of loading at a section of a beam.

UNIT – III

Flexural Stresses : Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/y = E/R$ – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I,T,Angle and Channel sections – Design of simple beam sections.

Shear Stresses: Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections.

UNIT – IV

Deflection Of Beams: Bending into a circular arc – slope, deflection and radius of curvature – Differential equation for the elastic line of a beam – Double integration and Macaulay's methods.

Determination of slope and deflection for cantilever and simply supported beams subjected to point loads, U.D.L. uniformly varying load-Mohr's theorems – Moment area method – application to simple cases including overhanging beams-deflections of propped cantilevers for simple loading cases.

UNIT – V

Conjugate Beam Method: Introduction – Concept of conjugate beam method. Difference between a real beam and a conjugate beam. Deflections of determinate beams with constant and different moments of inertia.

Direct And Bending Stresses : Stresses under the combined action of direct loading and bending moment, core of a section – determination of stresses in the case of chimneys, retaining walls and dams – conditions for stability – stresses due to direct loading and bending moment about both axis.

Text Books :

(1) Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.
(2) Strength of Materials by R.K Rajput, S.Chand & Company Ltd.
(3) Strength of Materials by B.S.Basavarajaiah, Universities Press, Hyderabad.
(4) Strength of Materials by Dr.R.K.Bansal, Lakshmi Publications.

References:

1. Strength of Materials by Ghosh & Datta, New Age Pubilishers
2. Strength of Materials by S.S.Bhavikatti, Vikas Publishing House Pvt. Ltd.
3. Strength of materials by A.R.Basu, Dhanpathi Rai & Co, New Delhi.
4. Strength of materials by Sadhu Singh, Khanna Pubilications, NewDelhi.
5. Strength of materials by Surendar Singh, CBS Pubilications.
6. Strength of Materials by – R.Subaramanian, Oxford university pubilishers.

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I B.Tech II Sem

15ACE03-BUILDING MATERIALS & CONSTRUCTION

L	T	P	C
3	1	0	3

Objectives: To give the students a basic idea about the traditional and modern construction materials a brief knowledge on building components and its construction methodologies.

UNIT – I

Introduction To Building Materials

Traditional & Organic Building Materials – Stone – Dressing of Stones – Modern Building Materials – Bricks – Manufacturing process – Ceramic Products – Manufacturing Process – Building Materials for Low Cost Housing – Utilisation of Wastes for Alternative Building Materials –Sustainable Materials in Construction –National Standards.

UNIT – II

Glass:

Introduction – Functions of Glass in Buildings – Constituents and Classification of Glass – Manufacturing Process –Properties of Glass – Common Types of Glass – Special Glass – Advantages and Disadvantages of Glass – National Standards.

PLASTIC:

Introduction – Polymerisation – Classification of Plastics – Commonly Used Plastics – Moulding and Fabricating for Plastic Products – Applications – Advantages – Disadvantages – Intelligent Use of Plastics in Buildings – National Standards.

UNIT – III

Insulating Materials

Thermal Insulating Materials: Introduction – Thermal Insulation – Heat Transfer Fundamentals – Thermal Properties of Insulating Materials – Selection of Insulating Materials – Classification of Insulation materials – Reflective Insulation Systems – Commonly Used Building Insulation Materials – Insulation that Should not be Used – National Standards.

Sound Insulating Materials: Introduction – Basics of Acoustics – Sound Absorption or Insulation – Green Insulation – National Standards.

UNIT – IV

Structural Components:–

Foundations – classification of Foundations – consideration in selection of foundation types – Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards.

UNIT – V

Internal Construction And Finishes

Internal elements – Internal walls – Construction joints – Internal walls, fire protection – separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door sets – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion Paints – Whitewash and Colourwash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards.

Text Books:

1. Building Material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
3. A Textbook on Building Construction by S.K.Sharma, S.Chand Pubilishers.
4. Building Materials by M.L.Gambhir, TMH Pubilishers.

References:

1. Building construction by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
2. R.Chudly "Construction Technology "– Volumes I and II" 2nd Edition, Longman, UK, 1987.
3. Building materials by S.C.Rangawala, Charotar Pubilishing House, Anand- INDIA.
4. Building Construction by S.C.Rangawala, Charotar Pubilishing House, Anand- INDIA
5. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
6. Building materials by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi

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I B.Tech II Sem

15ACE02-STRENGTH OF MATERIALS LAB

L	T	P	C
0	0	3	2

Objective: The object of the course to make the student to understand the behavior of materials under different types of loading for different types structures.

List Of Exercises:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test.
5. Hardness test.
6. Spring test.
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test

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I B.Tech II Sem

15ABS02-ENGINEERING PHYSICS LABORATORY

(Common for CE and ME)

L	T	P	C
0	0	3	2

Lab Objective:

- Will recognize the important of optical phenomenon like Interference and diffraction.
- Will understand the role of optical fiber parameters and signal losses in communication.
- Will recognize the importance of energy gap in the study of conductivity and hall effect in a semiconductor
- Will understand the applications of B H curve.
- Will acquire a practical knowledge of studying the crystal structure in terms of lattice constant.
- Will recognize the application of laser in finding the particle size and its role in diffraction studies.
- Will learn to synthesis of the nano materials and recognize its importance by knowing its nano particle size and its impact on its properties.

Any 10 of the following experiments has to be performed

1. Determination of radius of curvature of a Plano-convex lens by forming Newton's rings.
2. Determination of wavelength of given source using diffraction grating in normal incidence method.
3. Determination of Numerical aperture, acceptance angle of an optical fiber.
4. Energy gap of a Semiconductor diode.
5. Hall effect – Determination of mobility of charge carriers.
6. B-H curve – Determination of hysteresis loss for a given magnetic material.
7. Determination of Crystallite size using X-ray pattern (powder) using debye-scheerer method.
8. Determination of particle size by using laser source.
9. Determination of dispersive power of a prism.
10. Determination of thickness of the thin wire using wedge Method.
11. Laser : Diffraction due to single slit
12. Laser : Diffraction due to double slit
13. Laser: Determination of wavelength using diffraction grating
14. Magnetic field along the axis of a current carrying coil – Stewart and Gee's method.
15. Synthesis of nanomaterial by any suitable method.

Reference:

1. Engineering Physics Practicals – NU Age Publishing House, Hyderabad.
2. Engineering Practical physics – Cengage Learning, Delhi.

Lab Outcomes:

- Would recognize the important of optical phenomenon like Interference and diffraction.
- Would have acquired the practical application knowledge of optical fiber, semiconductor, dieclectric and magnetic materials, crystal structure and lasers by the study of their relative parameters.
- Would recognize the significant importance of nanomaterials in various engineering fields.

I B.Tech II Sem

15AME03-ENGINEERING AND IT WORKSHOP

(Common for all Branches)

L	T	P	C
0	0	3	2

PART A: ENGINEERING WORKSHOP

Course Objective:

- The objective of this Lab is to provide the basic concepts about different manufacturing processes, use of various workshops tools and exposer to the power tools.
- Identify and use marking out tools, hand tools, measuring equipment and to work to prescribed tolerances.

Trades For Exercises:

At least 2 exercise in each:

1. Carpentry
2. Fitting
3. House-wiring
4. Foundry
5. Tin smithy
6. Welding.

Text Book:

1. Work shop Manual / P.Kannaiah/ K.L.Narayana/Scitech Publishers.
2. Workshop practice manual by K.Venkata Reddy B.S Publications

Codes / Tables : will be provided

Question Paper pattern : Test in any two trades out of 6 trades.

Course outcomes

- Workshop practice is the backbone of the real industrial environment which helps to develop and enhance relevant technical hand skills required by the technician working in the various engineering industries and workshops.
- This course intends to impart basic know-how of various hand tools and their use in different sections of manufacturing.
- Irrespective of branch, the use of workshop practices in day to day industrial as well domestic life helps to dissolve the problems.
- Workshop curricula build the hands on experiences which would help to learn manufacturing processes and production technology courses in successive semesters.

Workshop practice is also important since only practice can make the man perfect.

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I B.Tech II Sem

15AME03-ENGINEERING AND IT WORKSHOP

(Common for all Branches)

L	T	P	C
0	0	3	2

PART B: IT Workshop

Course Objectives:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

Preparing your Computer (2 weeks)

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: Productivity tools (6 weeks)

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content

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sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 5: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 6: Presentations : creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

Task 7:ACCESS:

Optional Tasks:

Task 7: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

References:

1. "Introduction to Computers", Peter Norton, Mc Graw Hill
2. "LaTeX Companion" – Leslie Lamport, PHI/Pearson.
3. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.

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4. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
5. "Networking your computers and devices", Rusen, PHI
6. "Trouble shooting, Maintaining & Repairing PCs", Bigelows, TMH.

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II B.Tech I Sem

15ABS08-MATHEMATICS-III

(Common for all Branches)

L	T	P	C
3	1	0	3

Objectives:

- This course aims at providing the student with the concepts and applications of Matrices, Numerical Techniques and Curve fitting.

UNIT – I

Elementary row transformations-Rank – Echelon form, normal form – Consistency of System of Linear equations. Linear transformations. Hermitian, Skew-Hermitian and Unitary matrices and their properties. Eigen Values, Eigen vectors for both real and complex matrices. Cayley – Hamilton Theorem and its applications – Diagonolization of matrix. Calculation of powers of matrix and inverse of a matrix. Quadratic forms – Reduction of quadratic form to canonical form and their nature.

UNIT – II

Solution of Algebraic and Transcendental Equations: The Bisection Method – The Method of False Position– Newton-Raphson Method, Solution of linear simultaneous equation: Crout's triangularisation method, Gauss - Seidal iteration method.

UNIT – III

Interpolation: Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

UNIT – IV

Curve fitting: Fitting of a straight line – Second degree curve – Exponentional curve-Power curve by method of least squares. Numerical Differentiation for Newton's interpolation formula. Numerical Integration: Newton's – Cotes formula - Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule.

UNIT – V

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive approximations-Euler's, Runge-Kutta 2^{nd} and 4^{th} order Methods– Milne's Predictor-Corrector Methods.

Text Books:

3. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
4. Introductory Methods of Numerical Analysis, S.S. Sastry, PHI publisher.

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References:

1. Engineering Mathematics, Volume - II, E. Rukmangadachari Pearson Publisher.
2. Mathematical Methods by T.K.V. Iyengar, B.Krishna Gandhi, S. Ranganatham and M.V.S.S.N.Prasad, S. Chand publication.
3. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
4. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Outcomes:

At the end of the course, student will be able to analyze engineering problems using the concepts of Matrices and Numerical methods.

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15ACE04-SURVEYING – I

L	T	P	C
3	1	0	3

Objective: To ensure that the student develops knowledge of the basic and conventional surveying instruments, principles behind them, working of the instruments, plotting of the area from the field measurements, determination of the area and the theory behind curves.

UNIT – I

Basic Concepts: Surveying – History; Definition; primary divisions, Classification, Principles of surveying Plan and map; Basic Measurements; Instruments and Basic methods; units of measurement, Scales used for Maps and plans, Duties of a surveyor. Errors: Accuracy and Precision Sources and types of errors, theory of Probability, Rounding of numbers.

Chain Surveying: Instruments for chaining, Ranging out, chaining a line on a flat ground; Chaining on an uneven or a sloping ground; Chain & Tape corrections; Degree of accuracy. Principles of chain surveying; Basic definitions; Well-Conditioned Triangle, Field book, Field work; Offsets, Cross Staff survey; obstacles in chain survey-problems, Conventional signs.

UNIT-II

Compass Survey: Introduction, Bearings and angles, Designation of bearings, Conversion of bearings from one system to the other, fore bearing and back bearing, , Calculation of bearing from angles, Theory of Magnetic compass (i.e. Prismatic compass), Temporary adjustments of compass-Magnetic Declination, Local attraction-Related Problems-Errors in compass survey.

Plane Table Surveying: Introduction, Accessories, Working operations, Methods of plane tabling, Three point problem-Mechanical method -Graphical method, Two point problem, Errors in plane tabling.

UNIT-III

Levelling: Introduction, basic definitions, methods of leveling, leveling instruments: dumpy level, levelling staff, Temporary adjustments of dumpy level, theory of simple and differential leveling, Level field book, Classification of direct leveling methods, Reciprocal leveling, Profile leveling and Cross sectioning, Curvature and Refraction, Difficulties in leveling, errors in leveling, Degree of Precision.

Contouring: Introduction, contour interval, Characteristics of contours Methods of locating contours - Direct and indirect methods; Interpolation and sketching of contours, Contour gradient-Uses of contour maps.

UNIT-IV

Theodolite: Vernier Theodolite: Basic definitions; Fundamental lines and desired relations; Temporary adjustments; Measurement of a horizontal angle; Repetition and Reiteration methods of horizontal angle measurement. Measurement of vertical angle; Sources of errors in Theodolite survey.

Traverse Surveying: Introduction, Selection and marking of traverse stations, methods of traversing, traversing by free needle and fast needle method, traversing by direct observation of angles, checks in closed traverse, closing error, methods of balancing the traverse, Gale's traverse table, Omitted measurements.

UNIT-V

Computation Of Areas And Volumes: methods of determining areas, areas by sub-division into triangles, areas from offsets to a base line: regular and irregular intervals, area by double meridian distances, area by co-ordinates. embankments and cutting for a level section, two level sections, three level section and multi level section, volume of earth work from contour plan, capacity of a reservoir , volume of barrow pits.

Minor Instruments: uses and working of the minor instruments: hand level, line ranger, optical square, abney level, clinometers, pantagraph, sextant and planimeter.

Text Books:

(1) Surveying (Vol – 1,2 &3), by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain – Laxmi Publications (P) Ltd., New Delhi
(2) Text book of surveying by C.Venkataramaiah, Universities Press.
(3) Advanced Surveying by Satheesh Gopi, R.Shanta Kumar and N.Madhu, Pearson education.

References:

(1) Chandra AM, "Plane Surveying", New age International PVt.Ltd., Publishers, New Delhi, 2002
(2) Duggal S.K, "Surveying (Vol – 1 & 2), Tata McGraw Hill Publishing Co.Ltd. New Delhi, 2004.
(3) Arora K R "Surveying (Vol-1 & 2), Standard Book House, Delhi, 2004
(4) Surveying and Levelling by Kanetkar T.P., and Kulkarni, Vols. I and II, United Book Corporation, Pune, 1994
(5) Surveying and leveling by R.Subramaniah, Oxford university press, New Delhi.
(6) Surveying by Mimi Das Saikia, PHI Pubilications.

II B.Tech I Sem

15AME06-FLUID MECHANICS

L	T	P	C
3	1	0	3

Objective: This subject introduces the basic concepts of fluids, their behavioural properties, analyzing the fluid flows using primary equations. This subject further deals with various flow measuring devices and concepts of boundary layer flows.

UNIT – I

Introduction: Dimensions and units – physical properties of fluids, specific gravity, viscosity, surface tension and capillarity, vapor pressure and their influences on fluid motion. Newtonian and non Newtonian fluids. Fluid Pressure at a Point; Pascal's law, Hydrostatic law, Atmospheric, Absolute and gauge pressure; Hydrostatic paradox, Pressure measurement manometers; Simple, differential and Micro Manometers

Hydrostatic Forces On Surfaces: Total Pressure and Centre of Pressure: on Horizontal Plane Surface; Vertical Plane Surface; Inclined Plane Surface and Curved Surfaces.

UNIT-II

Buoyancy: Buoyancy; Buoyant Force and Centre of Buoyancy, Stability of submerged bodies and floating bodies; Metacentre and metacentric height, analytical method for metacentric height.

Kinematics Of Fluid Motion: Methods of describing fluid motion; Classification of flow; Steady, unsteady, uniform and non-uniform flows; Laminar and turbulent flows; Three, two and one dimensional flows; Irrotational and rotational flows; Streamline; Pathline; Streakline; Equation for acceleration; Convective acceleration; Local acceleration; Continuity equation; Velocity potential and stream function; Flownet; Vortex flow – free vortex and forced vertex flow.

UNIT-III

Dynamics Of Fluid Flow: Forces acting on a Fluid in Motion; Euler's equation of motion; Bernoulli's equation ; Energy correction factor; Momentum principle; Force exerted on a pipe bend.

Flow Measurements In Pipes: Discharge through Venturi Meter; Discharge through Orifice Meter; Discharge through flow nozzle; Measurement of velocity by Pitot tube,pitot-static tube.

UNIT-IV

Flowthrough Orifices And Mouthpieces: Flow through Orifices: Classification of Orifices; Determination of coefficients for an Orifice Flow through large rectangular Orifice; Flow through submerged Orifice – fully sub-merged and Partially sub-merged. Classification of Mouthpieces; Flow through external and internal cylindrical Mouthpiece

Flow Over Notches & Weirs: Classification of Notches and Weirs; Flow through rectangular, triangular and trapezoidal notches and weirs; End contractions; Velocity of approach; Cipolletti weir, Broad crested weir.

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UNIT-V

Analysis Of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length; Hydraulic power transmission through a pipe; Siphon; Pipes in series, parallel & branched pipes.

Laminar & Turbulent Flow In Pipes: Reynolds's experiment; Characteristics of laminar flow; Steady laminar flow through a circular pipe(Hazen poiseuille equation). Characteristics of turbulent flow, Prandtl's mixing length theory, Hydro dynamically smooth and rough boundaries, Velocity distribution, Friction factor for pipe flow.

Text Books:

(1) Fluid Mechanics by Modi and Seth, Standard book house.
(2) A text of Fluid mechanics and hydraulic machines by Dr.R.k.Bansal – Laxmi Publications (P) Ltd., New Delhi.
(3) Fluid Mechanics and Machinery by D.Rama Durgaiah, New Age International.

References:

(1) Fluid Mechanics and Machinery, CSP Ojha, Oxford Higher Education
(2) Fluid mechanics and machinery by Garde, New Age Pubilishers.
(3) Theory and applications of fluid mechanics by K.Subramanyam, TMH Pubilications, New Delhi.
(4) Principles of Fluid Mechanics and Fluid Machines by M.Narayana Pillai, Universities Press.
(5) Introduction to Fluid Machines by S.K.Som & G.Biswas .Tata Mc.Grawhill publishers PVt.Ltd.
(6) Fluid Mechanics by A.K.Mohanty, Prentice Hall of India PVt.Ltd., New Delhi.

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II B.Tech I Sem

15ACE06-ENGINEERING GEOLOGY

L	T	P	C
3	1	0	3

UNIT I

Introduction:

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs.

Weathering Of Rocks : Its effect over the properties of rocks importance of weathering with reference to dams, reservoirs and tunnels weathering of common rock like "Granite"

Mineralogy :

Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite ,Orthoclase Hornblende , Muscovite, Biotite, Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite, Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, Barytes and Bauxite.

UNIT II

Petrology:

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

UNIT III

Ground Water , Earth Quake &Land Slides:

Ground water, Water table, common types of ground water, springs, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT IV

Structural Geology:

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults un conformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

Geophysical Studies:
Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods.

UNIT V

Geology Of Dams , Reservoirs And Tunnels:
Types of dams and bearing of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor"s Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Lithological, structural and ground water) in tunneling over break and lining in tunnels.

Text Books:
1. Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005
2. Engineerring geology by vasudev kanthi, Universities press, Hyderabad.
3. Engineering Geology by D.Venkata Reddy, Vikas Publications, New Delhi.

Reference Books:
1. Engineerring geology by Prabin singh, Katson Pubilcations
2. Engineering Geology by Subinoy Gangopadhyay, Oxford University press.
3. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
4. F.G. Bell, Fundamental of Engineering Geology Butterworths, Publications, New Delhi, 1992
5. Krynine & Judd, Principles of Engineering Geology & Geotechnics, CBS Publishers & Distribution,
6. Engineering Geology by Mukarjee, World Press.
7. Foundations of Engineering Geology by Tony Waltham, Special Indian Edition, CRC Press New Delhi.

II B.Tech I Sem

15ACE08-STRENGTH OF MATERIALS – II

L	T	P	C
3	1	0	3

Objective: Study of the subject provides the understanding of principal stress, strains, springs, columns and structures.

UNIT – I

Principal Stresses And Strains: Introduction – Stresses on an inclined section of a bar under axial loading – compound stresses – Normal and tangential stresses on an inclined plane for biaxial stresses – Two perpendicular normal stresses accompanied by a state of simple shear – Mohr's circle of stresses – Principal stresses and strains – Analytical and graphical solutions.

Theories Of Failures: Various Theories of failures like Maximum Principal stress theory – Maximum Principal strain theory – Maximum shear stress theory – Maximum strain energy theory – Maximum shear strain energy theory.

UNIT – II

Thin Cylinders & Thick Cylinders : Thin seamless cylindrical shells – Derivation of formula for longitudinal and circumferential stresses – hoop, longitudinal and Volumetric strains – Changes in dia, and volume of thin cylinders – Thin spherical shells.

Introduction Lame's theory for thick cylinders – Derivation of lame's formulae – distribution of hoop and radial stresses across thickness – design of thick cylinders – compound cylinders – Necessary difference of radii for shrinkage – Thick spherical shells.

UNIT – III

Torsion Of Circular Shafts – Theory of pure torsion – Derivation of Torsion equations: – Assumptions made in the theory Theory of pure torsion – Torsional moment of resistance – Polar section modulus – Power transmitted by shafts – Combined bending and torsion and end thrust – Design of shafts according to theories of failure.

SPRINGS:

Introduction – Types of springs – deflection of close and open coiled helical springs under axial pull and axial couple –springs in series and parallel – Carriage or leaf springs.

UNIT – IV

Columns And Struts : Introduction – Types of columns – Short, medium and long columns – Axially loaded compression members – Crushing load – Euler's theorem for long columns – assumptions – derivation of Euler's critical load formulae for various end conditions – Equivalent length of a column – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Long columns subjected to eccentric loading – Secant formula – Empirical formulae – Straight line formula – Prof. Perry's formula.

UNIT – V

Unsymetrical Bending : Introduction – Centroidal principal axes of section – Graphical method for locating principal axes – Moments of inertia referred to any set of rectangular axes – Stresses in beams subjected to unsymmetrical bending – Principal axes – Resolution of bending moment into two rectangular axes through the centroid - Location of neutral axis – Deflection of beams under unsymmetrical bending.

Beams Curved In Plan : Introduction – circular beams loaded uniformly and supported on symmetrically placed Columns – Semicircular beam simply-supported on three equally spaced supports.

Text Books:

(1) A Text book of Strength of materials by R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.
(2) Strength of Materials by S.S. Bhavikatti – Vikas publishers
(3) Strength of Materials by R.Subramanian, Oxford University Press.
(4) Strength of Materials by D.S. Prakasa rao, University press.

References :

(1) Mechanics of Structures, by Ghosh& Datta, New Age Pubilishers
(2) Strength of Materials by B.C.Punmia.- Laxmi publications
(3) Strength of Materials by Schaum's out line series – Mc.Graw hill International Editions.
(4) Strength of Materials by S.Ramkrishna and R.Narayan – Dhanpat Rai Publications.
(5) Strength of Materials by L.S.Srinath et al., Macmillan India Ltd., Dew Delhi.
(6) Fundamentals of Solid Mechancis by M.L.Gambhir, PHI Learning Pvt. Ltd

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II B.Tech I Sem

15ACE05-SURVEYING LAB-I

L	T	P	C
3	0	3	2

Objective: To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

List Of Exercises:

(1) Survey of an area by chain survey (Closed traverse) & Plotting
(2) Chaining across obstacles
(3) Determination of distance between two inaccessible points with compass.
(4) Surveying of a given area by prismatic compass (Closed traverse) and plotting after adjustment.
(5) Radiation method, intersection methods by plane Table survey
(6) Two point and three point problems in plane table survey.
(7) Traversing by plane table survey
(8) Fly leveling (differential leveling)
(9) An exercise of L.S. and C.S. and plotting.
(10) Two exercises on contouring.

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II B.Tech I Sem

15ACE07-ENGINEERING GEOLOGY LAB

L	T	P	C
3	1	0	3

List Of Exercises:

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

Lab Examination Pattern:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Inter pretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

Text Books:

1. Elementary Exercises in Geology by CVRK Prasad, Universities press

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II B.Tech I SEM

15AHS04-HUMAN VALUES AND PROFESSIONAL ETHICS

(Common for all Branches)

L	T	P	C
3	1	0	3

Objectives

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of Others

UNIT-I: Human Values

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Spirituality.

UNIT-II: Engineering Ethics

Senses of 'Engineering Ethics'- Variety of moral issued – Types of inquiry – Moral dilemmas – Moral autonomy –Kohlberg's theory- Gilligan's theory- Consensus and controversy – Models of professional roles- Theories about right action- Self-interest - Customs and religion –Uses of Ethical theories – Valuing time –Cooperation – Commitment.

UNIT-III : Engineering As Social Experimentation

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking –respect for persons.

UNIT-IV: Engineers Responsibility For Safety And Risk

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk-Safety and the Engineer- Designing for safety.

UINIT-V: Global Issues

Globalization – Cross Cultural issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights(IPR).

Out Comes:

- Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field
- Identify the multiple ethical interests at stake in a real-world situation or practice
- Articulate what makes a particular course of action ethically defensible
- Assess their own ethical values and the social context of problems

- Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects
- Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work
- Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research

Text Books

1. Engineering Ethics includes Human Values by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
2. Engineering Ethics by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
3. Ethics in Engineering by Mike W. Martin and Roland Schinzinger – TMH- 2003.
4. Professional Ethics and Morals by Prof.A.R.Aryasri, Dharanikota Suyodhana, Maruthi Publications.
5. Professional Ethics and Human Values by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.
6. Professional Ethics and Human Values by Prof.D.R.Kiran-
7. Indian Culture, Values and Professional Ethics by PSR Murthy-BS Publication.

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II B.Tech II Sem

15ABS09-PROBABILITY AND STATISTICS

(Common for CE, ME and CSE)

L	T	P	C
3	1	0	3

Objectives: To help the students in getting a thorough understanding of the fundamentals of probability and usage of statistical techniques like testing of hypothesis, Statistical Quality Control and Queuing theory

UNIT – I

Basic concepts of Probability – Random variables – Expectation – Discrete and continuous Distributions – Distribution functions. Binomial, Poisson and Normal distributions – Related properties.

UNIT – II

Test of Hypothesis: Population and Sample - Confidence interval of mean from Normal distribution - Statistical hypothesis - Null and Alternative hypothesis - Level of significance. Test of significance - Z test for means and proportions.

UNIT – III

Small samples - t- test, F-test and Chi-square test (testing of goodness of fit and independence).

UNIT – IV

Statistical Quality Control: Concept of quality of a manufactured product -Defects and Defectives - Causes of variations - Random and assignable - The principle of Shewhart Control Chart-Charts for attribute and variable quality characteristics- Constructions and operation of $\bar{X}$ - Chart, R-Chart, p - Chart and C-Chart.

UNIT – V

Queuing Theory: Pure Birth and Death process, M/M/1 & M/M/S & their related simple problems.

Text Books:

1. Probability and Statistics for Engineers by Richard A. Johnson, 8th edition, PHI Learning Private Ltd.-2011.
2. Probability & Statistics by E. Rukmangadachari & E. Keshava Reddy, Pearson Publisher.
3. Probability & Statistics for engineers by Dr. J. Ravichandran WILEY-INDIA publishers.

References:

1. Operations Research by S.D. Sharma, KEDAR NATH RAM NATH, Publications.
2. Statistical methods by S.P. Gupta, S.Chand publications.

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3. Probability and Statistics for Engineers and Scientists by Ronald E. Walpole, Sharon L. Myers and Keying Ye, Pearson eighth edition.
4. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.

Outcomes:

At the end of the course, the student will be able to analyze the problems of engineering & industry using the techniques of Probability, Statistics and Queuing theory and draw appropriate inferences.

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15AME14-HYDRAULICS AND HYRAULIC MACHINERY

L	T	P	C
3	1	0	3

Objective: The main objective of this course is to deal with the concepts of flow through open channels and their applications and the principles of hydraulic machines and hydraulic models.

UNIT – I

Open Channel Flow-Uniform Flow: Introduction, Classification of flows, Types of channels; Flow analysis: The Chezy equation, Empirical formulae for the Chezy constant, Hydraulically efficient channel sections: Rectangular, Trapezoidal, Triangular and Circular channels; Velocity distribution; Energy and momentum correction factors. Application of Bernoulli's equation to open channel flow.

Open Channel Flow- Non – Uniform Flow: Concept of specific energy; Specific energy curves; Critical flow; Critical flow in a rectangular channel; Critical slope; discharge curve, Different slope conditions; Channel transitions- Reduction in width of a rectangular channel, Raised bottom in a rectangular channel, venture flume, Momentum principle applied to open channel flow; Specific force; Specific force curve.

UNIT – II

Open Channel Flow- Gradually Varied Flow: Introduction, Dynamic equation; Dynamic equation for GVF in wide Rectangular channel, classification of channel bottom slopes, Surface Profiles; Characteristics of surface profiles, Back water Curves and Draw down curves; Examples of various types of water surface profiles; Control section, Computation of surface profiles by single step method.

Open Channel Flow- Rapidly Varied Flow: Hydraulic jump; Elements and characteristics of hydraulic jump; Hydraulic jump in rectangular channels, height and length of the jump, Energy loss in a hydraulic jump, Types of hydraulic jump; applications of hydraulic jump; Location of hydraulic jump,.

UNIT – III

Impact Of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes, jet striking centrally and at tip, velocity triangles at inlet and outlet, expressions for Work done and efficiency-Angular momentum principle, Torque and head transferred in roto dynamic machines.

Hydraulic Turbines-I: Introduction, head and efficiencies of hydraulic turbines, Classification of turbines; pelton wheel: parts, Velocity triangles, work done and efficiency, working proportions, design of pelton wheel. Radial flow reaction turbines: velocity triangles and work done for inward radial flow turbine, degree of reaction, discharge, speed ratio, flow ratio.

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UNIT – IV

Hydraulic Turbines-II: Francis turbine: main components and working, work done and efficiencies, design proportions; design of Francis turbine runner. Kaplan turbine: main components and working, working proportions. Draft tube: theory and efficiency; specific speed, unit quantities, characteristic curves of hydraulic turbines. Cavitation: causes, effects.

Centrifugal Pumps: Introduction, component parts and working of a centrifugal pump, work done by the impeller; heads, losses and efficiencies; minimum starting speed; Priming ;specific speed; limitation of suction lift, net positive suction head(NPSH);Performance and characteristic curves; Cavitation effects ;Multistage centrifugal pumps; troubles and remedies.

UNIT – V

Dimensional Analysis And Similitude: Introduction, dimensions; Dimensional homogeneity; Methods of dimensional analysis- Rayleigh's method; Buckingham – Pi theorem; model analysis; similitude-types of similarities; Dimensionless numbers; Model laws ;Partially submerged objects; types of models; Scale effect.

Boundary Layer Theory& Drag And Lift: Boundary layer – concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate, laminar and turbulent Boundary layers, separation of BL. expression for drag and lift; Lift and Drag Coefficients; pressure drag and friction drag; Streamlined and bluff bodies.

Text Books :

(1) Fluid Mechanics, Hydraulic and Hydraulic Machines by Modi & Seth, Standard book house.

(2) A text of Fluid mechanics and hydraulic machines by Dr.R.K.Bansal – Laxmi Publications (P) Ltd., New Delhi.

References :

(1) Fluid Mechanics & Fluid Machines by Narayana Pillai, universities press.

(2) Open channel flow by srinivasan, Oxford University Press

(3) Fluid Mechanics And Machenary-Kothandaraman, New Age Pubilishers

(4) Open Channel flow by K.Subramanya.Tata Mc.Grawhill Publishers.

(5) Elements of Open channel flow by Ranga Raju, Tata MC.Graw Hill, Publications.

(6) Fluid mechanics and fluid machines by Rajput, S.Chand & Co.

(7) Open Channel flow by V.T.Chow, Mc.Graw Hill book company

(8) Hydraulic Machines by Banga & Sharma Khanna Publishers.

(9) Fluid Mechanics & Fluid Power Engineering by D.S. Kumar Kataria & Sons.

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II B.Tech II Sem

15ACE12-SURVEYING – II

L	T	P	C
3	1	0	3

Objective: To ensure that the student develops knowledge in the working of advanced instruments, setting out of curves from the field measurements and basic knowledge on remote sensing

UNIT-I

Trigonometric Leveling : Introduction; Determination of the level of the top of an object, When its base is accessible and When its base is not accessible; Determination of the height of the object when the two instrument stations are not in the same vertical plane; Axis signal correction; Difference in elevation by single observation and reciprocal observations.

UNIT-II

Tacheometric Surveying: Definition, Advantages of Tacheometric surveying- Basic systems of tacheometric measurement , Principle of stadia measurements, Determination of constants K and C, Inclined sight with staff vertical; Inclined sight with staff normal to the line of sight, Movable hair method, Tangential method, Subtanse bar, Errors in Tacheometry.

UNIT-III

Triangulation: Principles of triangulation, Uses of triangulation survey; Classification of triangulation; operations of triangulation survey; Signals and towers, Satellite station; Base line & Extension of the base line.

Setting Out Works: Introduction, Control stations; Horizontal control; Reference grid; Vertical control; Positioning of a structure; offset pegs, Setting out a foundation: reference pillars, batter boards, Setting out with a theodolite; Graded stakes; setting out a sewer; Setting out a culvert.

UNIT-IV

Curves: Simple curves–Definitions and Notations, designation of a curve, Elements of simple curves, location of tangent points, selection of peg interval, Methods of setting simple curves(based on equipment) – Rankines method,Two theodolite method. Compound curves – Elements of compound curve, setting out compound curve. Reverse curves – Elements of reverse curve, relationship between various elements.

UNIT-V

Electronic Distance Measurements: Introduction, Basic concepts-electromagnetic waves, basic definitions, phase of the wave ,units, types of waves; distance from measurement of transit time, Computing the distance from the phase differences, , EDM instruments, electronic theodolites, total station-models, fundamental measurements, recording, traversing, data retrieval.

Remote Sensing: Introduction, Principle of Remote sensing, EM Radiation and the atmosphere, interaction of EM radiation with earth's surface, remote sensing observation platforms, sensors, applications of remote sensing. Geographical Information System: Introduction and principle of Geographical Information System, components of GIS, applications.

Text Books:

1. Surveying Vol. 1 & II by Dr. K. R. Arora; Standard Book House;
2. Surveying Vol-I&II by B.C. Punmia ,Laxmi Publications
3. Higher Surveying by Chandra, New age Pubilishers

Reference Books:

1. Surveying Vol. 1and 2 – By S.K. Duggal. Tata Mc. Graw Hill Publishing Co.
2. Surveying and Levelling by Kanetkar T.P., and Kulkarni , Vols. I and II, United Book Corporation, Pune, 1994.
3.Principles of GIS for land resource assessment by P.A. Burrough –Clerendon Press, Oxford.
4. Advanced Surveying by Mahajan, Santhos K. Dhanpat Rai & Sons, Nai Sarak, Delhi, 1987.
5. Remote sensing and Image Interpretation by Lillesand,T.M.,and Kiefer R.W., John Wiley and Sons, Inc, New York,1997
6. Advanced Surveying: Total Station, GIS and remote Sensing by R. Sathikumar, Satheesh Gopi and N. Madhu, Pearson Education, India

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II B.Tech II Sem

15ACE14-STRUCTURAL ANALYSIS – I

L	T	P	C
3	1	0	3

Objective: To make the students to understand the principles of analysis of structures of static and moving loads by various methods.

UNIT – I

Energy Theorems : Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – II

Analysis Of Indeterminate Structures : Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's theorem..

UNIT – III

Fixed Beams & Continuous Beams : Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT – IV

Slope-Deflection: Introduction, derivation of slope deflection equation, application to continuous beams with and without settlement of supports- Analysis of single bay, single storey, portal frame including side sway .

UNIT – V

Moment Distribution Method Introduction to moment distribution method- application to continuous beams with and without settlement of supports. Analysis of single storey portal frames – including Sway

Text Books :

(1) Analysis of Structures – Vol-I&II by V.N.Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
(2) Structural Analysis by S S Bhavikatti – Vikas Publishing House.
(3) Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

References :

(1) Structural analysis – Hibbler – Pearson education

(2) Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.

(3) Structural Analysis – D.S.Prakasa rao - Univeristy press.

(4) Introduction To Structural Analysis-Nautial- New Age Pubilishers

(5) Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, NewDelhi.

(6) Structual analysis Vol.I and II by Dr. R.Vaidyanathan and Dr.P Perumal – Laxmi publications.

(7) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.

II B.Tech II Sem

15ACE15-BUILDING PLANNING AND DRAWING

L	T	P	C
3	1	0	3

Objective: This subject provides the knowledge of building by laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.

PART-A

UNIT -I

Planing Of Buildings: Types of buildings, types of residential buildings, site selection for residential building, orientation of buildings; aspect; prospect; privacy; furniture requirement;grouping;circulation;sanitation;lighting;ventilation;cleanliness;flexibility;elegancy ;Economy; practical considerations.

Building Byelaws And Regulations: Introduction- Terminology ;Objectives of building byelaws; Minimum plot sizes; Open space requirements ;Plinth area, floor area, carpet area; Floor area ratio (FAR), Floor space Index (FSI) ;areas for different units; Principles underlying building byelaws ; built up area limitations – Height of Buildings ,Wall thickness, lighting and ventilation requirement, safety from fire, drainage and sanitation; applicability of the bye-laws.

UNIT –II

Planning Of Residential Buildings: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings

Planning Of Public Building: Planning of Educational institutions, Hospitals, Office buildings, Banks, Industrial buildings, Hotels and Motels, Hostels, Bus Station.

UNIT -III

Buildings: Safety And Comfort: aspects of safety-structural, health, fire and constructional safety. Components of building automation system - HVAC, electrical lighting, Security, fire-fighting, communication etc. design for thermal comfort, ventilation comfort, air conditioning comfort, lighting comfort, noise and acoustic comfort.

PART-B

UNIT -IV

Sign Conventions And Bonds: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, and white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond; odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

Doors Windows, Ventilators And Roofs: Paneled Door – paneled and glazed door; glazed windows – paneled windows; Swing ventilator – Fixed ventilator; Couple roof – Collar roof; Kind Post truss – Queen post truss.

UNIT –V

Given line diagram with specification to draw plan, section and elevation of:

1. Residential Building
2. Hospital
3. Schools
4. Post office
5. Corporate Office Building
6. Hotels
7. Bank buildings
8. Bus stations
9. Industrial buildings

Final Examination Pattern: The end examination paper should consist of Part- A and Part-B. Part- A consists of three questions with either or choice from three units in planning portion .Each question carries 10 marks. Total marks for Part-A is 30 marks. Part- B consists of two questions with either or choice from drawing portion. Question from unit-IV carries 10 marks and question from unit-V carries 30 marks. Total marks for Part-B is 40 marks.

Text Books:

1. Planning and Designing and Scheduling – Gurucharan Singh and Jagadish Singh- Standard publishers.
2. Building Planning and Design – N.Kumara Swamy and A.Kameswara Rao. Charotar publications.

Reference:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code
2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill

II B.Tech II Sem

15ACE16-HYDROLOGY AND WATER RESOURCES ENGINEERING

L	T	P	C
3	1	0	3

Objective:

To make students understand the various hydrological processes, estimate the surface and ground-water resources of a drainage basin and to estimate the hydrologic extremes i.e. floods and droughts and their management.

UNIT I

Hydrologic Processes

Introduction – Hydrometeorology - Hydrologic cycle - Precipitation and its types - measurements - evaporation, evapotranspiration, infiltration and other abstractions.

UNIT II

Surface Runoff

Drainage basins – hydrologic losses and rainfall excess – hydrograph analysis – unithydrograph – S-curve Synthetic unit hydrograph – Rainfall-runoff models - SCS method – stream flow measurements.

UNIT III

Groundwater

Groundwater concepts – properties and types of aquifer – saturated flow – steady state one dimensional flow – steady state well hydraulics – unsteady groundwater flow – Theis method and Jacobs method – Ground Water Estimation by GEC norms - geophysical exploration -sea water intrusion.

UNIT IV

Reservoir Planning And Management

Single and multipurpose projects – dams – types – fixation of storage capacity – Strategies for reservoir operation – reservoir sedimentation.

UNIT V

Floods And Droughts

Definition of floods and droughts – frequency analysis – flood control measures – Inter basin water transfer – drought indices - drought prone area programme – artificial recharge – rain water harvesting.

Text Books:

1. Subramanya .K. Engineering Hydrology, Tata McGraw Hill, 2003.
2. Raghunath .H.M., Hydrology, Wiley Eastern Ltd., 2004.

References:

1. Linsley, R.K. and Franzini; J.B., Water Resources Engineering, McGraw Hill International Book Company, 2000

2. Ven Te Chow, Maidment, D.R. and Mays, L.W., Applied Hydrology, McGraw Hill International Book Company, 1998.

3. Todd.D.K., Ground Water Hydrology John Wiley and Sons, New York, 2000.

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II B.Tech II Sem

15AME23-FLUID MECHANICS, HYDRAULICS AND HYDRAULIC MACHINERY LAB

L	T	P	C
0	0	3	2

Objective: The object of the course to make the students understand the fluid flow concepts and get familiarity with flow measuring devices.

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Varification of Bernoulli's equation.
8. Impact of jet on vanes.
9. Study of Hydraulic jump.
10. Performance test on Pelton wheel turbine.
11. Performance test on Francis turbine.
12. Efficiency test on centrifugal pump.

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II B.Tech II Sem

15ACE13-SURVEYING - II LAB

L	T	P	C
0	0	3	2

Objective: To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

List Of Exercises:

1. Study of theodolite in detail – practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.
3. Trigonometric Leveling – Heights and distance problem (Two Exercises).
4. Heights and distance using Principles of tachometric surveying (Two Exercises)
5. Curve setting – different methods. (Two Exercises)
6. Setting out works for buildings & pipe lines.
7. Determination of area using total station.
8. Traversing using total station.
9. Contouring using total station.
10. Determination of remote height using total station.
11. Distance, gradient, Diff. height between tow inaccessible points using total stations.

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III B.Tech I Semester

15AHS05 – MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common for CE and ME)

L	T	P	C
3	1	0	3

Course Objective:

Prepare engineering students to analyze cost/revenue data and carry out make economic analyses in the decision making process to justify or reject alternatives/projects on an economic basis.

UNIT-I

Introduction to Managerial Economics & Demand Analysis: Definition of Managerial Economics, Characteristics and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics.

Demand Analysis: Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions.

Elasticity of Demand & Theory of Production and Cost Analysis: Definition -Types of Elasticity of demand - Measurement of price elasticity of demand: Total outlay method, Point method and Arc method- Significance of Elasticity of Demand.

UNIT-II

Demand Forecasting: Meaning - Factors governing demand forecasting - Methods of demand forecasting - Forecasting demand for new products- Criteria of a good forecasting method.

Theory of Production and Cost Analysis: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

UNIT -III

Introduction to Markets & Pricing Policies: Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing.Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

UNIT-IV

Types of Industrial Organization & Introduction to business cycles: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

Introduction to business cycles: Meaning - Features of business cycles.

Capital and Capital Budgeting: Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

UNIT V

Introduction to Financial Accounting: Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

Interpretation and analysis of Financial Statement: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

LEARNING OUTCOMES:

1. Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives.
2. Be able to perform and evaluate payback period and capitalized cost on one or more economic alternatives.
3. Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives.

Text Books:

1. J.V. PrabhakarRao: Managerial Economics and Financial Analysis, Maruthi Publications, 2011
2. N. AppaRao. & P. Vijaya Kumar: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011

References:

1. A R Aryasri - Managerial Economics and Financial Analysis, TMH 2011
2. Suma damodaran- Managerial Economics, Oxford 2011
3. S.A. Siddiqui& A.S. Siddiqui, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.

III B.Tech I Semester

15ACE18-STRUCTURAL ANALYSIS- II

L	T	P	C
3	1	0	3

Course Objective:

Indeterminate structures are subjected to different loading with different supported conditions; hence it is necessary for students to study the behaviour of the structures.

UNIT-I

Kani`s Method:- Analysis of continuous beams – including settlement of supports and single bay, single storey portal frames with side sway by Kani's method.

UNIT – II

Flexibility Methods:- Flexibility methods, Introduction, application to continuous beams including support settlements.

Stiffness Method: - Introduction, application to continuous beams including support settlements.

UNIT III

Influence Lines and Rolling Loads :For Statically Determinate Structures- Moving/Rolling and influence lines; Influence lines for beam reactions ; Influence lines for shearing force; Influence lines for bending moment; Calculation of maximum shear force and bending moment at a section for rolling loads; Calculation of absolute maximum bending moment; Influence lines for simple trusses.

UNIT IV

Arches : Three hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature. Two **Hinged Arches:** Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses, tied arches – fixed arches – (No analytical question).

UNIT – V

Plastic Analysis: Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

Course Outcomes:

On completion of the course, the students will be able to:

- *Apply the methods of indeterminate truss analysis*
- *Analyze the behavior of arches through different methods of analysis*
- *Use various classical methods for analysis of indeterminate structures*

- *Determine the effect of support settlements for indeterminate structures*
- *Able to analyze the beam and frames for vertical and horizontal loads and draw*

TEXT BOOKS

1. Structural Analysis (Matrix Approach) by Pundit and Gupta – Tata Mc.Graw Hill publishers.
2. Analysis of structures by Vazrani&Ratwani – Khanna Publications.
3. Structural Analysis by D.S.PrakashaRao, Univ.Press, Delhi.Structural Analysis by C.S. Reddy, Tata Macgrawhill, New Delhi.

REFERENCE

1. Theory of structures by Ramamuratam,jain book depot , New Delhi
2. Structural analysis – Hibbler, 6th edition – Pearson publilcation.
3. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
4. Analysis Of Structures By Dev Das Menon – John wileypubilication.
5. Comprehensive Structural Analysis-Vol.I&2 by Dr. R. Vaidyanathan&Dr.P.Perumal-Laxmi publications pvt. Ltd., New Delhi.
6. Analysis of Structures – Vol. I & 2 by Bhavikatti, Vikas publications.
7. Strength of Materials and mechanics of solids Vol-2 by B.C. Punmia, Laxmi Publications, New Delhi.

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III B.Tech I Semester

15ACE19-CONCRETE TECHNOLOGY

L	TP	C
3	1 0	3

Course Objective:

- *Lot of advances is taking place in the concrete technology as par with development taking place in the engineering.*
- *The present day industry needs the knowledge of concrete technology thoroughly.*
- *The subject is designed to give the basic knowledge as well as latest developments in concrete technology.*

UNIT - I

Cement, Concrete & Its Components: Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral additives: slags, flyashes, rice husk ash, metakaolin, calcinedclays,silica fume, limestone powder.and chemical admixtures- aggregates: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – II

Tests on Concrete : Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.- Water / Cement ratio – Abram's Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Curing- Compression tests – Tension tests – – Strength in tension & compression – Factors affecting strength– Relation between compressive & tensile strength– Flexure tests – Splitting tests – Non-destructive testing methods – codal provisions for NDT.

UNIT – III

Elasticity, Creep & Shrinkage : Modulus of elasticity – Dynamic modulus of elasticity – Posisson's ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage.

UNIT – IV

Mix Design: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method.

UNIT – V

Special Concretes: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – Bacterial concrete(self healing concrete).

Course outcomes:

- *Identify the functional role of ingredients of concrete and apply this knowledge to mix design philosophy.*
- *Acquire and apply fundamental knowledge in the fresh and hardened properties of concrete.*
- *Evaluate the effect of the environment on service life performance, properties and failure modes of structural concrete and demonstrate techniques of measuring the Non Destructive Testing of concrete structure.*
- *Develop an awareness of the utilization of waste materials as novel innovative materials for use in concrete.*
- *Design a concrete mix which fulfills the required properties for fresh and hardened concrete.*

TEXT BOOKS:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete Technology by M.S.Shetty. – S.Chand& Co.; 2004

REFERENCES:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by A.R. Santha Kumar, Oxford university Press, New Delhi
3. Non-Destructive Test and Evaluation of materials by J.Prasad& C.G.K. Nair , Tata Mcgraw hill Publishers, New Delhi.
4. P.K.Mehta and P.J.M. Monteiro," concrete micro structure, properties and materials', Third edition Tata McGraw Hill 2006

III B.Tech I Semester

15ACE20-DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES

L	T	P	C
3	1	0	3

Course Objectives:

1. Familiarize Students with different types of design philosophies.
2. Equip student with concepts of design of flexural members.
3. Understand Concepts of shear, bond and torsion.
4. Familiarize students with different types of compressions members and Design.
5. Understand different types of footings and their design.

UNIT –I

Introduction: Introduction to Materials, Constituents of concrete, recommendation in IS 456 – 2000, grades of concrete, working stress method, design constants; Design singly reinforced and Doubly Reinforced beams.

UNIT –II

Limit State Design: Concepts of limit state design – Comparison between two methods- Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design –stress - block parameters – limiting moment of Resistance-Limit state design of singly reinforced, doubly reinforced.

UNIT –III

Beams:, T, L and Continuous beam sections by limit state method.

Shear, Torsion, Bond, & Serviceability: Limit state design of section for shear and torsion – concept of bond, anchorage and development length, Limit state design of serviceability for deflection, cracking and codal provision

UNIT –IV

Slabs:, Design of one way slab - Two-way slab, continuous slab.

UNIT – V

Columns & Footings

Short and long columns – under axial loads, uni-axial bending and **biaxial bending(Not for Examination)**, I S Code provisions. Different types of footings – Design of isolated, square, Rectangular, stepped and sloped footings,

Course Outcomes:

- *Students are able to know the working stress and limit state methods of design.*
- *Students are able to know the design concepts of flexural members.*
- *Students are able to know the design concepts of compression members.*
- *Students are able to know the serviceability requirements of the reinforced cement concrete structure.*
- *Students are able to understand the different types of footings and their design.*

TEXT BOOKS

1. 1.Design of Reinforced Concrete Structures (Limit State) – A.K.Jain, 1st Edition, NemchandBrothers,Roorkee.
2. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.Ltd., New Delhi.
3. Reinforced concrete structures – I.C. Syal&A.K.Goel, S.Chand Publishers.
4. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi.

REFERENCE

1. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
2. Reinforced concrete design by S.UnnikrishnaPillai&DevdasMenon, Tata Mc.Graw Hill, New Delhi.
3. Limit state designed of reinforced concrete – P.C.Varghese, Prentice Hall of India, New Delhi..
4. Design of concrete structures – ArthusH.Nilson, David Darwin, and Chorles W. Dolar, Tata Mc.Graw-Hill, 3rd Edition, 2005.
5. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers.

ENGINEERING COLLEGE PULIVENDULA

III B.Tech I Semester

15ACE21-GEOTECHNICAL ENGINEERING – I

L	T	P	C
3	1	0	3

Course Objective:

The object of this course is to make the student to understand the behaviour of soil under different loads and different conditions. This is necessary because the safety of any structure depends on soil on which it is going to be constructed.

UNIT – I

INTRODUCTION: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density. INDEX PROPERTIES OF SOILS: Moisture Content, Specific Gravity, Insitu density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

UNIT –II

PERMEABILITY:

Soil water – capillary rise – flow of water through soils – Darcy's lawpermeability – Factors affecting – laboratory and Field determination of coefficient of permeability –Permeability of layered systems. SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

UNIT – III

STRESS DISTRIBUTION IN SOILS:

Boussinesq's and Westergaard's theories for point loads and areas of different shapes – Newmark's influence chart . COMPACTION: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

UNIT – IV

CONSOLIDATION :

Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil - preconsolidation pressure and its determination - Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement..

UNIT – V

SHEAR STRENGTH OF SOILS : Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio – Liquefaction- shear strength of clays.

Course Outcomes:

On completion of the course, the students will be able to:

- *carry out soil classification*
- *solve any practical problems related to soil stresses estimation, permeabilityand seepage including flow net diagram*
- *estimate the stresses under any system of foundation loads solve practicalproblems related to consolidation settlement and time rate of settlement*

TEXT BOOKS:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Soil Mechanics and Foundation by byB.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCES:

1. Basic and Applied Soil Mechanics by GopalRanjan& ASR Rao, New age International Pvt .Ltd, New Delhi.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, Pearson Pubilications
3. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special Indian Edition
4. Geotechnical Engineering by Brije.M.Das, Cengage Publications, New Delhi.4.Geotechnical Engineering by Brije.M.Das, Cengage Publications, New Delhi.

III B.Tech I Semester

15ACE22-ENVIRONMENTAL ENGINEERING – I

L	T	P	C
3	1	0	3

Course objectives:

To make the students conversant with sources and its demand of water
To understand the basic characteristics of water and its determination
To expose the students to understand the design of water supply lines
To provide adequate knowledge about the water treatment processes and its design
To have adequate knowledge on safe disposal methods

UNIT – I

Introduction: Necessity of protected water supply –Flow chart of public water supply system - Role of Environmental Engineer.

Water Demand and Water Quality: Population forecasts, design period – water demand, types of water demands – factors affecting – fluctuations – fire demand – Characteristics of water – Physical, Chemical & Biological and their testing – drinking water standards - Waterborne diseases - Comparison from quality and quantity and other considerations.

Water collection structures at source: intakes – infiltration galleries.

UNIT-II

Water Treatment (Sedimentation, Filtration and Disinfection): Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation flocculation clarifier design – coagulants – feeding arrangements– Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices

UNIT-III

Water Distribution Network Analysis : Distribution systems – Requirements, Layout of Water distribution systems – Design procedures- Hardy Cross and equivalent pipe methods - service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house.

UNIT IV

Waste Water Collection : House plumbing– inverted siphon – catch basins – flushing tanks– ejectors - Conservancy and water carriage systems – sewage and storm water estimation - fluctuations – types of sewers – Hydraulics of sewers and storm drains– design of sewers– shapes and materials.

Waste Water Characteristics: Characteristics of sewage – cycles of decay –decomposition of sewage. - B.O.D. – C.O.D. equations.

UNIT – V

Waste Water Treatment : Layout and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – trickling filters – ultimate disposal of sewage – Construction and design of Oxidation ponds – sewage farming – dilution. Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff -Tanks working principles and design – soak pits.

Course outcomes:

- *Understand key current environmental problems.*
- *Be able to identify and value the effect of the pollutants on the environment: atmosphere, water and soil.*
- *Be able to analyze an industrial activity and identify the environmental problems.*
- *Be able to plan strategies to control, reduce and monitor pollution.*
- *Be able to select the most appropriate technique to purify and/or control the emission of pollutants.*
- *Be able to apply the basis of an Environmental Management System (EMS) to an industrial activity.*
- *Be able to plan and design the quantity of water for any given population.*

TEXT BOOKS

1. Water supply and sanitary Engineering by G.S. Birdi, DhanpatRai& Sons Publishers.
2. Water supply and sanitary Engineering by S.A.Garg,
3. Elements of environmental engineering by K.N. Duggal, S. Chand Publishers.
4. Manual on Water supply and Treatment - CPHEEO, 1999.
5. Punmia B.C, Ashok Jain &Arun Jain, Water Supply Engineering, Laxmi Publications, Pvt. Ltd., New Delhi, 2004.

REFERENCS

1. Water and Waste Water Technology by Mark J Hammar and Mark J. Hammar Jr.
2. Water and Waste Water Technology by Steel
3. Water and Waste Water Engineering by Fair Geyer and Okun
4. Waste water treatment- concepts and design approach by G.L. Karia and R.A. Christian, Prentice Hall of India
5. Waste water Engineering by Metcalf and Eddy.
6. Unit operations in Environmental Engineering by R. Elangovan and M.K. Saseetharan, New age International
7. Environmental Engineering by georad.Kiely TMH Pubilications.

III B.Tech I Semester

15ACE23-CONCRETE TECHNOLOGY LAB

L	T	P	C
0	0	3	2

Course Objective:

To have knowledge on building materials like fine aggregate, coarse aggregate, cement, their mechanical properties and their applications.

1. a) Determination of Specific Gravity of Cement.
   b) Determination of Unit Weight or Bulk Density of Cement.
2. Determination of Normal Consistency of Cement.
3. a) Determination of Initial Setting Time of Cement.
   b) Determination of Final Setting Time of Cement.
4. a) Preparation of Mortar Cubes for Compressive Strength.
   b) Test on Mortar Cubes for Compressive Strength.
5. a) Fineness of Cement by sieving method.
   b) Fineness of Cement by Air Permeability Method.
6. a) Determination of Specific Gravity of Fine Aggregate.
   b) Determination of Bulk Density of Fine Aggregate.

Fine Aggregate

7. a) Determination of Specific Gravity of Coarse Aggregate.
   b) Determination of Bulk Density of Coarse Aggregate.
8. Tests on Bulking of Sand a. Laboratory Method b. Field Method.
9. Determination of Fineness Modulus of Fine Aggregate.
10. Determination of Fineness Modulus of Coarse Aggregate.

Tests on Concrete

1. Tests on Workability of Concrete.
   a. Slump Test
   b. Compaction Factor Test
2. Tests on Hardened Concrete.
   a. Compressive Strength
   b. Flexural Strength
   c. Split tensile strength.
3. Non-Destructive Testing of Concrete Structures (only demonstration).

CourseOutcomes:

- *Students can test and analyze the properties of concrete materials.*
- *Students can design different proportions of concrete mixes.*
- *Students can have knowledge on non-destructive techniques on concrete.*

NOTE: At least EIGHT of the above experiments are to be conducted.

List of Equipment :

1. Pycnometers.
2. Slump cone
3. Vicat's apparatus
4. Specific gravity bottle.
5. Lechatlier's apparatus.
6. Compaction factor setups
7. Longitudinal compressometer and

8.Rebound hammer, Pulse velocity machine.

9. Relevant IS Codes

JAWAHARLAL TECHNOLOGICAL UNIVERSITY ANANTAPUR
योगः कर्मसु कौशलम्
ENGINEERING COLLEGE PULIVENDULA

III B.Tech I Semester

15ACE24-GEOTECHNICAL ENGINEERING LAB

L	T	P	C
0	0	3	2

CourseObjective:

To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behaviour of soil under various loads and conditions.

LIST OF EXPERIMENTS

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Specific gravity of soils by Density Bottle method &Pycnometer method
5. Permeability of soil, constant and variable head test
6. Compaction test
7. CBR Test
8. Consolidation test
9. Unconfined compression test
10. Tri-axial Compression test
11. Direct shear test.
12. Vane shear test

NOTE: At least EIGHT of the above experiments are to be conducted.

CourseOutcome:

- *solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram*

TEXT BOOKS:

1. Soil Testing Lab Manual by K.V.S. AppaRao&V.C.C.Rao,University Science Press , Laxmi Publication.
2. Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, New Delhi.
3. Relevant IS Codes.

III B.Tech II Semester

15ACE31-DESIGN OF STEEL STRUCTURES

L	T	P	C
3	1	0	3

Course Objectives:

- *To understand design specifications, loading and design procedures of different steel structures as per BIS specifications.*
- *Ability to perform analysis and design of steel members and connections. 2. Ability to design steel structural systems*
- *Familiarity with professional and contemporary issues Assignments: Students write two professional papers.*

UNIT – I

Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads–and combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 -2007 – Design Strengths- deflection limits – serviceability - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members – Design Strength of members.

UNIT – II

Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns –column splice – column base – slab base.

UNIT – III

Design of Beams – Plastic moment – Bending and shear strength laterally / supported beams design – Built up sections – large plates Web buckling Crippling and Deflection of beams, Design of Purlin.

UNIT – IV

Design of eccentric connections with brackets, Beam end connections – Web angle – Unstiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

UNIT – V

Plate Girder: Design consideration – I S Code recommendations Design of plate girderWelded – Curtailment of flange plates stiffeners – splicings and connections. Gantry Girder : Gantry girder impact factors – longitudinal forces, Design of Gantry girders.

Note: The students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Compound beams including curtailment of flange plates.

Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including particulars at joints.
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

Course outcome:

- *The student will be able to: Understanding of the ASD and LRFD design philosophies and behavior of structural steel.*
- *Ability to analyze and design of tension members, columns, beams, beam-columns.*
- *Ability to analyze and design of simple bolted and welded connections.*
- *Ability to design steel framing system and connections of a building in a team setting.*
- *Familiarity with structural steel fabrication process and construction through field trip and/or speaker presentation.*
- *Familiarity with professional and ethical issues and the importance of lifelong learning in structural engineering.*

TEXT BOOKS

1. Design of Steel Structures by K.S.SaiRam , Pearson Pubilishers.
2. Limit State Design of Steel Structures by S.K. Duggal, Tata Mcgraw Hill, New Delhi.
3. Design of Steel Structures by Bhavikatti. IK INT Publication House, New Delhi, 2010.

REFERENCES

1. Structural Design and Drawing by N.KrishnaRaju, University Press, Hyderabad.
2. Structural Design in Steel by SarwarAlamRaz, New Age International Publishers, New Delhi
3. Steel Structures by Subramanyam.N, Oxford University press, New Delhi
4. Design of Steel Structures by Edwin Gaylord, Charles Gaylord,JamesStallmeyer, Tata Mc.Graw-Hill, New Delhi.

Codes/Tables: IS Codes:

1) IS -800 – 2007
2) IS – 875 – Part III
3) Steel Tables.
4) Railway Design Standards Code. and steel tables to be permitted into the examination hall.

III B.TechII Semester

15ACE32-GEOTECHNICAL ENGINEERING – II

L	T	P	C
3	1	0	3

CourseObjective:

To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically knowledge of the subject is essential.

UNIT – I

SOIL EXPLORATION:

Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

UNIT – II

EARTH SLOPE STABILITY:

Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

UNIT – III

EARTH PRESSURE THEORIES:

Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Rebhann's and Culmann's graphical method **RETAINING WALLS**:

Types of retaining walls – stability of retaining walls.

UNIT – IV

SHALLOW FOUNDATIONS:

Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff's and Skempton`s Methods

ALLOWABLE BEARING PRESSURE :

Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis

UNIT –V

PILE FOUNDATION:

Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

WELL FOUNDATIONS:

Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

Course Outcomes:

On successful completion of the course, the students will have the:

- *Ability to apply the principle of shear strength and settlement analysis forfoundation system.*
- *Ability to design shallow and deep foundations*
- *Ability to analyze and design earth retaining structures.*
- *Estimate bearing capacity using IS code methods*

TEXT BOOKS:

1. Geotechnical Engineering by C.Venkataramaiah, New Age Pubilications.
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

REFERENCES:

1. Das, B.M., - (1999) Principles of Foundation Engineering –6 th edition (Indian edition) Thomson Engineering
2. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
3. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
4. Bowles, J.E., (1988) Foundation Analysis and Design – 4 th Edition, McGraw-Hill Publishing company, Newyork.
5. Geotechnical Engineering by Manoj Dutta&Gulati S.K – Tata Mc.Grawhill Publishers New Delhi.

III B.TechII Semester

15ACE33-HIGHWAY ENGINEERING

L	T	P	C
3	1	0	3

CourseObjective:

This subject deals with the Planned Development of Highways in India and makes the student aware of the importance of Highways in economic development of a Nation. The subject also deals with various geometric elements of Highways and their Design. Fundamentals of Traffic Engineering also will be taught to the student. The students will be given exposure to Pavement Structure Design by various methods.

UNIT I

HIGHWAY DEVELOPMENT AND PLANNING:

Highway development in India – Necessity for Highway Planning-Jayakar Committee and its Recommendations - Different Road Development Plans- First, Second and Third Twenty Year Road Development Plans-Classification of Roads - Road Network Patterns – Highway Alignment-Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

UNIT – II

HIGHWAY GEOMETRIC DESIGN:

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements-Surface Characteristics, Carriageway, Shoulders, Formation, Right of way; Kerbs, foot paths, Medians- design specifications. Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- -Vertical curves.

UNIT – III

TRAFFIC ENGINEERING:

Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their inter relationship – Highway Capacity and Level of Service concept – Factors affecting Capacity and Level of Service - Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams- Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Specifications. Design of Traffic Signals –Webster Method –Saturation flow Rate-Phasing and Timing diagrams – Numerical problems.

UNIT – IV

INTERSECTION DESIGN:

Conflicts at Intersections- Channelisation: Objectives –Traffic Islands and Design criteria- Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

UNIT – V

PAVEMENT DESIGN :

Types Of Pavements – Difference Between Flexible And Rigid Pavements – Pavement Components – Sub Grade, Sub Base, Base And Wearing Course – Functions Of Pavement Components – Design Factors – Flexible Pavement Design Methods – G.I Method, CBR Method, (As Per IRC 37-2002)–Design Of Rigid Pavements – Critical Load Positions - Westergaard's Stress Equations – Computing Radius Of Relative Stiffness And Equivalent Radius Of Resisting Section – Stresses In Rigid Pavements – Design Of Expansion And Contraction Joints In CC Pavements. Design Of Dowel Bars And Tie Bars.

Course outcome:

- *Be able to analyze types of pavements, pavement layers and construction.*
- *Different types of subgrades properties and stabilization techniques.*
- *Be able to differentiate different construction machineries and usage.*
- *Road construction problems and solutions in different land pattern.*
- *Different types of road construction materials and origin of those materials.*
- *An idea on basics of Transportation Engineering*

TEXT BOOKS:

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition (2000).
2. Transportation Engineering, Volume – I by C.Venkataramaiah, Universities Press, Hyderabad.
3. Principles and Practice of Highway Engineering Design – L.R.Kadiyali and Lal-KhannaPublications.

REFERENCES:

1. Traffic Engineering and Transportation Planning by L.R.Kadiyali and Lal- Khanna Publications.
2. Highway Engineering – Dr.S.K.Sharma, S.Chand Publishers

III B.Tech II Semester

15ACE34-ENVIRONMENTAL ENGINEERING - II

L	T	P	C
3	1	0	3

Course objectives

1. *To provide the adequate information on various disposal standards for industrial effluents*
2. *To study the information about air pollution and its effects*
3. *To understand the knowledge about solid waste generation and disposal methods*
4. *To impart knowledge on Environmental management and Environmental Impact Assessment*

UNIT – I

INTRODUCTIONTO AIR POLLUTION: Air Pollution – sources of pollution – Classification– effects on human beings, Plants and Materials – Global effects of Air pollution – ozone layer disturbance - Greenhouse effect – Ambient air quality and emission standards - Air pollution indices - Air (Prevention & Control)Act 1986.

UNIT – II

PARTICULATE POLLUTANT CONTROL: Settling chambers - Filtration – Electrostatic precipitation - Cyclone separation - Wet collectors - Design of various particle control devices - **GASEOUS POLLUTANT CONTROL:** Gas absorption in tray and packed towers - Absorption with/without chemical reaction - Adsorption in fixed beds - Wet scrubbers

BIOLOGICAL AIR POLLUTION CONTROL TECHNOLOGIES: Bioscrubers - Biofilters - Integrated air pollution control systems

UNIT –III

INDUSTRIAL WASTE TREATMENT : industrial waste treatment –Volume reduction – strength reduction – Neutralization – Equalization – Proportioning –Nitrification and Denitrification – Removal of Phosphates – Effluent standards.

UNIT – IV

SOLID WASTE MANAGEMENT: Solid waste Management – sources, composition and properties of solid waste – collection and handling – separation and processing.

SOLID WASTE DISPOSAL METHODS: Solid waste disposal methods – Land filling and composting – Incineration.

HAZARDOUS WASTE: Hazardous Waste – Nuclear waste – Biomedical wastes – chemical wastes – Effluent – disposal and Control methods.

UNIT – V

ENVIRONMENTAL IMPACT ASSEMENT(EIA)**:** Definitions and concepts – rationale and historical development of EIA – EIA in Civil Engineering, Initial environmental examination – environmental impact statement – Terms of reference – environmental appraisal – environmental

impact factors and areas of consideration – measurement of environmental impact, organization – scope and methodologies of EIA – Check lists, Matrices, Networks – status of EIA in India.

Course outcomes:

- *Recognize the design philosophy of water and wastewater treatment processes;*
- *Determine appropriate treatment parameters involved in drinking water treatment and municipal wastewater treatment processes such as yield coefficients, BOD decay constant, aeration rate constant, etc.*
- *Apply the principles, procedures, and current code requirements to the analysis and design of water and wastewater treatment engineering systems.*
- *Apply pilot study techniques and laboratory analytical methods to analyze changes of water qualities of raw water and wastewater and to estimate efficiencies of the designed treatment engineering systems.*

TEXT BOOKS:

1. Environmental Science and Engineering by J.G.Henry and G.W.Heinke – Person Education.
2. Environmental Engineering and Management – Dr.SureshK.Dhameja– S.K.Kartarai& Sons 2nd Edition 2005.
3. Environmental Engineering by Basak, Tata Mc.Graw Hill Edition, NewDelhi.
4. Environmental Pollution Control Engineering by C.S Rao
5. Canter, R.L., "Environmental Impact Assessment", McGraw Hill Inc., New Delhi, 1996.
6. L. W. Canter, Environmental Impact Assessment, 2nd Ed., McGraw-Hill, 1997.
7. Shukla, S.K. and Srivastava, P.R., "Concepts in Environmental Impact Analysis", Common Wealth Publishers, New Delhi, 1992.

REFERENCES:

1. Solid Waste Engineering by PaarneVesilind, Willaiam, Cengage Publications, New Delhi.
2. Air Pollution and Control by MN Rao&H.N.Rao.
3. Environmental Engineering by Gerard Kiely, Tata Mc.Graw Hill Edition, New Delhi.
4. Air Quality by Thodgodish, Levis Publishers, Special India Edition, New Delhi.
5. Introduction to Environmental Engineering by Mackenzie.L.Davis, Devid.A.Cornwell, Tata Mc.Graw Hill Edition, New Delhi.
6. John G. Rau and David C Hooten "Environmental Impact Analysis Handbook", McGraw Hill Book Company, 1990.

III B.Tech II Semester

15ACE38-ENVIRONMENTAL ENGINEERING LAB

L	T	P	C
0	0	3	2

Course Objective:

The laboratory provides knowledge of estimating various parameters like pH, Chlorides, Sulphates, Nitrates in water. For effective water treatment, determination of optimum dosage and chloride demand are also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD of effluent.

LIST OF EXPERIMENTS:

1. Determination of pH and Turbidity.
2. Determination of Conductivity.
3. Determination and Estimation of total solids, total volatile solids and total fixed solids.
4. Determination and Estimation of Total dissolved solids and Total suspended solids.
5. Determination of Alkalinity/Acidity.
6. Determination of Chlorides.
7. Determination of iron.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of Optimum coagulant dose – Jar test.
11. Determination of Chlorine demand.
12. Determination of Dissolved Oxygen.
13. Determination of B.O.D
14. Determination of C.O.D
15. Presumptive coliform test.

NOTE: At least 8 of the above experiments are to be conducted.

LIST OF EQUIPMENT:

1) pH meter,
2) Turbidity meter,
3) Conductivity meter,
4) Hot air oven,
5) Muffle furnace,
6) Dissolved Oxygen meter,
7) U – V visible spectrophotometer,
8) Reflux Apparatus,
9) Jar Test Apparatus,
10) BOD incubator.
11) COD Extraction apparatus

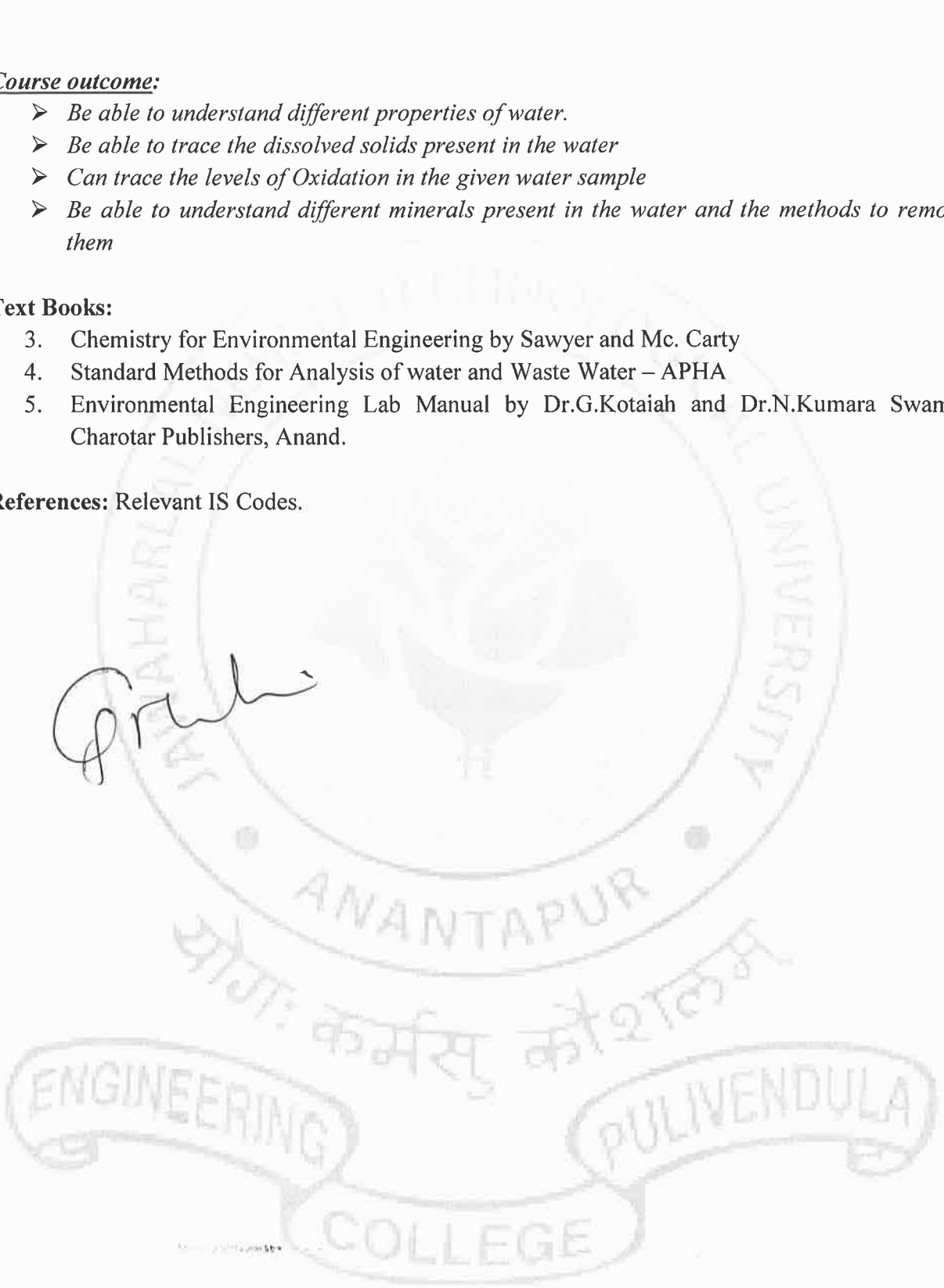
Course outcome:

- *Be able to understand different properties of water.*
- *Be able to trace the dissolved solids present in the water*
- *Can trace the levels of Oxidation in the given water sample*
- *Be able to understand different minerals present in the water and the methods to remove them*

Text Books:

3. Chemistry for Environmental Engineering by Sawyer and Mc. Carty
4. Standard Methods for Analysis of water and Waste Water – APHA
5. Environmental Engineering Lab Manual by Dr.G.Kotaiah and Dr.N.Kumara Swamy, Charotar Publishers, Anand.

References: Relevant IS Codes.



III B.TechII Semester

15ACE39-HIGHWAY ENGINEERING LAB

L	T	P	C
0	0	3	2

Course Objective:

To have knowledge on various highway materials like aggregate, bitumen, mechanical properties of the materials and their usage in the field.

Note: Minimum of eight experiments is to be executed

I. Tests on Aggregates

1. Aggregate Crushing Value Test
2. Los Angeles Abrasion Test
3. Aggregate Impact Value Test
4. Aggregate shape Test (Flakiness & Elongation)
5. Specific Gravity of Aggregate Test
6. Water Absorption of Aggregate Test
7. Soundness Test

II. Tests on Bitumen

1. Penetration Test
2. Ductility Test
3. Softening Point Test
4. Specific Gravity Test
5. Viscosity Test
6. Flash and Fire Point Test

III. Demo on Bituminous Mixes

1. Marshall Stability Test

Course Outcomes:

- *Be able to analyze various properties for Aggregates and Bitumen.*
- *Aggregate properties like Crushing, Impact, Soundness etc., will be known*
- *Bitumen properties like Ductility, Penetration, Softening point, flash and fire etc will be known*

III B.Tech II Semester

15AHS06-ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB

(Common for CE and EEE)

L	T	P	C
0	0	3	0

1. INTRODUCTION

The introduction of the Advanced Communication Skills Lab is considered essential at 3rd year level. At this stage, the students need to prepare themselves for their careers which may require them to listen to, read, speak and write in English both for their professional and interpersonal communication in the globalised context.

The proposed course should be a laboratory course to enable students to use 'good' English and perform the following:

- Gathering ideas and information to organize ideas relevantly and coherently.
- Engaging in debates.
- Participating in group discussions.
- Facing interviews.
- Writing project/research reports/technical reports.
- Making oral presentations.
- Writing formal letters.
- Transferring information from non-verbal to verbal texts and vice-versa.
- Taking part in social and professional communication.

2. OBJECTIVES:

This Lab focuses on using multi-media instruction for language development to meet the following targets:

- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.
- To prepare all the students for their placements.

3. SYLLABUS:

The following course content to conduct the activities is prescribed for the Advanced Communication Skills (ACS) Lab:

UNIT-I: COMMUNICATIVE COMPETENCY

1. *Reading Comprehension* – Techniques-Book Review
2. *Listening comprehension* – Video Talks-Eminent speeches
3. *Verbal Competency* - Vocabulary - Spotting Errors- Aptitude Tests

UNIT-II: TECHNICAL WRITING

1. *Essentials of writing* -Technical Paper/ Report writing-Concise writing
2. *Administrative / Business Documentation* – Circular Writing -Meeting – Agenda – Minutes-Resolutions
3. *Project Writing* – Framing Outline – Finding Problem- Documentation-Citation

UNIT-III: PRESENTATIONAL SKILLS

1. *Oral presentations* – Public Speaking –Paper & Seminar Presentation
2. *Digital Presentations* -Power point - Video Presentation -Poster presentation
3. *Stage Dynamics* – Body Language – Para Language

UNIT-IV: CORPORATE SKILLS

1. *Etiquettes* -Dress - Dining – Net Etiquettes
2. *Telephonic skills* –Mobile Etiquettes
3. *Soft Skills* – Intra – Inter Personal Skills

UNIT-V: GETTING READY FOR JOB

1. *Before Interview* -Curriculum vitae/ Resume-Covering letter-E-mail writing
2. *During Interview* – G.D-Mock Interviews– Psychometric Tests – Follow up
3. *After interview* - Excelling in Profession– Team spirit– Work culture

4. LEARNING OUTCOMES:

- Acquiring extensive range of vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects / Employability skills /developing organizational abilities in tune with corporate requirement
- Effective Speaking Abilities

5. MINIMUM REQUIREMENT:

The Advanced Communication Skills (ACS) Laboratory shall have the following infra-structural facilities to accommodate at least 35 students in the lab:

- Spacious room with appropriate acoustics.
- Round Tables with movable chairs
- Audio-visual aids /LCD Projector
- Public Address system
- P – IV Processor, Hard Disk – 80 GB, RAM–512 MB Minimum, Speed – 2.8 GHZ
- T. V, a digital stereo & Camcorder
- Headphones of High quality

6. SUGGESTED SOFTWARE:

The software consisting of the prescribed topics elaborated above should be procured and used.

1. K-VAN SOLUTIONS-Advanced communication lab
2. DELTA's key to the Next Generation TOEFL Test: Advanced Skill Practice.
3. TOEFL & GRE(KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
4. Train2success.com

7. BOOKS RECOMMENDED:

1. Objective English for Competitive Exams, HariMohana Prasad, 4th edition, Tata McGraw Hill.
2. Effective Technical Communication, AshrifRizvi, TataMcGrahill, 2011.
3. Technical Communication, Meenakshi Raman &Sangeeta Sharma, O U Press 2009.
4. Books on TOEFL/GRE/GMAT/CAT/IELTS, Barron's/DELTA/Cambridge University Press.2012.
5. Soft Skills for Everyone, Butterfield Jeff, Cengage Publications, 2011.
6. Ultimate Psychometric Tests: Mike Bryon,VinodVasishtha for Kogan Page India Pvt. Ltd, New Delhi.
7. Soft Skills- Know Yourself And Know The World, Dr.K.Alex, Chand Publications ,Third revised edition 2014.
8. Management Shapers Series , Universities Press (India) Pvt Ltd., Himayatnagar, Hyderabad 2008.
9. Word Power Made Handy, ShaliniVerma, S Chand Publications, 2011.

IV B.Tech I Semester

15AHS07-MANAGEMENT SCIENCE

(Common for CE and EEE)

L	T	P	C
3	1	0	3

Course Objectives:

- *To analyze the characteristics and contributions of enterprising people*
- *To assess their own entrepreneurial and enterprising potential To develop an understanding of the general role of Small Business Enterprises*
- *To develop skills to start, run and manage SMEs*
- *Understand the role of entrepreneurship in economic development.*
- *Identify the general characteristics of entrepreneurs.*
- *Know the differences between entrepreneurial and managerial type jobs.*
- *Understand the significance and sources of capital. Participate in the preparation of a complete business plan.*
- *Have an understanding of individual personalities and interpersonal skills needed for effective communications in a diverse business environment.*

UNIT I

INTRODUCTION TO MANAGEMENT:

Concepts of Management Nature - importance and Functions of Management, Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

DESIGNING ORGANIZATIONAL STRUCTURES:

Basic concepts related to Organisation - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

UNIT II

OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control:*c*chart, *p* chart, (simple Problems) Deming's contribution to quality.

MATERIALS MANAGEMENT: EOQ, ABC Analysis, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

UNIT III

HUMAN RESOURCES MANAGEMENT (HRM):

Concepts of HRM ,Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

UNIT IV

STRATEGIC MANAGEMENT:

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

PROJECT MANAGEMENT (PERT/CPM):

Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

UNIT V

CONTEMPORARY MANAGEMENT PRACTICES:

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

Assignments, case studies and mini project.

CourseOutcomes:

- *Equipping engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations.*
- *Exploring and developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate.*
- *Cultivating the technical skills as well as the behavioral challenges of running organizations and complex systems.*
- *Emphasizing quantitative analytic skills and an entrepreneurial spirit*
- *Have an introductory understanding of global entrepreneurship concepts.*
- *Understand the concept & process of entrepreneurship- its contribution & role in the growth & development of individual & the nation.*

TEXT BOOKS:

1. **Management Science**,Aryasri: TMH, 2004.
2. **Management** ,Stoner, Freeman, Gilbert, , 6th Ed, Pearson Education,New Delhi, 2004.

REFERENCES:

1. Marketing Mangement ,Kotler Philip & Keller Kevin Lane: 12/e, PHI,2005.
2. Essentials of Management ,Koontz&Weihrich:, 6/e, TMH, 2005.
3. Management—Principles and Guidelines, Thomas N.Duening& John M.Biztantra, 2003.
4. Production and Operations Management, KanishkaBedi, , Oxford University Press, 2004.
5. Personnel Management ,Memoria&S.V.Gauker, , Himalaya, 25/e, 2005
6. Modern Management ,Samuel C.Certo:, 9/e, PHI, 2005
7. Business Policy and Strategic Management, Lawrence R Jauch, R.Gupta&WilliamF.Frank Bros., 2005.

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IV B.Tech I Semester

15ACE51-ADVANCED STRUCTURAL ENGINEERING

L	T	P	C
3	1	0	3

CourseObjective:

To make the student more conversant with the design principals of multistoried buildings, roof system, foundation and other important structures.

UNIT-I: *Design of a flat slab (Interior panel only)*

UNIT-II: *Design of concrete bunkers of circular shape – (excluding staging) – Introduction to silos*

UNIT-III: *Design of concrete chimney*

UNIT-IV: *Design of circular and rectangular water tank resting on the ground*

UNIT-V: *Design of cantilever and counter forte retaining wall with horizontal back fill*

FINAL EXAMINATION PATTERN:

The question paper shall contain 2 questions of either or type covering all the syllabus where each question carries 35 marks out of 35 marks, 20 marks shall be for the design and 15 marks are for the drawing.

Course Outcomes:

On completion of this course the student will be able to

- *Design of roof systems with reference to Indian standards*
- *Design of water retaining and storage structures*
- *Design of silos and chimneys*

TEXT BOOKS :

1. Structural Design and drawing (RCC and steel) by KrishnamRaju, Universites .Press , New Delhi
2. R.C.C Structures by Dr. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, Laxmi Publications, New Delhi
3. Advanced RCC by Varghese, PHI Publications, New Delhi.
4. Design of RCC structures by M.L.Gambhir P.H.I. Publications, New Delhi.

Reference books :

1. R.C.C Designs by Sushilkumar , standard publishing house.
2. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications, New Delhi.

IV B.Tech I Semester

15ACE52-BRIDGE ENGINEERING

L	T	P	C
3	1	0	3

Course Objectives:

1. *Familiarize Students with different types of Bridges and IRC standards.*
2. *Equip student with concepts and design of Slab Bridges, T Beam Bridges, Box Culverts.*
3. *Understand concepts of design of Plate Girder Bridges.*
4. *Familiarize with different methods of inspection of bridges and maintenance.*

UNIT I

INTRODUCTION:

Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.

BOX CULVERT:

General aspects. Design loads, Design of Box culvert subjected to RC class A A tracked vehicle only.

BRIDGE BEARINGS:

General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastometric pad Bearing.

UNIT II

DECK SLAB BRIDGE:

Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported)subjected to class AA Tracked Vehicle only.

UNIT III

BEAM & SLAB BRIDGE (T-BEAM BRIDGE):

General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

UNIT IV

PLATE GIRDER BRIDGE:

Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder– Bridge of single line B.G.

COMPOSITE BRIDGES:

Introduction – Advantages – Design philosophy of Composite Bridges consisting of RCC slabs over steel girders including shear connectors

UNIT V

PIERS & ABUTMENTS:

General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers –Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excludingDesign).

Course Outcomes:

On completion of the course, the students will be able to:

- *Design the basic components of bridge structures like bridge deck slabs, longitudinal girders, transverse girders, piers and well foundations.*

TEXT BOOKS:

1. Victor D.J - Essentials of bridge Engineering, Oxford and IBH Publishers.
2. Arya and Azmani - Design of steel structures, Nemchand Publishers.
3. Design of Bridges Structure by T.R.Jagadish&M.A.Jayaram Prentice Hall of India Pvt., Delhi.
4. Design of Bridges by N.KrishnamRaju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
5. Relevant – IRC & Railway bridge Codes.

REFERENCE:

1. Design of Concrete Bridges by Aswini, Vazirani, Ratwani.
2. Bridge Engineering by PonnuSwamy, TATA Mcgraw Hill Company, New Delhi.
3. Design of RC Structures by B. C. Punmai, Jain & Jain, Lakshmi Publications.
4. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
5. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.

IV B.Tech I Semester

15ACE53-GROUND IMPROVEMENT TECHNIQUES
(CBCC (DEPARTMENTSPECIFIC))

L	T	P	C
3	1	0	3

Course Objective:

To have knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils.

1. *To introduce the various types of improvement methods of engineering properties soils.*
2. *To introduce the application of engineering methods to ground improvement projects.*

UNIT I

Dewatering: Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis .

Grouting: Objectives of grouting- grouts and their properties- grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.

UNIT II

Densification Methods

Granular Soils:-In – situ densification methods in granular Soils: – Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, and Impact at depth.

Cohesive Soils: – In – situ densification methods in Cohesive soils:– preloading or dewatering, Vertical drains – Sand Drains, Sand wick geo-drains – Stone and lime columns – thermal methods.

UNIT III

Stabilization: Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum

UNIT IV

Reinforced Earth: Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls. **Geosynthetics:** Geo-textiles-Types, Functions and applications – geogrids and geomembranes – functions and applications. **Geoenvironmental** application of geosynthetic: geomembranes for landfills and ponds, Geosynthetics clay liner, filtration, erosion control, slope protection

UNIT V Expansive Soils: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

Course outcomes

- *Student will be able to understand soil dewatering techniques with respect to field conditions.*
- *Student will be able to understand grouting techniques with respect to field conditions.*
- *Student will be able to understand soil dewatering techniques with respect to field conditions.*
- *Student will be able to understand and design principles of reinforced soil walls.*
- *Student will be able to understand geo synthetics and their field applications.*

TEXT BOOKS:

1. Haussmann M.R. (1990), Engineering Principles of Ground Modification, McGraw-Hill International Edition.
2. Dr.P.Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi / University science press, New Delhi
3. NiharRanajanPatra. Ground Improvement Techniques, Vikas Publications, New Delhi

REFERENCE BOOKS:

4. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional, Boca Taton, Florida, USA.
5. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley and Sons, New York, USA.
6. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jersey, USA

ANANTAPUR ENGINEERING COLLEGE PULIVENDULA

IV B.Tech I Semester

15ACE54-EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

(CBCC (DEPARTMENTSPECIFIC))

L	T	P	C
3	1	0	3

Course objectives:

- *Select and apply the appropriate energy dissipation or base-isolation device for mitigating seismically induced damage to a building*
- *Predict damage to un-reinforced masonry buildings and identify the vulnerable features*
- *Assess existing building structures and provide plans for their effective retrofitting*
- *Assess seismic performance of non-structural components and building contents and identify effective measures to mitigate potential damage.*

UNIT – I

Earthquake Engineering : - Engineering Seismology –Earthquake phenomenon – Causes and effects of earthquakes – Faults –Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenteretc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams.

UNIT – II

Introduction to Structural Dynamics: – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT – III

Earthquake Analysis : - Introduction – Rigid baseexcitation – Formulation of equations of motion for SDOF System – Earthquake response analysis of single and multi-storyed buildings – Use of response spectra.

Codal Design Provisions : - Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings –Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT – IV

Codal Detailing Provisions: - Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

Shear walls : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

UNIT – V

Aseismic Planning : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity -Proximity of Adjacent Buildings.

Course outcomes:

- *Describe seismicity of the world and the role of plate tectonics*
- *Accurately interpret response spectra presented in the different formats including the Acceleration-Displacement Response Spectrum (ADRS) diagram for quantifying potential seismic hazards on infrastructure*
- *Students should know assess seismic performance of non-structural components and building contents and identify effective measures to mitigate potential damage.*

TEXT BOOKS:

1. Earthquake Resistant Design of Structures – PankajAgarwal&ManishShrikhande – Printice Hall of India, New Delhi
2. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, New Delhi

REFERENCES:

1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch, Delhi.
2. Earthquake Tips by C.V.R.Murty, I.I.T. Kanpur.
3. Structural Dynamics by Mario Paaz.
4. Earthquake Hazardous Mitijation by R.Ayothiraman and HemanthHazarika, K.International Publishing House Pvt.Ltd., New Delhi.
5. Dynamics of Structures – Clough &Penzien, McGraw Hill –International Edition

Codes/Tables:

IS Codes: IS:1893, IS:4326 and IS:13920 to be permitted into the examinations Hall.

IV B.Tech I Semester

15ACE55-PRESTRESSED CONCRETE
(CBCC (DEPARTMENTSPECIFIC))

L	T	P	C
3	1	0	3

Course Objective:
To have knowledge on prestressing, design and deflection of prestressed concrete beams.

UNIT – I

Introduction: Historic development – General principles of prestressing, pretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

UNIT – II

Methods Of Prestressing:- Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing – Loss of prestress in pre-tensioned and posttensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel and wobble frictional losses.

UNIT – III

Analysis & Design of Sections For Flexure;- Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

UNIT – IV

Design Of Shear : Shear and Principal Stresses – Design for Shear in beams – Analysis of stress – General designs considerations.

UNIT – V

Deflections Of Prestressed Concrete Beams: Importance of control of deflections – factors influencing deflections – short term deflections of uncrackedmembers prediction of long term deflections.

Course Outcomes:
Student shall have knowledge on

- *Methods of prestressing and able to design various prestressed concreteStructural elements.*
- *Analysis of sections to withstand shear and flexure.*

TEXT BOOKS:

1. Prestressed Concrete by N. Krishna Raju; - Tata Mc.Graw Hill Publications.
2. Prestressed Concrete by N.Rajasekharan; - Narosa publications.
3. Prestressed Concrete by Ramamrutham,Dhanpatrai Publications

REFERENCE:

1. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley & Sons.
2. Pre stressed concrete by E.G.Nawy Codes/Tables: Codes: BIS code on prestressedconcrete, IS 1343 to be permitted into the examination Hall.

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IV B.Tech I Semester

15ACE56-ARCHITECTURE AND TOWN PLANNING
(CBCC (DEPARTMENTSPECIFIC))

L	T	P	C
3	1	0	3

Objective:-

To know the western architecture and Indian architecture and also to gain knowledge on the principles of architectural design and historical background of town planning.

A) ARCHITECTURE:

UNIT-I

History of Architecture:

a) Western Architecture: Egyptian, Greek, Roman Architectures; influencesComparative Analysis Orders.

b) Indian Architecture: Vedic age - Indus Valley civilization - Buddhist period; stambas, Slenstas. Roranas, Chaityans, Viharas with one example for each Hindu temples - Evaluation of Dravidian and Indo Aryan Styles - Principle factors. Temple of Aibole, Mahabalipuram, Madurai, Deograph, Bhuvaneshwar, Mount Abu.

c) Indo - Sarsanic Architecture; Mosque - Place- Fort Tomb.

UNIT - II

Architectural Design:

a) Principle of designing : Composition of plan Relationship between plan and elevation elements, form, surface Mass, Texture, Color, Tone.

b) Principle of Compositions: Unity, contrast, proportion, scale, Bab Rhuthm, character. Principles of Planning a Residence; Site Orientation prospect, Grouping, circulation, privacy, services and other factors.

UNIT – III

Introduction of Post-classic Architecture and contribution of eminent architects to modern period. Brief summary of post - classic architecture - Indian and Western Architectural contribution of Edward Lutyens, Le Corbusier), Frank Lloyd Wrigt, Walter Groping, Vender Rohe, Caarihan, Nervi, Oscar Niemyer, Edward Durell stone.

TOWN PLANNING:

UNIT – IV

Historical Back Ground:

Town planning in India - town plans of Magad - town plans of ancient Indian towns; Mourya, Pataliputravijayanagara, Delhi.Town planning in the West-town plans of Acropolis, Rome, Paris, London.

UNIT – V

Components of Planning;

a) Zoning
b) Roads and road Traffic.
c) Housing-Slums, Parks, Play grounds.
d) Public Utility Services.
e) Surveys and maps for planning.
f) Neighbourhood Planning.

Planning New town, planning standards, National and regional Planning, town planning and legislation. Garden cities and satellite town

Course Outcomes:

- *Appreciate Town Planning Schemes.*
- *Explain the tools of town planning*
- *Explain different components of town and their effect in town planning*
- *Describe the facts relating to the Industrial areas of a town*
- *Describe the aspects involved in a Development Plan*
- *Demonstrate different features of Traffic management*
- *Apply land-use regulation for planning issues*

REFERENCES:

A) ARCHITECTURE

4. Indian Architecture – Vol:- I and II by Percy Brown, Taraporevala Publications, Bombay.
5. Planning and 'Design of Building -Section of Architecture by Y.S.Sane.
6. Modern Architecture and Design by Nikolans, Pevshar.
7. Modern Ideal Hol1 lnes for India by R.S.Deshpande.

B) TOWN PLANNING

1. Town and Country .Planning - A.J.Brown and H.M.Sherrard.
2. Town Design .-FederikGibbard, Architectural press, London.
3. National Building Code of India.
4. Town Planning in India - Town and Country Planning Organisation, New Delhi 1962. 5. Regional Planning - Misra R.P., Mysore University.
5. Urban and Regional Planning; Principles and case studies by K.S.Rama Gouda, Mysore University Publications.
6. Town and Country Planning - P. Abercrombe, Oxford University press.

IVB.Tech I Semester

15ACE57-RETROFITING AND REHABILITATION OF STRUCTURES
(CBCC (DEPARTMENTSPECIFIC))

L	T	P	C
3	1	0	3

Course Objective:

To have knowledge on the deterioration of structures, causes of corrosion, inspection, testing, repair of structures and their health monitoring.

UNIT I

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage.

UNIT II

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention.Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.

UNIT III

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

UNIT IV

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning, Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

UNIT V

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

CourseOutcomes:

1. *Understand the causes and prevention of deterioration in structures.*
2. *Interpret the types of damages and understand their mechanisms.*
3. *Categorize the causes and prevention mechanisms of corrosion in steel reinforcement and fire induced damages.*
4. *Able to Examine to inspect and assess the structures using techniques of visual inspection and NDT.*
5. *Estimate the structural damage and recommend suitable repair and strengthening methods.*
6. *Make use of the latest health monitoring and building instrumentation methods*

TEXT BOOKS:

1. Concrete Technology by A.R. Santakumar, Oxford University press.
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.

REFERENCE BOOKS:

1. Defects and Deterioration in Buildings, EF & N Spon, London
2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981)
4. Building Failures : Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson,

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IV B.Tech I Semester

15ACE58-TRANSPORTATION ENGINEERING
(CBCC (DEPARTMENTSPECIFIC))

L	T	P	C
3	1	0	3

Course Objective:

The course deals with different components of Transportation Engineering like Railway , airport Engineering & harbours. This course also imparts a sound knowledge on design and planning components of railways, airports, docks and harbours.

UNIT – I

Railway Engineering:

Introduction – Permanent Way Components – Cross Section Of Permanent Way – Functions And Requirements Of Rails, Sleepers And Ballast – Types Of Gauges – Creep Of Rails – Theories Related To Creep – Coning Of Wheels – Adzing Of Sleepers – Rail Fastenings.

UNIT – II

Geometric Design Of Railway Track:

Gradients – Grade Compensation – Cant And Negative Super Elevation – Cant Deficiency – Degree Of Curves – Safe Speed On Railway Track – Points And Crossings – Layout And Functioning Of Left Hand Turn Out And Right Hand Turn Outs – Station Yards – Signaling And Interlocking.

UNIT –III

Airport Engineering:

Airport Site Selection – Factors Affecting Site Selection And Surveys- Runway Orientation – Wind Rose Diagram – Basic Runway Length – Correction For Runway Length – Terminal Area – Layout And Functions – Concepts Of Terminal Building – Simple Building , Linear Concept, Pier Concept And Satellite Concept – Typical Layouts .

UNIT- IV

Geometric Design Of Runways And Taxiways:

Aircraft Characteristics – Influence Of Characteristics On Airport Planning And Design – Geometric Design Elements Of Runway – Standards And Specifications As Per - Functions Of Taxiways – Taxiway Geometric Design – Geometric Elements And Standard Specifications – Runway And Taxiway Lighting.

UNIT – V

Ports,Docks And Harbours:

Requirements Of Ports And Harbours – Types Of Ports – Classification Of Harbours – Docks And Types Of Docks – Dry Docks, Wharves And Jetties – Breakwaters: Layouts Of Different Types Of Harbours And Docks – Dredging Operations – Navigation Aids.

Course Outcomes:

- *Can be able to get different modes of Transportation like Roadways, Railways, Airways and Water ways.*
- *An idea on Railway Engineering, its functions, requirements and geometric design of Railways.*
- *Airports, air traffic, runway lengths and its geometric design will be known*
- *Classification on Ports, Harbours , Dock yards and their types .*

Text Books:

1. A Text Book Of Railway Engineering-S.C.Saxena And S.Arora, Dhanpatrai And Sons, New Delhi.
2. Transportation Engineering, Volume – II (Railways,Airports,Docks and Harbours,Bridges and Tunnels) by C.Venkataramaiah, Universities Press, Hyderabad.
3. Airport Planning And Design- S.K. Khanna And M.G Arora, Nemchand Bros.

References:

1. SatishChandraAndAgarwal, M.M. (2007) "Railway Engineering" Oxford Higher Education, University Press New Delhi.
2. Highway, Railway, Airport AndHarbour Engineering – K.P. Subramanian, ScitechPubilishers.

JNTU ANANTAPUR
ENGINEERING COLLEGE PULIVENDULA

IVB.Tech I Semester

15ACE59-CAD LAB

L	T	P	C
0	0	3	2

Course objectives:

- *We introduce you to STAAD.Pro's state of the art user interface, visualization tools, powerful analysis and design engines with advanced finite element (FEM) and dynamic analysis capabilities.*
- *Student will know how to perform accurate and numerically efficient plate/shell element incorporating out-of-plane shear and in-plane rotation; automatic element mesh generation; comprehensive element stress output including in-plane stresses, out-of-plane shear, bending and principal stresses at nodal as well as user specified points*
- *Student will learn how to achieve user-specified design parameters to customize design*
- *Student will know how to perform code check, member selection and optimized member selection consisting of analysis/design cycles.*
- *Student will know how to design concrete beams/columns/slabs/footings as per all major international code*

CAD:

SOFTWARE:S TAAD PRO or Equivalent

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

Course outcomes:

- *STAAD.Pro comes with flexible modeling environment, advanced features, and fluent data collaboration. It is the world's number one structural analysis and design software that supports Indian and all international codes*
- *STAAD.Pro allows structural engineers to analyze and design virtually any type of structure. Structural engineering firms, structural consultants, departments in construction companies, owner/operators, and government agencies, and offshore platform designers' use this software extensively.*
- *STAAD.Pro Lab. Covers all the steps involved in structural analysis and design of concrete and steel.*
- *We introduce you to STAAD.Pro's state of the art user interface, visualization tools, powerful analysis and design engines with advanced finite element (FEM) and dynamic analysis capabilities.*

TEXT BOOK:

1.Computer Aided Design Lab Manual by Dr. M. N. SeshaPrakash And Dr. C. S. Suresh

IV B.Tech II Semester

15ACE81-ESTIMATION, COSTING AND VALUATION

L	T	P	C
3	1	0	3

Objective:

The objective of the course is to make the student to understand about estimation and valuations of different types of structures and their valuation as per standard schedule of rates.

UNIT – I

INTRODUCTION: General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

STANDARD SPECIFICATIONS: Standard specifications for different items of building construction

UNIT – II

ESTIMATION OF BUILDINGS: Detailed Estimates of Buildings

UNIT – III

EARTHWORK ESTIMATION : Earthwork for roads and canals.

REINFORCEMENT ESTIMATION: Reinforcement bar bending and bar requirement schedules.

UNIT – IV

CONTRACTS AND TENDERS : Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tending.

UNIT – V

RATE ANALYSIS: Working out data for various items of work over head and contingent charges.

VALUATION: Valuation of buildings. .

Course outcomes:

On completion of the course, the students will be able to:

- *apply different types of estimates for different building elements*
- *carry out analysis of rates and bill preparation different building elements*
- *understand the concepts of specification writing*
- *carry out valuation of assets*

TEXT BOOKS :

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Contracts and estimations by B.S.Patil, Universities.Press, Hyderabad.
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications

REFERENCES:

1. Estimating and Costing by G.S. Birdie, DhanpatRai Publishing Company (P) Ltd
2. A Text book of Estimating and Costing by D.D.Kohli, S.ChandPubilishers.

IV B.Tech II Semester

15ACE82-DESIGN AND DRAWING OF IRRIGATION STRUCTURES

L	T	P	C
3	1	0	3

Course objectives:

1. *To understand the basic types of irrigation, irrigation standards and crop water assessment.*
2. *To study the different aspects of design of hydraulic structures.*
4. *To provide knowledge on various hydraulic structures such as energy dissipaters, head and cross regulators, canal falls and structures involved in cross drainage works.*
5. *To understand the analysis of seepage and hydraulic jump.*
6. *To design different types of dams.*

DESIGN AND DRAWING OF THE FOLLOWING IRRIGATION STRUCTURES.

UNIT-I: Surplus weir

UNIT-II: Tank sluice with tower head

UNIT-III: Trapezoidal notch fall.

UNIT-IV: Canal regulator.

UNIT-V: Sloping glacis weir.

Final Examination pattern:

Any two questions of the above five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

Course Outcomes:

On completion of the course, the students will be able to:

- *design various irrigation structures like head and cross regulator structures*
- *identify various types of reservoirs and their design aspects*

TEXT BOOKS:

1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wiley eastern Ltd.
2. Irrigation Engineering & Hydraulic Structures by Garg S K ,Khanna Publishers, Delhi, 1995.

IV B.Tech II Semester

15ACE83-CONSTRUCTION TECHNOLOGY AND PROJECT MANAGEMENT

L	T	P	C
3	1	0	3

Cours Objective:

The objective of the course is to make the student to understand about fundamentals of construction management and techniques to be used to perform and complete the construction works intime by saving time and money.

UNIT – I

FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY :

Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations. PREPARATORY WORK AND IMPLEMENTATION Site layout – Infrastructure Development – Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – False work and Temporary Works.

UNIT - II

EARTHWORK :

Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging.Rock Excavation – Basic Mechanics of Breakage – Blasting Theory – Drillability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting.

UNIT - III

PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS :

Introduction – Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT network problems.

UNIT - IV

ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK :

Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems – Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems.

UNIT - V

PERT AND CPM: TIME COMPUTATIONS & NETWORK ANALYSIS

Introduction – Uncertainties : Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems -Earliest expected time – Formulation for TE - Latest allowable occurrence time – Formulation for TL - Combined tabular computations for TE and TL problems.Introduction - Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for TE and TL - Start and f inish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

Course Outcomes:

- *Students are able to learn different types of technologies in construction.*
- *Students are able to identify the activities involved in construction project.*
- *Students are able to draw the bar charts and network diagrams.*
- *Students are able to compute the time estimates of the construction project.*

TEXT BOOKS :

1. Construction project management by Jha ,Pearsonpubilications,New Delhi.
2. Construction Technology by SubirK.Sarkar and SubhajitSaraswati – Oxford Higher Education- Univ.Press, Delhi.
3. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications New Delhi.

REFERENCES:

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003
2. Total Project management, the Indian context- by : P.K.JOY- Mac Millan Publishers India Limited.

ENGINEERING COLLEGE PULIVENDULA

B.TECH - R15 REGULATIONS

CHOICE BASED CREDIT COURSES (INTER DEPARTMENT)

OFFERED

IN

II YEAR I SEMESTER

w.e.f.

2015 ADMITTED BATCH



DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA

ANNEXURE-I

Choice Based Credit Course of Inter Department offered in

B.TECH II YEAR I SEMESTER

BRANCH	SUBJECT CODE	SUBJECT NAME
PHYSICS	15ABS12	Basics of Nano Science and Nano Technology
MATHEMATICS	15ABS14	Set Theory and Mathematical Logic
	15ABS23	Mathematical Modeling
CHEMISTRY	15ABS15	Green Chemistry and Catalysis for Sustainable Environment
	15ABS16	Instrumental Methods of Chemical Analysis
	15ABS17	Chemistry of Nano Material and Application
ENGLISH	15AHS08	Campus Recruitment Training & Soft Skills
	15AHS09	Competitive & Spoken English
CE	15ACE09	Green Buildings
	15ACE10	Disaster Management and Mitigation
	15ACE11	Water Harvesting and Conservation
ECE	15AEC08	Basic Electronics
	15AEC09	Fundamentals of Digital Electronics
	15AEC10	Electronic Measurements & Instrumentation
ME	15AME11	Robotics
	15AME12	Mechanical Manufacturing Process
	15AME13	Non-Conventional Sources of Energy
EEE	15AEE08	Principles of electrical engineering
	15AEE01	Electrical engineering materials
	15AEE09	Electrical measuring instruments
CSE	15ACS04	Data Structures
	15ACS11	Object oriented Programming
	15ACS08	Operating Systems

II B.Tech – I Sem

15ABS12-Basics of Nano science and Nanotechnology

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

OBJECTIVES:

1. To understand the fundamentals of nanoscience and nanotechnology
2. To give a general introduction to different classes of nanomaterials
3. To impart basic knowledge on various synthesis and characterization techniques involved in Nanotechnology
4. To make the learner familiarize with nanotechnology potentialities.

Unit-I Basics of Nanoscience:

Introductory quantum mechanics for nano science- Historical back ground of nanoscience - Density of states for zero, one, two and three dimensional materials, Quantum confinement, Quantum wells, wires, dots, Factors affecting to particle size, Metal semiconductor (MS) and metal insulator (MI).

Unit-II Properties of Nanomaterials:

Mechanical, Thermal, Electrical, Optical, Magnetic and Structural properties, Carbon based materials- Fabrication, structure, electrical properties and mechanical properties.

Unit-III Synthesis of Nanomaterials:

Physical methods: Bottom up-Ball Milling, Physical vapour deposition, Laser pyrolysis, Sputter deposition.

Chemical methods: Hydrothermal, Sol-gel method, solution combustion method, Co-precipitation method.

Unit-IV Characterization:

Spectroscopic techniques: UV- Visible Spectroscopy, Fourier Transform infrared (FTIR) spectroscopy, Principles and analysis of X-ray diffraction (XRD); electron diffraction, Scanning Electron Microscope (SEM) – Transmission Electron Microscope (TEM).

Unit –V Applications:

Nano engineered materials – coatings – catalysts - nano scale thin films for water-repellent, antireflective and self cleaning surfaces. Communication systems, solar cells and energy storage applications.

TEXT BOOKS

1. ***A Textbook of Nanoscience and Nanotechnology,*** Pradeep T.,Tata Mc Graw Hill Education Pvt. Ltd., 2012.
2. Introduction to Nano Technology, Charles P. Poole Jr & Frank J. Owens. John Wiley and Sons, 2003.
3. The Chemistry of nanomaterials: Synthesis, Properties and Applications, C.N.R. Rao, A. Muller and A.K. Cheetham, Vol – 1, Wiley Online Library, 2005.
4. The Physics of Micro/Nano- Fabrication, Ivor Brodie & Julius J.Muray, Springer, 1992.

REFERENCES

1. ***Nanoscience: Nanotechnologies and Nanophysics,*** Dupas C., Houdy P., Lahmani M., Springer-Verlag Berlin Heidelberg, 2007.
2. Quantum Physics, A. Ghatak & S. Lokanathan, 5th Edition, Mac Millan India, 2004.
3. Nanophysics and Nanotechnology, Edward L. Wolf, Wiley-VCH, 2006.
4. Elements of X-ray Diffraction, B.D.Cullity, Addision Wesely, 1978.
5. Concise Encyclopedia of Materials Characterization, Robert Cahn, 2nd Edition (Advances in Materials Science and Engineering), Elsevier Publication, 2005.

Outcomes:

- Students will have the exposure to the multidisciplinary area of nanoscience.
- The necessary foundation for advanced materials engineering subject.
- Familiarity about the necessary characterization tools for nanoscale.
- Overview on the importance of nanoscience and nanotechnology through recent applications.

II B.Tech – **I Sem**

15ABS14- SET THEORY AND MATHEMATICAL LOGIC

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Objectives:

- This course aims at providing the student with the concepts of statements, sets relations and Mathematical induction.

UNIT – I

Statement, truth values, negation, conjunction, disjunction, conditional and biconditional, contrapositive statement.

UNIT – II

Set, subset, superset, operations viz. union, intersection, complement etc. of sets; power set, cartesian product.

UNIT – III

Equivalence relations, equivalence classes, partition, fundamental theorem of equivalence relation, partial order relation, Poset, chain, upper & lower bounds in poset, greatest & least elements, maximal & minimal elements, supremum & infimum, Zorn's lemma, introduction to lattice theory. Functions, injection, surjection and bijection; image and pre-image of set under function and inverse mapping, composite mapping.

UNIT – IV

Peano's axioms, principle of mathematical induction, well ordering principle, axiom of choice.

UNIT – V

Finite and infinite sets, countable and uncountable sets, Schroeder Bernstein Theorem, Continuum hypothesis.

TEXT BOOKS:

1. P. R. Halmos, Naive Set Theory Springer, 2009.
2. Bartle, R. G. and Sherbert, D. R. Introduction to Real Analysis, (John Wiley and Sons, Third (Indian) Edition), 2007.

REFERENCES:

1. K. Hrbacek and T. Jech, Introduction to Set Theory , 3rd edition, CRC press, 1999.

Outcomes: The student will be able to analyze the Mathematical logical structures with the concepts of statements, sets, relations and Mathematical Induction.

2.7.18

II B.Tech – **I Sem**

15ABS23-Mathematical Modeling
(Choice based Credit Course)

L	T	P	C
3	1	0	3

Objectives:

- This course aims at providing the basic knowledge to understand a Mathematical model and formulate a Mathematical model related to a real word problems of engineering, biological science etc.

UNIT – I

Mathematical Modeling: Need, Techniques, Classifications and Simple illustarations,
Mathematical modeling Through Ordinary differential equations of First Order :
Mathematical modeling Through differential equations; Linear growth and decay models; Non-Linear Growth and Decay models; Mathematical modeling in dynamics through ordinary differential equations of first order.

UNIT – II

Mathematical modeling Through System of Ordinary differential equations of First Order: Mathematical modeling in population dynamics; Mathematical modeling of Epidemics through system of ordinary differential equations of first order; Compartment models through Systems of ordinary differential equations; Mathematical modeling in dynamics through systems of ordinary differential equations of first order.

UNIT – III

Mathematical modeling Through Ordinary differential equations of Second Order: Mathematical modeling of Planetary motion ; Mathematical modeling of Circular motion and motion of satellites; Mathematical modeling through linear differential equations of second order.

UNIT – IV

Mathematical modeling Through Difference equations : Need for Mathematical modeling Through Difference equations and simple models; Basic theory of Linear difference equations with constant coefficients; Mathematical modeling Through Difference equations in population dynamics and genetics; Mathematical modeling Through Difference equations in Probability theory.

UNIT – V

Mathematical modeling Through Functional, Integral, Delay- Differential and Differential-Difference Equations: Mathematical modeling Through Functional equations;
Mathematical modeling Through Integral equations; Mathematical modeling Through Delay-Differential and Differential-Difference Equations.

TEXT BOOKS:

1. J. N. Kapoor. Mathematical Modeling, NEW AGE INTERNATIONAL PUBLISHERS.

REFERENCES:

1. A. C. Fowler. Mathematical Models in Applied Sciences, Cambridge University Press.

Outcomes: The student will be able to analyze the real word problem through the technique of modeling of that problem to have better insight of the real word problem.

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II B.Tech – **I Sem**

15ABS15-GREEN CHEMISTRY AND CATALYSIS FOR SUSTAINABLE ENVIRONMENT

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products.
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

UNIT 1: Principles And Concepts Of Green Chemistry

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling.

UNIT 2: Catalysis And Green Chemistry

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal Catalysts with Phosphine Ligands, Greener Lewis Acids, Asymmetric Catalysis, Heterogenising the Homogenous catalysts, Phase transfer catalysis: Hazard Reduction, C–C Bond Formation, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples.

UNIT 3: Organic Solvents: Environmentally Benign Solutions

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbondioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalyst and solvent.

UNIT 4: Emerging Greener Technologies And Alternative Energy Sources

Biomass as renewable resource, Energy: Fossil Fuels, Energy from Biomass, Solar Power, Other Forms of Renewable Energy, Fuel Cells, Chemicals from Renewable feedstocks: Chemicals from Renewable Feedstocks: Chemicals from Fatty Acids, Polymers from Renewable Resources, Some Other Chemicals from Natural Resources, Alternative Economies: The Syngas Economy, The Biorefinery, Design for energy efficiency: Photochemical Reactions: Advantages of and Challenges Faced by Photochemical

Processes, Examples of Photochemical Reactions, Chemistry Using Microwaves: Microwave Heating, Microwave-assisted Reactions, Sonochemistry: Sonochemistry and Green Chemistry, Electrochemical Synthesis: Examples of Electrochemical Synthesis. Industrial applications of alternative environmentally benign catalytic systems for carrying out the important reactions such as selective oxidation, reduction and C-C bond formations (specific reactions).

UNIT 5: Green Processes For Green Nanoscience

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing Green Nanoscience. Green Synthesis of Nanophase Inorganic Materials and Metal Oxide Nanoparticles: Hydrothermal Synthesis, Reflux Synthesis, Microwave-Assisted Synthesis, Other methods for Green synthesis of metal and metal oxide nanoparticles, Green chemistry applications of Inorganic nanomaterials

Text Books :

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition,

   Oxford University Press, USA

References :

1. Green Chemistry for Environmental Sustainability, First Edition, Sanjay K. Sharma and Ackmez Mudhoo, CRC Press, 2010.
2. Edited by Alvise Perosa and Maurizio Selva , Hand Book of Green chemistry Volume 8:

   Green Nanoscience, wiley-VCH, 2013.

Course Outcomes:

Upon completion of this course the students should recognize and acquire green chemistry concepts and apply these ideas to develop respect for the inter connectedness of our world and an ethic of environmental care and sustainability.

II B.Tech – I Sem

15ABS16-INSTRUMENTAL METHODS OF CHEMICAL ANALYSIS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- To understand the principles of different instruments
- To apply the instruments for analysis of various species in different matrices
- To apply instrumental methods for framing project works

UNIT – I: Molecular Spectrophotometry

Absorption spectra, Lamberts Law, Beer's Law - Combined law equation; Derivations from Beer's Law. Block diagram of a uv- visible spectrophotometer – quantitative analysis ; Direct method for the determination of metal ions; Chromium, Manganese, Iron etc in alloys.

UNIT – II: Infrared Spectroscopy

Interaction of infra-red radiation with molecules, Sources of IR Radiation ; Spectral regions; Block diagram of IR Spectrometer , Function of each component; Sampling Techniques; Application of IR Spectroscopy to functional group analysis (-OH, $-NH_2$, -CHO, -CO-R, -CONH).

UNIT III: Chromatography

Gas Chromatography: Principles of Gas Chromatography, block diagram of gas chromatograph, Function of each component, Detectors (FID, ECD), stationary phase for column, mobile phase, chromatogram, qualitative analysis, quantitative analysis, retention time, retention volume, capacity factor, area., normalization method. Analysis of gaseous and volatile impurities.

HPLC: Principles of high performance liquid chromatography, Block diagram of HPCL, Systems, functions of each component, stationary phases, eluting solvents, pumps, detectors, quantitative applications of HPLC for environmental analysis.

UNIT IV: Atomic Spectrophotometry

Principle of atomization, atomic absorption spectrometer, applications for metal ions, Atomic emission, application and principle of ICP-OES, X-ray fluorescence spectrometry- Applications

UNIT V: Thermal methods of analysis

TGA- Thermo Gavimetry – Principle, instrumentation and applications
DTA- Differential Thermal Analysis- Principle, instrumentation and applications
DSC- Differential Scanning Coulometry- Principle, instrumentation and applications

Text BOOK:

1. Principles of Instrumental Analysis, 6th Edition, Douglas A. Skoog, James Holler. J, Stanley R. Crouch, Cengage Learning, New Delhi, 2014.
2. Instrumentaiotn methods of analysis, Chatwal & Anand, Himalaya Publ;ications, 2003

REFERENCES:

1. Instrumental methods of analysis, Willand merrit and dean, caps publications & Distribution, 1999.
2. Vogels Text book of Quantitative chemical analysis, 6th edition ,Mendham J, Denny R.C,Barnes J.D, Thomas M.J.K, pearson education, 2002.
3. Modern Analytical Chemistry, 1St edition, David Harvey, McGraw-Hill Higher Education, 2010.

Course Outcomes:

Upon successful completion of this course, the students will be able to:

1. Differentiate between classical and instrumental methods of Chemical analysis.
2. Apply different types of Instrumental methods for analysis of various samples in water and other environmental samples

II B.Tech – I Sem

15ABS17-CHEMISTRY OF NANO MATERIALS AND APPLICATIONS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- And also characterisae the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

Unit I:

Introduction:Scope of nanoscience and nanotecnology, nanoscience in nature, classification of nanostructured materials, importance of nano materials.

Synthetic Methods: Bottom-Up approach:- Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis, microwave heating synthesis and sonochemical synthesis.

UNIT-II

Top-Down approach:- Inert gas condensation, arc discharge method, aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electrodeposition method, high energy ball milling.

UNIT-III

Techniques for characterization: Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterilas, BET method for surface area analysis, dynamic light scattering for particle size determination.

UNIT-IV

Studies of Nano-structured Materials: Synthesis, properties and applications of the following nanomaterials, fullerenes, carbon nanotubes, core-shell nanoparticles, nanoshells, self-assembled monolayers, and monolayer protected metal nanoparticles, nanocrystalline materials, magnetic nanoparticles and important properties in relation to nanomagnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals.

UNIT.V

Engineering Applications of Nanomaterials

TEXT BOOKS:

1. NANO: The Essentials : T Pradeep, MaGraw-Hill, 2007.
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, Baldev Rai, BB Rath and James Murday, Univ. Press, 2012.

REFERENCE BOOKS:

1. Concepts of Nanochemistry; Ludovico Cademrtiri and Geoffrey A. Ozin & Geoffrey A. Ozin, Wiley-VCH, 2011.

2. Nanostructures & Nanomaterials; Synthesis, Properties & Applications: Guozhong Cao, Imperial College Press, 2007.
3. Nanomaterials Chemistry, C. N. R. Rao, Achim Muller, K.Cheetham, Wiley-VCH, 2007.

Course Out Come: At the end of the course, the student will be able to:

- Understand the state of art synthesis of nano materials
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry.
- Analyze nanoscale structure in metals, polymers and ceramics
- Analyze structure-property relationship in coarser scale structures
- Understand structures of carbon nano tubes

II B.Tech – **I Sem**

15AHS08-CAMPUS RECRUITMENT TRAINING & SOFT SKILLS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Objectives:

1. To develop awareness in students of the relevance and importance of soft skills.
2. To provide students with interactive practice sessions to make them internalize soft skills.
3. To prepare the students for placements.
4. To train students to use language appropriately for interviews, group discussion and public speaking
5. To help the students to understand interpersonal skills.
6. To support them in building interpersonal skills.
7. To better the ability to work with others

Outcome:

After completing this course,

- The students would have Understood of what Soft Skills is,
- Understood the significance of soft skills in the working environment
- Turning out engineering students with a clear concept of soft skills and equipping them with readiness to implement them at work place.

UNIT I: Interview Dynamics-Preparation-Power Selling- Cracking the top Questions-Stress Control.

UNIT II: Intra Personal Skills: Knowing Strengths & Weaknesses – Goal Setting-Quotient Skills- Positive thinking- Problem Solving-analytical Skills.

UNIT III: Intra Personal Skills: Managerial Skills, Group dynamics- Negotiation Skills-Time Management.

UNIT IV: Verbal Skills: Dynamics of listening, Speaking, Reading & Writing skills- Email writing.

UNIT V: Non Verbal Skills: Body Language- Body Posture, Gestures, Eye Contact, Facial Expressions, Appearance, Space Distance /Proxemics , Touch/Haptics,. Para Language-Tone, Pace, Pause, Volume , Quality .

REFERENCE BOOKS:

1. M. Ashraf Rizvi: Effective Technical Communication, Tata McGraw Hill, New Delhi, 2014.
2. Alex.k, soft skills, 3rd ed. S. Chand Publication, New Delhi, 2014.
3. Technical Communication, Principle and Practice, Meenakshi Raman and Sangita Sharma, OUP, 2009.

4. Sherfield, M. Robert at al Cornerstone Developing Soft Skills, 4th ed. Pearson Publication,
New Delhi, 2014.
5. Shalini Varma, Body Language for your success mantra, 4th ed, S. Chand Publication, New Delhi, 2014.

II B.Tech – I Sem

15AHS09-COMPETITIVE & SPOKEN ENGLISH

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Objectives:

- To train students to use language effectively in everyday conversations, to participate in group discussions, to help them face interviews, and sharpen public speaking skills
- To help the second language learners to acquire fluency in spoken English and neutralize mother tongue influence.
- To enable them to learn better pronunciation through stress on word accent, intonation, and rhythm.
- To train students to use language appropriately for interviews, group discussion and public speaking
- To improve the students' fluency in English, through a well-developed vocabulary and enable them to listen to English spoken at normal conversational speed by educated English speakers and respond appropriately in different socio-cultural and professional contexts.
- Further, they would be required to communicate their ideas relevantly and coherently in writing.

Expected Outcomes:

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students.
- Speaking with clarity and confidence thereby enhancing employability skills of the students.
- Accomplishment of sound vocabulary and its proper use contextually
- Flair in Writing and felicity in written expression.
- Enhanced job prospects.
- Effective Speaking Abilities.

UNIT I: ~~Creating~~ cracking the unknowing passage-Reading Comprehension- Listening Comprehension.

UNIT II: Correction of the Sentences Nouns – Pronouns – Verbs- Tenses- Articles- Prepositions- Sentences.

UNIT III: Competitive Vocabulary – Word Building – Memory techniques

UNIT IV: Functional English – Sentences – Construction – Neutralization of accent – Intonation.

UNIT V: Dynamics of Speaking – Communication Skills – Speech Preparation – Speaking Practices.

Reference books:

1. M. Ashraf Rizvi: **Effective Technical Communication**, Tata McGraw Hill, New Delhi, 2014.
2. Wren and Martin, **High School English Grammar and Composition,** S. Chand Publication, New Delhi, 2014.
3. Hari Mohan Prasad, **Objective English for Competitive Examination,** Tata McGraw Hill, New Delhi, 2014.
4. R.S. Aggarwal , **Objective General English,** S. Chand Publication, New Delhi.
5. R.K Bansal, **Spoken English : Manual of Speech and Phonetics,**4th Edition, Orient Black swan Pvt Ltd.-New Delhi, 2013.

II B.Tech – I Sem

15ACE09-GREEN BUILDINGS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

UNIT-I Introduction :Concept of Green Building, Need for Green Building, Benefits of Green Buildings, Green Building Materials and Equipment in India, Key Requisites for Constructing a Green Building, Important Sustainable features for Green Building,

UNIT-II Green Building Concepts and Practices Indian Green Building Council, Green Building Moment in India, Benefits Experienced in Green Buildings, Launch of Green Building Rating Systems, Residential Sector, Market Transformation;
Green Building Opportunities And Benefits: Opportunities of Green Building, Green Building Features, Material and Resources, Water Efficiency, Optimum Energy Efficiency, Typical Energy Saving Approach in Buildings, LEED India Rating System and Energy Efficiency,

UNIT-III Green Building Design Introduction, Reduction in Energy Demand, Onsite Sources and Sinks, Maximise System Efficiency, Steps to Reduce Energy Demand and Use Onsite Sources and Sinks, Use of Renewable Energy Sources. Ecofriendly captive power generation for factory, Building requirement,

UNIT-IV Air Conditioning Introduction,CII Godrej Green business centre,Design philosophy,Design interventions,Energy modeling, HVAC System design,Chiller selection,pump selection,Selection of cooling towers,Selection of air handing units,Precooling of fresh air,Interior lighting system,Key feature of the building. Eco-friendly captive power generation for factory,Building requirement.

UNIT-V Material Conservation Handling of non process waste, waste reduction during construction,materials with recycled content,local materials,material reuse,certified wood ,Rapidly renewable building materials and furniture; Indoor Environment Quality And Occupational Health: Air conditioning, Indore air quality, Sick building syndrome, Tobacco smoke control, Minimum fresh air requirements avoid use of asbestos in the building, improved fresh air ventilation, Measure of IAQ, Reasons for poor IAQ, Measures to achieve Acceptable IAQ levels,

Text Books:

1. Handbook on Green Practices published by Indian Society of Heating Refrigerating and Air conditioning Engineers, 2009.

2. Green Building Hand Book by Tomwoolley and Samkimings, 2009.

Reference Books: 1. Complete Guide to Green Buildings by Trish riley
2. Standard for the design for High Performance Green Buildings by Kent Peterson, 2009



II B.Tech – I Sem

15ACE10-DISASTER MANAGEMENT AND MITIGATION

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

UNIT-I - Introduction To Disaster :Meaning, Nature, Importance of Hazard, Risk, Vulnerability and Disaster- Dimensions & Scope of Disaster Management - India's Key Hazards – Vulnerabilities - National disaster management framework - Disaster Management Cycle.

UNIT-II - Natural Disaster :Natural Disasters- Meaning and nature of natural disaster; their types and effects. Floods, drought, cyclone, earthquakes, landslides, avalanches, volcanic eruptions, Heat and cold waves, Climatic change: global warming, Sea level rise, ozone depletion.

UNIT-III - Anthropogenic DisasteR :Man Made Disasters- Nuclear disasters, chemical disasters, biological disasters, building fire, coal fire, forest fire, oil fire, air pollution, water pollution, deforestation and industrial waste water pollution.

UNIT-IV - Approaches In Disaster Management :Pre- disaster stage (preparedness) - Preparing hazard zonation maps, Predictability/ forecasting & warning - Preparing disaster preparedness plan - Land use zoning - Preparedness through Information, education. Emergency Stage - Rescue training for search & operation - Immediate relief - Assessment surveys. Post Disaster stage – Rehabilitation - Social Aspect - Economic Aspect and Environmental Aspect.

UNIT-V - Disaster Mitigation :Meteorological observatory - Seismological observatory - Hydrology Laboratory and Industrial Safety inspectorate. Technology in Disaster Management - Emergency Management Systems (EMS) in the Disaster Management Cycle - Remote Sensing and Geographic Information Systems(GIS) in Disaster Management. 2

Text Book:

1. Sharma.S.R, "Disaster management", A P H Publishers, 2011.

REFERENCES:

1. VenuGopalRao.K, "Geoinformatics for Disaster Management", Manglam Publishers and Distributors, 2010.
2. Singh.R.B, "Natural Hazards and Disaster Management: Vulnerability and Mitigation", Rawat Publications, 2006.

3. Gupta.H.K, "Disaster Management", University Press, India, 2003.
4. Gupta.M.C, "Manuals on Natural Disaster management in India", National Centre for Disaster Management,IIPA, New Delhi, 2001.



II B.Tech I-Sem

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY
COLLEGE OF ENGINEERING: PULIVENDULA (AUTONOMOUS)

II Year B.Tech (Civil Engineering) I Semester

T	L	C
1	3	3

15ACE11 – **WATER HARVESTING AND CONSERVATION**
(CBCC)

OBJECTIVE: *The course aims at bringing awareness about the need for conservation of Water. The student will be taught different methods of Water Harvesting and also the methods of Water Conservation. He will also learn the principles of Watershed Management.*

UNIT – I

Origin, Occurrence & Movement of Groundwater:-Introduction-sources of ground water – Hydro geological Cycle – Infiltration – natural openings in rocks – zones of aeration , saturation and water table – classification of ground water – laboratory and field methods of sampling ground water- aquifers – aquifuges- aquicludes – aquitards – ill effects due to lowering of water table -Artificial recharge.

UNIT – II

Water Harvesting: Principles of water harvesting-methods of rainwater harvestingdesign of rainwater harvesting structures-Purification Techniques for direct use-Harvesting of surface runoff-onsite detention basin - ponds - types - Recycling of harvested water

UNIT – III

Water Recovery and Reuse: Perspective on recycle and reuse- factors affecting the development of water reclamation and reuse criteria- elements/components of water reclamation and reuse criteria / guidelines- sewage irrigation- Waste water reclamation-waste water recharge for reuse – Treatment Requirements for Water Reuse-methods.

UNIT – IV

Sustainable Watershed Approach & Watershed Management Practices: Concept of watershed-Introduction to watershed management- Integrated water resources management- natural resources management-agricultural practices-integrated farming-Conjunctive use of water resources-Community participation-Watershed Management Practices in Arid and Semiarid Regions-Case studies-Short term and long term strategic planning.

UNIT – V

Soil and Water Conservation: Scope of soil and water conservation-Mechanics and types of erosion-their causes-Soil erosion control measures - bank protectionvegetative barriers-contour bund- contour trenches-contour stone walls-contour ditchesterraces-outlets and grassed waterways-Gully control structures - temporary and permanent - design of permanent soil conservation structures-Design of farm ponds and percolation ponds.

TEXT BOOKS:

1. Watershed Management by Murty, J.V.S, New Age Intl., New Delhi .
2. Water Resources Conservation and Management by Chatterjee, S. N.,Atlantic Publishers.
3. Ground Water by S.Ramakrishnan, SCITECH Publishers.

REFERENCE BOOKS:

1. Advances in Soil and Water Conservation by Pierce, F.J. and Frye, W. W. (1998):, Ann Arbor Press, Michigan.
2. Soil and Water Conservation Engineering, 4th Ed. By Schwab, G. O., Fangmeier, D. D., Elliot, W. J. and Frevert, R. K. (1993), John Wiley and Sons Inc., USA
3. Watershed Management in India by Murthy, J.V.S., Wiley Eastern, New Delhi, 1994 .
4. Irrigation Water Management - Principles and Practice by Dilip Kumar Majumdar,, PHI Pvt.Ltd.NewDelhi-1.
5. Irrigation and Water Power Engineering by Madan Mohan Das & Mimi Das Saikia, PHI learning Pvt. Ltd., NewDelhi-1

Course Outcomes: *On completion of the course, the student will be able to*

a) Appreciate the importance of Water Conservation
b) Understand the methods of Water Harvesting
c) Understand the principles of Watershed Management and its importance in sustainability



II B.Tech – **I Sem**

15AEC08-BASIC ELECTRONICS
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

UNIT – I:
Semiconductor devices: Diode, BJT, their structures and principle of operations.
Amplifiers: Functionality, specifications-voltage gain, current gain, input resistance, output resistance, dynamic range, bandwidth, linearity, power efficiency

UNIT- II:
Power electronics: Half wave and full wave rectification, filtering, regulation with Zener diode and linear regulators.
Filters: Low pass, high pass, band pass and band stop filters, specifications-cutoff frequency, roll off.

UNIT – III
Feedback Amplifiers: Basic concept of negative and positive feedback, application of negative feedback in amplifiers, effect on gain, bandwidth, input resistance, output resistance and de-sensitivity to parameter variations.
Oscillators: Barkhausen criterion, RC phase shift, Wien bridge, Colpitts, Hartley and Crystal oscillators, applications of oscillators.

UNIT – IV
Operational amplifier: Differential mode of operation, common mode rejection, typical op-amp specifications-open loop gain, differential input resistance, unity gain-bandwidth, inverting amplifier, non-inverting amplifier, summing amplifier, Instrumentation Amplifier, concept of active filters.

UNIT – V
Digital electronics: Review of Boolean algebra and signed number representation schemes in binary, implementation of Boolean functions using various logic gates, concept of combinatorial and sequential circuits, registers and counters from functional viewpoint.

Text Books:

1. Electronics Devices and Circuits, J.Millman and Christos. C. Halkias, 3rd edition, Tata McGraw Hill, 2006.
2. Electronics Devices and Circuits Theory, David A. Bell, 5th Edition, Oxford University press., 2008.

References:

1. Electronics Devices and Circuits Theory, R.L.Boylestad,Lousis Nashelsky and K.Lal Kishore, 12th edition, 2006, Pearson, 2006.
2. Electronic Devices and Circuits, K. Lal Kishore, 3rd Edition, BSP, 2008.
3. Electronic Devices and Circuits, N.Salivahanan, and N.Suresh Kumar, 3rd Edition, TMH, 2012

II B.Tech – I Sem

15AEC09-FUNDAMENTALS OF DIGITAL ELECTRONICS
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

UNIT-I:

Binary Systems: Introduction of Digital Computers and Digital Systems, Binary numbers, Base Conversion: Binary, Decimal, Hex, Octal. Complements: R's Complement, 2's and 10's Complement, (R-1)'s Complement, 1's and 9's Complement, Binary Codes: Decimal Codes, Error Detection codes, Reflected Code.

UNIT-II:

Binary Logic And Boolean Algebra: Basic Binary logic, Logic Gates: AND, OR, INVERTER, Postulates, Boolean algebra, Two value Boolean algebra, Basic theorems of Boolean algebra: De-Morgan's Theorems, Boolean functions Boolean forms: Canonical, Standard.

UNIT-III:

Boolean Function Implementation: Need for simplification, K–Map method: 2–Variable K–map, 3–Variable K–map, 4–variable K–map, K–Map using Don't care condition, Universal Gates: NAND, NOR, NAND Implementation, NOR Implementation.

UNIT-IV:

Basic Combinational Logic: Design procedure of combinational logic, Adder: Half Adder, Full Adder, Subtractor, Half Subtractor, Full Subtractor, Code Conversion, BCD – Excess-3 conversion.

UNIT-V:

Combinational Logic Using MSI And LSI: Binary Parallel Adder, Magnitude Comparator: 2 Input Comparator, Decoder: 2–4 Decoder, 3–8 Decoder, Encoder: 4–2 Encoder, 8–3 Encoder, Multiplexer: 4–1 multiplexer, Demultiplexers: 1–4 Demultiplexers.

Text Book:

1. Digital Design, M.Morris Mano & Michel D. Ciletti, 5th Edition, Pearson Education, 1999.
2. Switching theory and Finite Automata Theory, Zvi Kohavi and Nirah K.Jha, 2nd Edition, Tata McGraw Hill, 2005.

Reference Books:

1. Fundamentals of Digital Circuits, Anand Kumar, Prentice-Hall of India, Latest Edition
2. Digital electronics Principles, Malvino & Leech, Tata McGraw-Hills publication, Latest Edition.

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II B.Tech – **I Sem**

15AEC10-ELECTRONIC MEASUREMENTS & INSTRUMENTATION
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives for electrical measurements and instrumentation:

1. This course introduces the basic principles of different types of electrical instruments for the Measurement of voltage, current, power factor, power and energy.
2. It also explains the measurements of RLC parameters using bridge principles.
3. The principles of magnetic measurements are also explained.
4. The principle of working of CRO and its applications are explained.

Course outcomes for electrical measurements and instrumentation:

1. Use wattmeters, pf meters, and energy meters in a given circuit.
2. Extend the range of ammeters and voltmeters
3. Measure active power, reactive power, power factor, and energy in both 1-phase and 3-phase circuits
4. Determine the resistance values of various ranges, L and C values using appropriate a.c bridges

UNIT – I:

Fundamentals of Measurements: Introduction, types of measurements, static & dynamic characteristics of measurement system, types of Errors, error sources and remedies.
Multimeter: Principle of measurement of D.C. Voltage and current, A.C. Voltage and current, Resistance, AC and DC sensitivity, Specifications.

UNIT – II:

Fundamentals of Cathode Ray Oscilloscope: Block diagram, CRO probes, Delay line, types of Oscilloscopes. Measurement of: Signal voltage, Current, Phase & Frequency using Lissajous patterns, Industrial applications of CRO.

UNIT – III:

Review of DC Bridges: Wheatstone bridge, Wien Bridge, errors and precautions in using bridges,
AC bridges: Measurement of inductance-Maxwell's bridge, Anderson Bridge. Measurement of capacitance- Shearing Bridge. Kelvin Bridge, Q-meter.

UNIT – IV:

Signal generator-fixed and variable, AF oscillators, function generators, pulse, random noise, sweep waveform generators, and their standards, specifications and principles of working (Block diagram approach).

UNIT – V:

Sensors and Transducers: Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric

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transducers) Temperature (resistance thermometers, thermocouples, and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Text Books:

1. A course in electrical & electronic measurements and instrumentation – AK Sawhney, Puneet Sawhney, 4th Edition, Dhanpat Rai & Sons Educational and technical publisher, 2012.
2. Modern Electronic Instrumentation and Measurement Techniques, Albert D.Helfrick and William D.Cooper, Pearson / Prentice Hall of India, 2007

References:

1. Measurement Systems- Application and Design, Ernest O. Doebelin, TMH, 2007.
2. Electronic Instrumentation, H.S.Kalsi, 2nd edition, Tata McGraw Hill, 2004.
3. Principles of Measurements and Instrumentation, Alan. S. Morris, 2nd Edition, Prentice Hall of India, 2003.

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II B.Tech – I Sem

15AME11-ROBOTICS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives

- To design, develop and complete robotic activities and challenges
- This course aims at providing the students the fundamental knowledge of the various subscriptions such as kinematics, Dynamics, controls, sensors, actuators, etc.
- It is aimed to provide adequate background in both analysis and design of robots.

UNIT – I

Fundamentals of Robots: Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots. Introduction to matrix representation of a point in a space a vector in space, a frame in space, Homogeneous transformation matrices, representation of a pure translation, pure rotation about an axis.

UNIT – II

Kinematics of robot: Forward and inverse kinematics of robots- forward and inverse kinematic equations for position and orientation, Denavit-Hartenberg(D-H) representation of forward kinematic equations of robots, The inverse kinematic of robots, Degeneracy and Dexterity, simple problems with D-H representation.

Differential motions and Velocities: Introduction, differential relationship, Jacobian, differential motions of a frame-translations, rotation, rotating about a general axis, differential transformations of a frame. Differential changes between frames, differential motions of a robot and its hand frame, calculation of Jacobian, relation between Jacobian and the differential operator, Inverse Jacobian.

UNIT – III

Control of Manipulators: Open- and Close-Loop Control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID Control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

UNIT – IV

Robot Vision: Industrial applications of vision-controlled robotic systems, process of imaging, architecture of robotic vision system, Image acquisition, description of other components of vision system, image representation, image processing.

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UNIT – V

Robot Cell Design and Programming: Robot cell layouts-Robot centered cell, In-line robot cell, Considerations in work cell design, Work cell control, Inter locks, Error detection, Work cell controller.

Methods of robot programming, WAIT, SIGNAL, and DELAY commands, Robotic languages, VAL system.

Text Books:

1. Industrial Robotics – Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey – Mc Graw Hill, 1986.
2. Robotics and control – R K Mittal and I J Nagrath, - Tata Mc Graw Hill

References:

1. Introduction to Robotics – Analysis, System, Applications by Saeed B. Niku, PHI Publications
2. Robot Analysis and Control - H. Asada and J.J.E. Slotine John Willey & Sons.
3. Fundamentals of Robotics: Analysis and control, Robert J. Schilling, Prentice Hall, 1990.
4. A robot Engineering text book – Mohsen shahinpoor, Harper & Row Publishers,1987
5. Introduction to Robotics: Mechanics and Control, John.J.Craig, Addison- Wesley, 1999
6. Robotics: Control, sensing, vision, and intelligence – K.S. FU, R.C. Gonzalez and C.S.G Lee. Mc Graw Hill, 1987.
7. Robotic Engineering an integrated approach- Richard D. Klafter Thomas – PHI publications

Course outcomes

By studying this course, students will be

- Familiar with the history, concept development and key components of robotics technologies.
- Understand basic mathematic manipulation of spatial coordinate representation and transformation.
- Understand and able to solve basic robot forward and inverse kinematic problems.
- Understand and able to solve robotic dynamics, path planning and control problems.
- Able to undertake practical robotics experiments that demonstrate the above skills.

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II B.Tech – I Sem

15AME12-MECHANICAL MANUFACTURING PROCESSES

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Objectives:

The objectives of this course are to introduce to demonstrate the various manufacturing processes. To develop knowledge and importance of surface treatment, processing of powder metals, glass, ceramics plastics. To apply knowledge of basic mathematics to calculate the machining parameters for different machining processes and acquire knowledge on advanced manufacturing processes.

UNIT – I

Surface treatment: Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

UNIT – II

Processing of Powder metals, Glass and Superconductors: Introduction, production of metal powders, compaction of metal powders, sintering, secondary and finishing operations, design considerations for powder metallurgy, Process capabilities, economics of powder metallurgy, forming and shaping of Glass, techniques for strengthening and treating Glass, design considerations for Glass, processing of superconductors.

Processing of ceramics: Applications, characteristics, classification .Processing of particulate ceramics, Powder preparations, consolidation, Drying , sintering, Hot compaction, Area of application , finishing of ceramics.

UNIT – III

Fabrication of Microelectronic devices: Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in microelectronics, surface mount technology, Integrated circuit economics. E-Manufacturing, nanotechnology, and micromachining, High speed Machining

UNIT – IV

Processing Of Plastics, injection and blow moulding, calendaring, thermo forming, compression moulding, transfer moulding, High energy rate forming methods Rapid manufacturing: - Introduction - concepts of rapid manufacturing, information flow for rapid prototyping, classification of rapid prototyping process, sterer holography fused deposition modeling, selective laser sintering, Applications of rapid prototyping process

UNIT – V

Processing of Composites: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

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Text Books:

1. Manufacturing Engineering and Technology, Schmid and kalpakjin, Pearson Education.
2. Manufacturing Technology, Foundry forming and welding, Vol I , P.N. Rao,TMH
3. Rapid Prototyping Principles and Applications, RafiqNoorani, Wiely Pub

Reference Books:

1. Production Technology, R.K. Jain, Khanna Publishers,17th edition, 2012
2. Process and materials of manufacturing -Lindberg, PE
3. Principles of Metal Castings, Rosenthal.
4. Welding Process, Parmar, Khanna publication.
5. Manufacturing Technology, R.K. Rajput, Laxmi Pub

Course Outcomes:

After completion of this course student will be able to

- Understand the principles of processing of various powder metals, glass, ceramics and semiconductors.
- Understand the applications of rapid prototyping and processing of plastics

Suggested Links:

- www.casde.iitb.ac.in/store/events/2003/IAT-Pune.../DFMA.ppt
- www.rose-hulman.edu/~stienstr/ME470/DFA.ppt
- www.design4manufacturability.com/DFM_article.htm
- http://www.learnerstv.com/Free-Engineering-Video-lectures-ltv234-Page1.htm

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II B.Tech – I Sem

15AME13-NON-CONVENTIONAL SOURCES OF ENERGY

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objective:

- To explain concept of various forms of renewable energy
- To outline division aspects and utilization of renewable energy sources for both domestics and industrial applications
- To analyse the environmental and cost economics of using renewable energy sources compared to fossil fuels.

UNIT - I

Principles Of Solar Radiation: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

UNIT-II

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage And Applications :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

UNIT-III

Wind Energy : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-Mass : Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engineoperation and economic aspects.

UNIT-IV

Geothermal Energy : Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy : OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

UNIT-V

Direct Energy Conversion: Need for DEC, Carnot cycle, limitations, principles of DEC.

Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux,

MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion,

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economic aspects.Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Text Books:

1. Renewable energy resources, Tiwari and Ghosal, Narosa.
2. Non-Conventional Energy Sources ,G.D. Rai

References :

1. Renewable Energy Sources, Twidell& Weir
2. Solar Energy, Sukhatme
3. Solar Power Engineering,B.S.Magal Frank Kreith&J.F.Kreith.
4. Principles of Solar Energy, Frank Krieth& John F Kreider.
5. Non-Conventional Energy, Ashok V Desai, Wiley Eastern 6. Non-Conventional Energy Systems, K Mittal , Wheeler.

Course Outcome:

At the end of the course the student will

1. Have knowledge about various renewable energy sources
2. Be able to choose the appropriate renewable energy as an alternate for conventional power in any application.

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II B.Tech – **I Sem**

15AEE08-PRINCIPLES OF ELECTRICAL ENGINEERING

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives for Principles of Electrical Engineering:

1. Students can learn about fundamental concepts circuits, DC, AC Machines.
2. Students can learn about Electrical instruments.
3. Student learn how to apply electrical principles in their applications.
4. Student can able verify theorems such as super position, thevinins and maximum power transfer and the measurements of RLC parameters using bridge principles

UNIT I: Fundamentals of Electrical Circuits

Circuit Concept–R-L-C Parameters -Kirchhoff's Laws – Network Reduction Techniques-Series, Parallel, Series Parallel, Star-to-Delta or Delta-to-Star Transformation. R.M.S, Average Values and Form Factor for Different Periodic Wave Forms – Sinusoidal Alternating Quantities – Phase and Phase Difference. Concept of Power Factor-Concept of Reactance, Impedance, Susceptance and Admittance-Real and Reactive Power, Complex Power. Examples. Star Delta Transformation Technique. Thevenin's, Norton's and Superposition Theorems for D.C Excitations.

UNIT II: DC Machines

Principle of Operation of DC Machines, Constructional features, EMF equation, Types of Generators, Magnetization and load characteristics of DC Generators.

DC motors, Types of DC Motors, Characteristics of DC Motors, Losses and Efficiency, Swinburne's Test, Speed control of DC Shunt and series Motors, Flux and Armature voltage control methods.

UNIT III: Transformers & Induction machines

Principle of Operation of Single Phase transformer, Types, Constructional Features, EMF equation, Phasor Diagrams for no load and loaded conditions, efficiency of Transformer and regulation, OC and SC Tests, predetermination of Efficiency and Regulation (Simple Problems). Concept of rotating field, Principle of Operation of induction motors.

UNIT IV: Special Machines

Principle of operation of Shaded pole motors, Capacitor motors, AC Servo motors, AC Tachometers, Synchros, Stepper motors and its characteristics.

V.Sara

BOS – chairman

UNIT V: Electrical Measurements

Moving Coil & Moving Iron Instruments (Ammeter & Voltmeter).Dynamometer Type Watt meters & Energy Meters(operating principles).

Course outcomes for Principles of Electrical Engineering:

1. Students able to demonstrate knowledge on fundamental concepts circuits, DC, AC Machines.
2. Students able to demonstrate knowledge on how to measure the electrical quantities using measuring instruments.
3. Students are able to apply electrical principles in their applications.
   Students are able to determine the RLC parameters using bridge principles.

Text Books

1. Network Analysis – A Sudhakar, Shyammohan S.Palli, 3 ed., 2009. TMH.
2. Introduction to Electrical Engineering – M.S.Naidu and S. Kamakshaiah, 2008, TMH.

References:

1. Electric Machines by I.J. Nagrath & D.P. Kothari, Tata Mc Graw – Hill Publishers, 3rd Edition, 2004.
2. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co.

BOS - chairman

II B.Tech – **I Sem**

15AEE01-ELECTRICAL ENGINEERING MATERIALS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives for Electrical Engineering material:

1. To aquire knowledge on general properties of different conductors.
2. To learn the fundamental properties of dielectric materials and high resistivity materials.
3. To gain knowledge on different insulating materials.
4. To learn about different types of wiring and wiring materials.

UNIT-I Conducting Materials:

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials – classification of electrical materials – concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials –electrical/mechanical/thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys – applications.

UNIT-II Dielectric Materials And High Resistivity Materials :

Introduction – solid, liquid and gaseous dielectrics, leakage current, permittivity, dielectric constant, dielectric loss – loss angle – loss constant, Breakdown voltage and dielectric strength of – solid, liquid and gaseous dielectrics, effect of break down– electrical and thermal effects ,Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal / mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

UNIT-III Insulating Materials-I:

Introduction – characteristics of a good electrical insulating materials – classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials, electrical, thermal and mechanical properties of, Asbestos, Bakelite, rubber, plastics, thermo plastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

UNIT-IV Insulating Materials-II:

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids – their Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators – classification based on dielectric strength – dielectric loss, chemical stability properties and their applications .

BOS- chairman

UNIT-V Domestic Wiring:

Wiring materials and accessories – Types of wiring – Types of Switches - Specification of Wiring – Stair case wiring - Fluorescent lamp wiring-Godown wiring – Basics of Earthing – single phase wiring layout for a residential building

Course outcomes for Electrical Engineering material:

1. Able to demonstrate the knowledge on different types of electrical materials.
2. Able to evaluate the leakage current, loss angle, permittivity, dielectric constant and loss constant of different dielectrics.
3. Able to understand the fundamentals of different insulating materials

Able to demonstrate knowledge on types of switches and wiring.

Text Books:

1. Electrical engineering materials by G.K. Mittal, Khanna publication 2nd edition.
2. A course in Electrical Engineering Materials by R.K .RAJPUT, Laxmi publications.
3. Electrical technology volume-I by B.L. Theraja, SChand publications.

Reference Books:

1. "An Introduction to electrical engineering materials" by C.S. Indulkar and S. Thiruvengadam, SChand & Company.
2. "Electrical engineering Materials" by T.T.T.I, Madras, Tata McGraw Hill
3. "A course in electrical engineering materials" by S.P. Seth, Dhanapatrai & Sons, New Delhi

V. Seth
BOS-chairman

II B.Tech – I Sem

15AEE09-ELECTRICAL MEASURING INSTRUMENTS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Objective:

Electrical measurements course introduces the basic principles of all measuring instruments. It also deals with the measurement of RLC parameters voltage, current Power factor, power, energy and magnetic measurements and Digital Meters

UNIT- I Measuring Instruments

Classification – Deflecting, Control and Damping Torques – Ammeters and Voltmeters – PMMC, Dynamometer, Moving Iron Type Instruments – Expression for the Deflecting Torque and Control Torque – Errors and Compensations, Extension of range using Shunt and Series Resistance. Cathode Ray Oscilloscope- Cathode Ray tube-Time base generator- Horizontal and Vertical Amplifiers – Application of CRO – Measurement of Phase , Frequency, Current & Voltage- Lissajous Patterns

UNIT – II Measurement Of Power And Energy

Single Phase Dynamometer Wattmeter, LPF and UPF, Double Element and Three Element Dynamometer Wattmeter, Expression for Deflecting and Control Torques. Types of P.F. Meters – Dynamometer and Moving Iron Type – 1-ph and 3-ph Meters. Single Phase Induction Type Energy Meter – Driving and Braking Torques – Errors and Compensations. Three Phase Energy Meter.

UNIT – III Instrument Transformers And Potentiometers

CT and PT – Ratio and Phase Angle Errors – Design Considerations.

Potentiometers: Principle and Operation of D.C. Crompton's Potentiometer – Standardization – Measurement of unknown Resistance, Current, Voltage.

A.C. Potentiometers: Polar and Coordinate types- Standardization – Applications.

UNIT – IV D.C & A.C Bridges

Method of Measuring Low, Medium and High Resistance – Sensitivity of Wheatstone's Bridge – Kelvin's Double Bridge for Measuring Low Resistance, Measurement of High Resistance – Loss of Charge Method. Measurement of Inductance - Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance and Loss Angle - Desauty Bridge. Wien's Bridge – Schering Bridge.

BOS - chairman

UNIT – V Magnetic Measurements

Ballistic Galvanometer – Equation of Motion – Flux Meter – Constructional Details, Comparison with Ballistic Galvanometer. Determination of B-H Loop Methods of Reversals - Six Point Method – A.C. Testing – Iron Loss of Bar Samples.

Text Books:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications.
2. Electrical Measurements and measuring Instruments – by E.W. Golding and F.C. Widdis, 5th Edition, Reem Publications.

Reference Books:

1. Electronic Instrumentation by H. S. Kalsi, Tata Grawhill Mc, 3rd Edition.
2. Electrical Measurements – by Buckingham and Price, Prentice – Hall
3. Electrical Measurements: Fundamentals, Concepts, Applications – by Reissland, M.U, New Age International (P) Limited, Publishers
4. Electrical & Electronic Measurement & Instrumentation by R. K. Rajput, 2nd Edition, S. Chand & Co.

V. Sarma
BOS - Chairman

II B.Tech – I Sem

15ACS04-DATA STRUCTURES

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

UNIT-I

Stacks & Queues: stacks, stacks using dynamic arrays, Queues, circular queues using dynamic arrays, amazing problem, evaluation of expressions.

Linked List: single linked list and chains, representing chains in C, Linked stacks and queues, polynomials, additional list operations, equivalence classes, sparse matrices, double linked list.

UNIT –II

Trees : Introduction, Binary tree, Binary tree traversals , Additional binary tree operations, Threaded binary trees, Heaps, Binary search trees, Selection trees, Forests, Representation of disjoint sets, Counting binary trees.

UNIT-III

Graphs: The graph abstract datatype, Elementary graph operations, Minimam cost spanning trees, Shortest paths and transitive closure.

Sorting: Motivation, Insertion sort, Quick sort, Merge sort , Heap sort, sorting on several keys, list and table sorts, external sorting.

UNIT –IV

Hashing: Introduction, Static hashing, dynamic hashing, Bloom Filters.

Priority Queues: Single ended and double ended priority queues, leftist trees, Binominal Heaps, Fibonacci Heaps, Pairing Heaps, Symmetric Min-Max Heaps, and Interval Heaps.

UNIT-V

Efficient binary search trees: Optimal binary search trees, AVL Trees, RED Black Trees, Splay Trees, M- Way search trees, B-Trees, B+ -Trees.

Text Books:

1. Fundamentals of Data structures in C 2nd edition HOROWITZ , SAHNI, ANDERSON-FREED.

II B.Tech I Sem

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANATHAPURAMU
COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA
REGULATION - R15

15ACS11– OBJECT ORIENTED PROGRAMMING (CBCC)

L T P C
3 1 0 3

Learning Objectives:

- This subject will help to improve the analytical skills of object oriented programming
- Overall development of problem solving and critical analysis
- Formal introduction to Java programming language

Learning Outcomes: On successful completion of this course, the student should be able to:

- Show competence in the use of the Java programming language in the development of small to medium-sized application programs that demonstrate professionally acceptable coding and performance standard
- Understand the basic principles of the object-oriented programming
- Demonstrate an introductory understanding of graphical user interfaces, multithreaded programming, and event-driven programming.

Unit-I :

Introduction to Java : Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, Arrays in java.

Unit-II :

Objects and Classes : Basics of objects and classes in java, Constructors, Finalizer, Visibility modifiers, Methods and objects, Inbuilt classes like String, Character, StringBuffer, File, this reference.

Unit-III :

Inheritance and Polymorphism : Inheritance in java, Super and sub class, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in java, Package in java, UTIL package.

Unit-IV :

Event and GUI programming : Event handling in java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing.

Unit-V :

Multithreading in java : Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.

Text Books:

1 Introduction to Java Programming (Comprehensive Version), Daniel Liang, Seventh Edition, Pearson.

2 Programming in Java, Sachin Malhotra & Saurabh Chaudhary, Oxford University Press.

3 Murach's Beginning Java 2, Doug Lowe, Joel Murach and Andrea Steelman, SPD.

Reference Books:

4 Core Java Volume-I Fundamentals, Eight Edition, Horstmann& Cornell, Pearson Education.

5 The Complete Reference, Java 2 (Fourth Edition), Herbert Schild, TMH.

6 Java Programming, D. S. Malik, Cengage Learning.



II B.Tech – **I Sem**

15ACS08-OPERATING SYSTEMS

L	T	P	C
3	1	0	3

Course Objective

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications

Course Outcomes

- Understand what makes a computer system function and the primary PC components.
- Understand past and current trends in computer technology.
- Use basic software applications.
- Add functionality to the exiting operating systems
- Design new operating systems

UNIT I

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security, Kernel data Structures, Computing Environments, Open- Source Operating Systems

Operating System Structure: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

Processes: Process concept, process Scheduling, Operations on processes, Inter process Communication, Examples of IPC systems.

UNIT II

Threads: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

Process Synchronization: The critical-section problem, Peterson's Solution, Synchronization Hardware, Mutex Locks, Semaphores, Classic problems of synchronization, Monitors, Synchronization examples, Alternative approaches.

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling, Multiple- Processor Scheduling, Real-Time CPU Scheduling, Algorithm Evaluation.

UNIT III

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Virtual memory: demand paging, page-replacement, Allocation of frames, Thrashing, Memory- Mapped Files, Allocating Kernel Memory

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

UNIT IV

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

File system Interface: The concept of a file, Access Methods, Directory and Disk structure, File system mounting, File sharing, Protection.

File system Implementation: File-system structure, File-system Implementation, Directory Implementation, Allocation Methods, Free-Space management.

UNIT V

I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

Protection: Goals of Protection, Principles of Protection, Domain of protection, Access Matrix, Implementation of Access Matrix, Access control, Revocation of Access Rights, Capability- Based systems, Language – Based Protection

Security: The Security problem, Program threats, System and Network threats, Cryptography as a security tool, User authentication, Implementing security defenses, Firewalling to protect systems and networks, Computer–security classifications.

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

Reference Books:

1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.

B.TECH - R15 REGULATIONS

CHOICE BASED CREDIT COURSES (INTER DEPARTMENT)

OFFERED

IN

III YEAR II SEMESTER

w.e.f.

2015 ADMITTED BATCH

DEPARTMENT OF ELECTRICAL & ELECTRONICS ENGINEERING

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR

COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

PULIVENDULA – 516390, Y.S.R. (DIST), ANDHRA PRADESH, INDIA

ANNEXURE-II

Choice Based Credit Course of Inter Department

offered in

B.TECH III YEAR II SEMESTER

BRANCH	SUBJECT CODE	SUBJECT NAME
MATHEMATICS	15ABS18	FUZZY SETS AND APPLICATIONS
	15ABS19	OPTIMIZATION TECHNIQUES
CHEMISTRY	15ABS20	CHEMISTRY ENERGY MATERIALS
	15ABS21	CHEMISTRY OF LIFE
	15ABS22	CHEMISTRY OF POLYMERS AND THEIR APPLICATIONS
CE	15ACE35	REMOTE SENSING & GIS
	15ACE36	ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT
	15ACE37	FINITE ELEMENT METHODS
EEE	15AEE34	RENEWABLE ENERGY SOURCES
	15AEE19	POWER ELECTRONICS
	15AEE35	UTILIZATION OF ELECTRICAL ENERGY
ME	15AME35	OPTIMIZATION TECHNIQUES BY MATLAB
	15AME36	MECHATRONICS & MEMS
	15AME37	AUTOMOTIVE ELECTRONICS
ECE	15AEC34	FUNDAMENTALS OF COMMUNICATION SYSTEMS
	15AEC35	INDUSTRIAL ELECTRONICS
	15AEC36	NEURAL NETWORKS & FUZZY LOGIC
CSE	15ACS35	MOBILE COMPUTING
	15ACS36	OPTIMIZATION TECHNIQUES
	15ACS37	MACHINE LEARNING

III B.Tech II Semester

15ABS18-FUZZY SETS AND APPLICATIONS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *This course aims at providing the student with the basic concepts of Fuzzy sets, along with the properties and applications.*

UNIT – I

Fuzzy sets - basic definitions, α-level sets, convex fuzzy sets.

UNIT – II

Basic operations on fuzzy sets, types of fuzzy sets

UNIT – III

Cartesian products, algebraic products, bounded sum and difference, t-norms and t-conorms. Fuzzy sets in contrast of probability theory.

UNIT – IV

The extension principle - the Zadeh's extension principle, image and inverse image of fuzzy sets.

UNIT – V

Fuzzy numbers, elements of fuzzy arithmetic,Fuzzy relations and fuzzy graphs, composition of fuzzy relations, min-max composition and its properties, fuzzy equivalence relations, fuzzy relational equations, fuzzy graphs.

Course Outcomes: *The student will be able to analyze several real time problems effectively, under fuzziness.*

TEXT BOOKS:

1. Klir, G. J. and Yuan, B. Fuzzy Sets and Fuzzy Logic : Theory and Applications, (Prentice Hall of India, New Delhi, 1997)

REFERENCES:

1. Zimmermann, H. J. Fuzzy set theory and its Applications (Allied publishers Ltd., New Delhi, 1991).
2. M.Ganesh, Introduction to Fuzzy sets and Fuzzy Logic (PHI Publications,2001)

27.7.18

III B.Tech II Semester

15ABS19-OPTIMIZATION TECHNIQUES

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *This course aims at providing the student with the basic concepts and several methods of optimization .*

UNIT – I

Linear programming I : Simplex Method

Introduction , Applications of Linear Programming, Standard form of a Linear Programming Problem, Geometry of Linear Programming Problems, Basic Definitions in Linear Programming. Simplex Method, Simplex Algorithm and Two phase Simplex Method.

UNIT – II

Linear programming II : Duality in Linear Programming

Symmetric Primal-Dual Relations, General Primal-Dual Relations, Duality Theorem, Dual Simplex Method and Transportation Problem.

UNIT – III

Non-linear programming: Unconstrained optimization techniques

Introduction: Classification of Unconstrained minimization methods,

Direct Search Methods : Random Search Methods : Random jumping Method, Random Walk method. Grid Search Method

UNIT – IV

Non-linear programming: Constrained optimization techniques

Introduction , Characteristics of a constrained problem, Random Search Methods, complex method, Sequential linear programming, Basic approach in methods of Feasible directions, Zoutendijk's method of feasible directions: direction finding problem, determination of step length, Termination criteria.

UNIT-V

Geometric Programming

Unconstrained Minimization Problems : solution of unconstrained geometric programming using differential calculus and arithmetic-geometric inequality.

Constrained minimization Problems : Solution of a constrained geometric programming problem, primal-dual programming in case of less-than inequalities, geometric programming with mixed inequality constraints.

Course Outcomes: *The student will be able to analyze optimization problems in engineering and technology using various elegant optimization technique.*

2.7.18

TEXT BOOKS:

Singiresu S Rao., Engineering Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.

REFERENCES:

1. Chong, E.K.P.and Zak, S. H.. An Introduction to Optimization, John Wiley & Sons, N.Y.
2. Peressimi A.L., Sullivan F.E., Vhl, J.J..Mathematics of Non-linear Programming, Springer – Verlag.

2.7.18

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR ENGINEERING COLLEGE PULIVENDULA

III B.Tech II Semester

15ABS20-CHEMISTRY ENERGY MATERIALS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.*
- *To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.*
- *To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquification method*
- *Necessasity of harnessing alternate energy resources such as solar energy and its basic concepts.*
- *To understand and apply the basics of calculations related to material and energy flow in the processes.*

UNIT-1: Electrochemical Systems: Galvanic cell, standard electrode potential, application of EMF, electrical double layer, dipole moments, polarization, Batteries-Lead-acid and Lithium ion batteries

UNIT-2: Fuel Cells: Fuel cell working principle, Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), Fuel cell efficiency, Basic design of fuel cell,.

UNIT-3: Hydrogen Storage: Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF), Carbon structures, metal oxide porous structures, hydrogel storage by high pressure methods. Liquifaction method.

UNIT-4: Solar Energy: Solar energy introduction and prospects, photo voltaic (PV) technology, concentrated solar power (CSP), Solar Fuels, Solar cells.

UNIT-5: Photo and Photo electrochemical Conversions: Photochemical cells and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions.

Course Outcome:

- *Ability to perform simultaneous material and energy balances.*
- *Student learn about various electrochemical and energy systems*
- *Knowledge of solid, liquid and gaseous fuels*
- *To know the energy demand of world, nation and available resources to fulfill the demand*
- *To know about the conventional energy resources and their effective utilization*
- *To acquire the knowledge of modern energy conversion technologies*
- *To be able to understand and perform the various characterization techniques of fuels*
- *To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively*

References :

1. **Physical chemistry by** Ira N. Levine
2. **Essentials of Physical Chemistry,** Bahl and Bahl and Tuli.
3. **Inorganic Chemistry,** Silver and Atkins
4. **Fuel Cell Hand Book 7th Edition**, by US Department of Energy (EG&G technical services and corporation)
5. **Hand book of solar energy and applications** by Arvind Tiwari and Shyam.
6. **Solar energy fundamental, technology and systems** by Klaus Jagar et.al.
7. **Hydrogen storage** by Levine Klebonoff

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CBCC ANEXURE-II R-15

III B.Tech II Semester

15ABS21-CHEMISTRY OF LIFE

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives:

- *To impart knowledge in chemistry to the students about Structure and function of bio-molecules such as protein & nucleic acid, metabolism, and regulation that are particularly relevant to the biological and life sciences.*

UNIT-1: Cell Chemistry:

Introduction to cell as the basic unit of Life; Types of cells; Procaryotes and Eucaryotes – examples; Characteristics of Plant & Animal cells; Structure of Cell and its Organelles and their functions;

A Chemical probe into the Cell: - Cell Walls composition - (G+) & (G-) Procaryotes, Plant and Animal cells i) Minerals ii) Carbohydrates iii) Proteins iv) Lipids v) Nucleic acids vi) Enzymes vii) Vitamins viii) Hormones, etc. their biological functions.

UNIT -2: Lipids and Membranes:

Introduction: Lipid Structure - Acyl glycerol, Phospho glycerides (Phospholipids), ether lipids and sphingolipids. Bio-synthesis of lipids. Biological membranes – their role, structural complexity and compositions; Plasma membrane, Membrane lipids, Membrane proteins; Lipid bilayers, Fluid Mosaic Model of biological membrane. Dyanamic nature of lipid bilayers and membrane. Protein and Glycoprotein components of membrane. Membrane transport pores and channels, active transport and passive transport.

UNIT -3: Enzyme, Catabolic and Anabolic processes:

Definition, classification and nomenclature; Factors affecting the enzyme catalysed reactions. Advantages and limitations of enzymes in organic synthesis – mechanistic aspects of enzyme catalysis – Lock and Key mechanism, Induced – Fit mechanism, Desolvation and Solvation – substitution theory, Three- point attachment rule. Factors affecting the enzyme catalysed reactions. Enzyme selectivity – chemo, regio, diastereo and enatio selectivity – illustration with suitable examples. Regulation of enzyme activity – Allosteric enzymes. Enzyme inhibition – reversible inhibition – competitive, non-competitive and uncompetitive inhibition of enzymes. Immobilised enzymes – immobilization by physical and chemical methods. Co-Enzymes involved in Oxidation-Reduction processes. Role of metal ions in biological processes, physiology of digestion.

Catabolic and Anabolic processes: Energy transfer processes, role and significance of ATP; The electron transport system - Oxidative phosphorylation; Photosynthesis and its mechanism (cyclic and non-cyclic).

UNIT -4: Bio-Chemistry of Carbohydrates, Respiration and Carbohydrate Metabolism:

Bio-Chemistry of Carbohydrates: Classification of Carbohydrates; Stereoisomerism; Optical isomerism; Optical activity projection and perspective formulas; D-glyceride as a reference compound; Cyanohydrin synthesis; Structure of glucose; monosaccharides, disaccharides and polysaccharides; Polysaccharides and Glycoproteins in cells.

Respiration and Carbohydrate Metabolism: Glycolysis and Kreb's Cycle; Physiology of respiration in mammals, respiratory exchange and transport of respiration at cellular level. Interconversion of glycogen and glucose in liver and the role of insulin.

UNIT -5: Chemistry and Bio-Chemistry of Amino Acids & Proteins:

General properties of Amino acids; Proteins - Classification and Function; Structure of Proteins – Primary, Secondary, Tertiary and Quaternary Structure of Proteins. Synthesis of Peptides and Poly Peptides. Determination of Structure of Poly Peptides -N-terminal and C- terminal residue analysis.

Bio-Chemistry of Nucleic Acids: Introduction; Hydrolysis of Nucleic acids; Structure, Physical and Chemical properties of Heterocyclic bases - Adenine, Guanine, Uracil and Thymine; Structure of DNA: Primary, Secondary, Tertiary structures of DNA. A,B,C and Z forms of DNA. Structure of RNA – types of RNA – mRNA, rRNA and tRNA.; Definition and explanation of Replication, Transcription, Translation. Genetic Code – Codons – Protein synthesis.

Course outcome:

Students will gain an understanding of:

- *the chemical basis for biological phenomena and cellular structure*
- *how physiological conditions (esp. the chemistry of water) influence the structures and reactivities of biomolecules*
- *the chemical properties of amino acids, cofactors, and sugar*
- *the basic principles of protein and polysaccharide structure*
- *enzyme kinetics and their application to the elucidation of catalytic mechanisms*
- *constructing reasonable electron-pushing mechanisms for enzyme-catalyzed reactions*
- *the chemical logic of metabolism*
- *nucleic acid structure – building blocks of both DNA and RNA, secondary structures, tertiary structures and higher order packaging of genomic DNA*
- *translation – process for translation of messenger RNA into polypeptides, interpreting the genetic code, mechanism of ribosomal action*

References:

1. **"*Outlines of Bio-Chemistry*",** by E.E. Conn & Stumpf, John Wiley & Sons, New York, **(2000).**
2. **"*Text Book of Bio-Chemistry*",** by West, Todd et.al, Oxford and & BH Manohar Publishers & Distributers.
3. **"*Priciples of Bio-Chemistry*"** by White, Handler, Smith et.al.
4. **"*Bio-Chemistry*",** by Lehninger, W.H. Freeman and Companies, USA.
5. **" *Bio-Chemistry*"** by L.Stryer and W.H.Freeman and Companies, USA..
6. **"*Organic Chemistry*",** by R.T.Morison and R.N.Boyd, Allyn & Bacon Inc., (printed in Singapore) **(2001).**

CBCC ANEXURE-II R-15

III B.Tech II Semester

15ABS22-CHEMISTRY OF POLYMERS AND THEIR APPLICATIONS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

The objectives of this course are:

- *To impart the students the knowledge of polymer materials, their formation mechanisms, properties and uses*
- *provides students with an opportunity to identify different types of polymers in our surrounding*
- *introduces hydrogels of polymer networks in drug delivery system and study of surface phenomenon.*
- *introduces students to the practical application of polymers*

UNIT – 1 : Polymers-Basics and Characterization

Basic concepts: monomers, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization: condensation, addition and copolymerization, Mechanism of free radical, chain, ionic and coordination polymerization. Average molecular weight concepts: number, weight, viscosity average molecular weights, polydispersity and molecular weight distribution.

Measurement of molecular weight: End group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers.

UNIT – 2 : Synthetic Polymers

Addition and condensation polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization.

Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications.

Preparation, properties and applications of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons,

Urea - formaldehyde, phenol - formaldehyde and melanine Epoxy and Ion exchange resins. Characterization of polymers by IR, NMR, GPC and XRD.

UNIT – 3 : Natural Polymers & Modified cellulosics

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils, gums and proteins.

Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; speciality plastics- PES, PAES, PEEK, PEAK.

UNIT -4: Hydrogels of Polymer networks and Drug delivery

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, Introduction to drug to drug delivery systems including, drug development, regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release. Applications of hydrogels in drug delivery.

UNIT – 5 : Surface phenomena

Surface tension, adsorption on solids, electrical phenomena at interfaces including electrokinetics, micelles, reverse micelles, solubilization. Application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

Course outcome:

Upon successful completion of this course, the students will be able to:

- *differentiate between natural and man-made polymers.*
- *explain polymerization methods*
- *understand polymerization kinetics*
- *understand drug and drug delivery systems and*
- *applications and uses of polymers.*

References :

1. A Text book of Polymer science, Billmayer
2. Organic polymer Chemistry, K.J.Saunders, Chapman and Hall
3. Advanced Organic Chemistry, B.Miller, Prentice Hall
4. Polymer Chemistry – G.S.Mishra
5. Polymer Chemistry – Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar
6. Physical Chemistry –S. Glasston & K.J Laidler
7. Drug Delivery- Ashim K. Misra

III B.Tech II Semester

15ACE35-REMOTE SENSING & GIS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives:

- *To Know the concept of photogrammetry.*
- *Analysis of RS and GIS data and interpreting the data for modelling applications.*
- *To educate of GIS in civil engineering field.*

UNIT I

INTRODUCTION TO PHOTOGRAMMETRY:

Principles& types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

UNIT II

REMOTE SENSING :

Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

UNIT III

GEOGRAPHIC INFORMATION SYSTEM:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS.

TYPES OF DATA REPRESENTATION:

Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

UNIT IV

GIS SPATIAL ANALYSIS:

Computational Analysis Methods(CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

UNIT V

WATER RESOURCES APPLICATIONS:

Land use/Land cover in water resources, Surface water mapping and inventory, Rainfall – Runoff relations and runoff potential indices of watersheds, Flood and Drought impact assessment and monitoring, Watershed management for sustainable development and Watershed characteristics. Reservoir sedimentation, Fluvial Geomorphology, water resources management and monitoring, Ground Water Targeting, Identification of sites for artificial Recharge structures, Drainage Morphometry, Inland water quality survey and management, water depth estimation and bathymetry.

Course Outcomes:

On completion of the course the students will have knowledge on

- *Understanding the concept of photogrammetry.*
- *Analysis of RS and GIS data and interpreting the data for modelling applications.*
- *Understand Application of GIS in civil engineering field.*

TEXT BOOKS:

1. Remote Sensing and GIS by B.Bhatta, Oxford University Press,New Delhi.
2. Advanced surveying: Total station GIS and remote sensing – Satheesh Gopi – Pearson publication.

REFERENCE BOOKS:

1. Fundamentals of remote sensing by gorge Joseph , Universities press, Hyderabad.
2. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall (India) Publications.
3. Basics of Remote sensing & GIS by S.Kumar, Laxmi Publications.
4. Remote sensing and GIS by M.Anji reddy ,B.S.Pubiliications,New Delhi.
5. *Remote Sensing and its applications by LRA Narayana University Press 1999.*
6. *GIS by Kang – tsung chang, TMH Publications & Co.,*
7. *Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell,Oxford Publishers 2004*

ENGINEERING COLLEGE PULIVENDULA

III B.Tech II Semester

15ACE36-ENVIRONMENTAL IMPACT ASSESTMENT & MANAGEMENT

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objectives:

- *To apply knowledge acquired to the process of environmental impact modeling and prediction as a design tool with application to a number of case studies.*
- *To adapt skills in GIS to environmental management systems*

UNIT I

INTRODUCTION:

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT II

EIA METHODOLOGIES:

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT III

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT IV

ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE:

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

ENVIRONEMNTAL AUDIT:

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT V

ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION):

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act.Case studies and preparation of Environmental Impact assessment statement for various Industries.

Course outcomes

- *an understanding of current EIA methods and the techniques and tools used.*
- *To develop an understanding of current assessment methods and legislation.*
- *To develop an understanding of current environmental monitoring systems.*

Text Books:

1. Environmental Impact Assessment Methodologies, by Y. Anjaneyulu, B.S. Publication, Sultan Bazar, Hyderabad.
2. Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice Hall Publishers

Reference Books:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari & Sons Publication.,New Delhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

ANANTAPUR ENGINEERING COLLEGE PULIVENDULA

III B.Tech II Semester

15ACE37-FINITE ELEMENT METHODS (CBCC)

L	T	P	C
3	1	0	3

Course objectives:

- *To know FEM Principles to displacement*
- *Students will apply matrix in constructions*

UNIT –I

INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

UNIT –II

PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

UNIT –III

ONE DIMENSIONAL ELEMENTS: Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems. Different types of elements for plane stress and plane strain analysis – Displacement models –generalized coordinates – shape functions – convergent and compatibility requirements– Natural coordinate system

UNIT –IV

GENERATION OF ELEMENT : Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements. Concepts of, isoparametric elements for 2D analysis –formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.

UNIT-V

AXI-SYMMETRIC ANALYSIS: Basic principles-Formulation of 4-noded iso-parametric axi-symmetric element – Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads.

Course Outcomes:

- *Students can understand FEM Principles*
- *Students can apply matrix in construction*

TEXT BOOK:

1. Finite Elements Methods in Engineering by Tirupati. R. Chandrnpatla and Ashok D. Belegundu – Pearson Education Publications.
2. Finite element analysis by S.S. Bhavakatti-New age internationalpublishers
3. Finite Element methods for Engineers by U.S.Dixit, Cengage Publishers, New Delhi.
4. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, New Delhi.
5. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

REFERENCES:

1. Concepts and Applications of Finite Element Analysis by Robert D.Cook, David S. Malkus and Michael E.Plesha. Jhon Wiley & Sons.
2. Finite element analysis by David V Hutton, Tata Mcgraw Hill, New Delhi
3. Applied Fem by Rammurthy, I.K.International Publishers PVt. Ltd., New Delhi.
4. Fem by J.N.Reddy, Mcjraw, TMH Publications, New Delhi.

JNTUA ANANTAPUR ENGINEERING COLLEGE PULIVENDULA

III B.Tech II Semester

15AEE19-POWER ELECTRONICS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *The basic power semiconductor switching devices and their principles of operation..*
- *This course covers characteristics of semi conductor devices, ac-dc, dc-dc, ac-ac and dc-ac converters.*
- *The importance of using pulse width modulated techniques to obtain high quality power supply is also discussed in detail in this course.*

UNIT – I POWER SEMI CONDUCTOR DEVICES

Power Semiconductor Diodes, Thyristors – Silicon Controlled Rectifiers (SCR's) – BJT – Power Transistor - Power MOSFET – Power IGBT - TRIACs, GTOs - Characteristics and Principles of Operation and other Thyristors – Basic Theory of Operation of SCR – Static Characteristics – Turn On and Turn Off Methods- Dynamic Characteristics of SCR - Two Transistor Analogy – Triggering Circuits – Series and Parallel Connections of SCR's – Snubber Circuits – Specifications and Ratings of SCR's, BJT, IGBT - Numerical Problems –Commutation Circuits.

UNIT – II PHASE CONTROLLED CONVERTERS

Phase Control Technique – Single Phase Line Commutated Converters – Mid Point and Bridge Connections – Half Controlled Converters, Fully Controlled Converters with Resistive, RL and RLE loads– Derivation of Average Load Voltage and Current – Line Commutated Inverters - Active and Reactive Power Inputs to the Converters without and with Free Wheeling Diode, Effect of Source Inductance – Numerical Problems.

Three Phasé Line Commutated Converters – Three Pulse and Six Pulse Converters – Mid Point and Bridge Connections - Average Load Voltage with R and RL Loads – Effect of Source Inductance–Dual Converters (Both Single Phase and Three Phase) - Waveforms –Numerical Problems.

UNIT – III DC – DC CONVERTERS

Buck converters, boost converters and buck boost converters. Steady state analysis, voltage and current ripple, design of inductor and capacitor values.

UNIT – IV INVERTERS

Inverters – Single Phase Inverter – Basic Series Inverter – Basic Parallel Capacitor Inverter Bridge Inverter – Waveforms –sine-triangle PWM, Three Phase VSI in 120^0 And 180^0 Modes of Conduction. unipolar, bipolar inverter PWM techniques selective harmonic elimination - Voltage Control Techniques for Inverters Pulse Width Modulation Techniques – Numerical Problems.

UNIT – V AC VOLTAGE CONTROLLERS & CYCLO CONVERTERS

AC Voltage Controllers – Single Phase Two SCR's in Anti Parallel – With R and RL Loads – Modes of Operation of Triac – Triac with R and RL Loads – Derivation of RMS Load Voltage, Current and Power Factor Wave Forms – Firing Circuits -Numerical Problems - Thyristor Controlled Reactors; Switched Capacitor Networks.

BOS - chairman

Cyclo Converters – Single Phase Mid Point Cyclo Converters With R and RL loads (Principle of Operation only) – Bridge Configuration Of Single Phase Cyclo Converter with R and RL loads (Principle of Operation only) – Waveforms

Course Outcomes:

- *Basic operating principles of power semiconductor switching devices*
- *The operation of power electronic converters, choppers, inverters, AC voltage controllers, and cycloconverters, and their control.*
- *To understand the working of inverters and application of PWM techniques for voltage control and harmonic mitigation.*
- *How to apply the learnt principles and methods to practical applications.*

TEXT BOOKS:

1. Power Electronics – by M. D. Singh & K. B. Kanchandhani, Tata Mc Graw – Hill Publishing Company, 1998.
2. Power Electronics : Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 1998

REFERENCE BOOKS:

1. Power Electronics – by P. S. Bimbra, Khanna Publications.
2. Power electronics, Essentials and applications – L. Umanand Wiley Publications
3. Power Electronics – by Vedam Subramanyam, New Age International (P) Limited, Publishers
4. Power Electronics - by V. R. Murthy , 1st edition -2005, OXFORD University Press
5. Power Electronics-by P. C. Sen, Tata Mc Graw-Hill Publishing.
6. The power electronics (hand book) : Timothy L. Skgarnina
7. Theory of Power Electronics- by KL Rao, Ch Sai Babu, S Chand Publications Revised Edition 2009

V. Sen
BOS-chairman

ANANTAPUR ENGINEERING COLLEGE PULIVENDULA

III B.Tech II Semester

15AEE34-RENEWABLE ENERGY SOURCES

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

This course enables the students to

- *Identify the use of renewable energy sources for electrical power generation*
- *Know the environmental effects of energy conversation*
- *Analyze the different types of turbines for ocean energy conversations*
- *Understand the concept of fuel cells and preventive measurements on pollution*

UNIT-I:

Photo voltaic power generation ,spectral distribution of energy in solar radiation, solar cell configurations, voltage developed by solar cell, photo current and load current, practical solar cell performance, commercial photo voltaic systems, test specifications for PV systems, applications of super conducting materials in electrical equipment systems.

UNIT-II:

Principles of MHD power generation, ideal MHD generator performance, practical MHD generator, MHD technology.

Wind Energy conversion: Power from wind, properties of air and wind, types of wind Turbines, operating characteristics.

UNIT-III:

Tides and tidal power stations, modes of operation, tidal project examples, turbines and generators for tidal power generation.

Wave energy conversion: properties of waves and power content, vertex motion of Waves, device applications. Types of ocean thermal energy conversion systems Application of OTEC systems examples,

UNIT-IV:

Miscellaneous energy conversion systems: coal gasification and liquifaction, biomass conversion, geothermal energy, thermo electric energy conversion, principles of EMF generation, description of fuel cells, Co-generation and energy storage, combined cycle co-generation, energy storage.

Global energy position and environmental effects: energy units, global energy position.

UNIT-V:

Types of fuel cells, H_2-O_2 Fuel cells, Application of fuel cells – Batteries, Description of batteries, Battery application for large power. Environmental effects of energy conversion systems, pollution from coal and preventive measures steam stations and pollution, pollution free energy systems.

V. Sarala
BOS-chairman

Course Outcomes:

The student will have the knowledge on the following concepts

- *Find different renewable energy sources to produce electrical power*
- *Solar radiation on earth surface and concept of photo voltaic cells.*
- *Find the various types of turbines and design of energy systems*
- *Estimate the global energy position on miscellaneous energy conversation systems.*

TEXT BOOKS:

1. "Energy conversion systems" by Rakosh das Begamudre, New age International publishers, New Delhi - 2000.
2. John twidell & wier, renewable energy sources, CRC press, 2009.
3. G. D. Rai – non conventional sources, Khanna Publishers.

References books:

1. D.P Kothari, Rakesh Ranjan, renewable energy sources and emerging technologies, PHI, 2009.
2. C.S Solaniki, solar Photo Voltaic- Fundamentals-Principals and applications, PHI 2009

V. Ferd
BOS- chairman

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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CBCC ANEXURE-II R-15

III B.Tech II Semester

15AEE35-UTILIZATION OF ELECTRICAL ENERGY

Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

This course enables the students to

- *Understand different types of heating and welding techniques.*
- *Study the basic principles of illumination and its units of Illumination.*
- *Understand different lighting design schemes for various applications.*
- *Learn basic principles of traction system & speed time curves for different traction system.*
- *Understand the fundamentals of environmental aspects of hybrid electric vehicles.*
- *Study the concepts of economic aspects of utilizing electrical energy.*

UNIT–I ILLUMINATION:

Definition – Laws of Illumination–Polar Curves – Calculation of MHCP and MSCP. Lamps: Incandescent Lamp, Sodium Vapour Lamp, Fluorescent Lamp. Requirement of Good Lighting Scheme – Types, Design and Calculation of Illumination. Street Lighting and Factory Lighting – Numerical Problems.

UNIT–II ELECTRIC HEATING & WELDING:

Electrical Heating: Advantages. Methods of Electric Heating – Resistance, Arc, Induction and Dielectric Heating.

Electric Welding: Types – Resistance, Electric Arc, Gas Welding. Ultrasonic, Welding Electrodes of Various Metals, Defects in Welding.

Electrolysis - Faraday's Laws, Applications of Electrolysis, Power Supply for Electrolysis.

UNIT–III INTRODUCTION TO HYBRID ELECTRIC VEHICLES:

History of hybrid and electric vehicles, social and environmental importance of hybrid and electric vehicles, impact of modern drive-trains on energy supplies.

UNIT–IVELECTRIC TRACTION:

Introduction – Systems of Electric Traction. Comparison Between A. C And D. C Traction – Special Features of Traction Motors - Methods of Electric Braking – Plugging, Rheostatic and Regenarative Types. Mechanics of Train Movement. Speed-Time Curves of Different Services – Trapezoidal and Quadrilateral, Speed-Time Curves – Numerical Problems. Calculations of Tractive Effort, Power, Specific Energy Consumption - Effect of Varying Acceleration and Braking Retardation, Adhesive Weight and Coefficient of Adhesion – Problems.

BOS-Chairman

UNIT–V ECONOMIC ASPECTS OF UTILISING ELECTRICAL ENERGY:

Power Factor Improvement, Improvement of Load Factor, Off Peak Loads- Use of Exhaust Steam, Waste Heat Stations, Pit Head Generation, Diesel Plant, General Comparison of Private Plant and Public Supply- Initial Cost and Efficiency, Capitalization of Losses, Choice of Voltage, Cost of Renewals.

Course Outcomes:

The students will have knowledge on the following concepts to:

- *Identify most appropriate heating & welding techniques for suitable applications*
- *Design the levels of illumination based on the applications*
- *Determine speed-time curves, acceleration & retardation of different traction services.*
- *Estimate energy consumption levels at various modes of operation in traction systems*
- *Identify the economic aspects of utilizing electrical energy*

TEXT BOOKS:

1. Utilization of Electric Energy – by E. Openshaw Taylor and V. V. L. Rao, Universities Press.
2. Art & Science of Utilization of electrical Energy – by Partab, Dhanpat Rai & Co.
3. Utilization of Electrical Energy & Traction – J.B.Gupta, Rajeev Manglik,Rohit Manglik – Published by S.K Kataria & Sons.

REFERENCE BOOKS:

1. Utilization of Electrical Power including Electric drives and Electric traction – by N.V.Suryanarayana, New Age International (P) Limited, Publishers, 1996.
2. Utilization of Electrical Power – by R. K. Rajput, Laxmi Publications
3. Generation, distribution and utilization of electrical energy by C.L Wadhwa,wiley Eastern Limited-1993
4. Electrical Power,S.L Uppal Khanna Publisher – 1988.

ENGINEERING PULIVENDULA COLLEGE

BOS-chairman

III B.Tech II Semester

15AME35-Optimization Techniques by MATLAB
(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course objective:

To engage in learning of optimization principles, be able to effectively setup and solve real-world optimization problems, and develop technical and communication skills. The course also aims to teach how to use computer programs such as MATLAB to solve mathematical models.

UNIT I

Introduction to MAT LAB: Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

UNIT II

Introduction to Optimization: Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

UNIT III

Single Variable Optimization: Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

UNIT IV

Multi Variable Optimization: Conjugate gradient method, Newton's method, Powell's method, Flectcher- Reeves method, Hook and Jeeves method, interior penalty function with MATLAB code.

UNIT V

Evolutionary Algorithms: Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

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***Course Outcomes*:**

after completion of this course the student can be able to,

- Define and use optimization terminology and concepts, and understand how to classify an optimization problem.
- know the Application of Optimization Methods to Engineering Problems.
- implement basic optimization algorithms in a computational setting and apply existing optimization software packages (MATLAB) to solve engineering problems.

Text books:

1. "MATLAB An introduction with applications" Rao V.Dukkipati, New age international publications.
2. "Optimization in practice with MATLAB" Achille Messac, Cambridge University Press.
3. "Introduction to optimum design" Jasbir S Arora, Academic Press, Elsevier Publications.

References:

1. "MATLAB Optimization Techniques" Cesar Perez Lopez, Academic press, Springer publications.
2. "Applied Numerical Methods with MATLAB for Engineers and scientists" Steven C.Chapra. Mc,Graw Hill Publications.
3. "Nonlinear optimization" Benny Yakir, open source from net.

Head
Mechanical Engineering Department,
JNTUA College of Engineering,
PULIVENDULA - 516 390.

III B.Tech II Semester

15AME36-MECHATRONICS AND MEMS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *To understand the technologies behind modern mechatronic systems.*
- *To provide methodological fundamentals for the development of fully automated system.*
- *To teach students how to develop a robotic or automated system project focusing on the hardware and software integration, and*
- *To apply the acquired knowledge for developing a mechatronic system.*

UNIT – I

Introduction: Definition of Mechatronics, Need for Mechatronics in Industry, Objectives of mechatronics, mechatronics design process, Mechatronics key elements, mechatronics applications – Computer numerical control (CNC) machines, Tool monitoring systems, Flexible manufacturing system (FMS), Industrial Robots, Automatic packaging systems, Automatic inspection systems.

UNIT – II

Sensors: Static characteristics of sensors, Displacement, Position and Proximity Sensors, Force and torque sensors, Pressure sensors, Flow sensors, Temperature sensors, Acceleration sensors, Level sensors, Light sensors, Smart material sensors, Micro and Nano sensors, Selection criteria for sensors.

UNIT – III

Actuators: Mechanical, Electrical, Hydraulic and Pneumatic Actuation systems, Characteristics and their limitations, Design of Hydraulic and Pneumatic circuits, Piezoelectric actuators, Shape memory alloys, Selection criteria for actuators.

UNIT – IV

Microprocessors, Microcontrollers and Programmable Logic Controllers: Architecture of of Microprocessor, Microcontroller and Programmable Logic Controller, PLC Programming using ladder diagrams, logics, latching, sequencing, timers relays and counters, data handling, Analog input/output, selection of -.

UNIT – V

Micro Electro Mechanical Systems (MEMS): History, Effect of scaling, Fabrication Techniques: Oxidation, Physical Vapor disposition, Chemical Vapor Deposition, Lithography, Etching, Wafer bonding, LIGA, DRIE, Applications: Lab on chip.

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JNTUA College of Engineering,
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Course Outcomes

Upon successful completion of this unit, the student will be able to:

- *Define the discipline of mechatronics.*
- *Identify examples of mechatronic systems that are encountered in real life.*
- *Identify the components of a typical mechatronic system.*

Text books:

1. Mechatronics, W.Bolton, Pearson Education
2. Mechatronic System Design, Devadas Shetty and Richard A Kolk, Cengage learning
3. Mechatronics an integrated approach, Clarence W. de Silva, CRC Press
4. Micro Electro Mechanical Systems Design, James J Allen, CRC Press Taylor & Francis group
5. Mechatronics, Ganesh S Hedge, Jones and Bartlett Publishers

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III B.Tech II Semester

15AME37-AUTOMOTIVE ELECTRONICS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

- *To understand the use of electronics in the automobile.*
- *To appreciate the various electronic and the instrumentation systems used in automobile.*

UNIT 1

Introduction to microcomputer: Microcomputer: Buses, memory, timing, CPU registers; Microprocessor architecture: Initialization, operation codes, program counter, branch and jump instructions, subroutine. Analog to digital converters and Digital to analog converters, sampling, polling and interrupts, digital filters, lookup table.

UNIT 2

Sensors and actuators: Speed sensors, Pressure sensors: Manifold Absolute Pressure sensor, knock sensor, Temperature sensors: Coolant and Exhaust gas temperature, Exhaust Oxygen level sensor, Position sensors: Throttle position sensor, accelerator pedal position sensor and crankshaft position sensor, Air mass flow sensor. Solenoids, stepper motors and relays.

UNIT 3

Electronic engine management system: Electronic engine control: Input, output and control strategies, electronic fuel control system, fuel control modes: open loop and closed loop control at various modes, EGR control, Electronic ignition systems – Spark advance correction schemes, fuel injection timing control.

UNIT 4

Electronic vehicle management system: Cruise control system, Antilock braking system, electronic suspension system, electronic steering control, traction control system, Transmission control, Safety: Airbags, collision avoiding system, low tire pressure warning system.

UNIT 5

Automotive instrumentation system: Input and output signal conversion, multiplexing, fuel quantity measurement, coolant temperature and oil pressure measurement, display devices-LED, LCD, VFD and CRT, Onboard diagnostics(OBD), OBD-II, off board diagnostics.

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PULIVENDULA - 516 390.

Course outcomes:

After completion of this course the student can be able to:

1. *Obtain an overview of automotive components, like sensors, actuators, communication protocols and safety systems employed in today's automotive industry .*
2. *Interface automotive sensors and actuators with microcontrollers.*
3. *Know, the various display devices that are used in automobiles.*

Text Books:

1. Understanding Automotive Electronics, William B Ribbens, Newne Butterworth-Heinermann, 6th edition 2003.
2. Crouse W H, Automobile Elctrical Equipment, McGraw Hill Book Co.Inc, Newyork 2005

References:

1. Bechhold "Understanding Automotive Electronics", SAE, 1998.
2. Robert Bosch "Automotive Hand Book", SAE (5th Edition), 2000.
3. Tom Denton,"Automobile Electrical and Electronic Systems" 3rd edition- Edward Arnold, London - 2004.
4. Eric Chowanietz - 'Automotive Electronics' - SAE International USA – 1995

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Mechanical Engineering Department,
JNTUA College of Engineering,
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III B.Tech II Semester

15AEC34-FUNDEMENTALS OF COMMUNICATION SYSTEMS (QUALITATIVE TREATMENT ONLY)

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

1. *To study the fundamental concept of the analog communication systems.*
2. *To analyze various analog modulation and demodulation techniques.*
3. *To know the working of various transmitters and receivers.*
4. *To understand the influence of noise on the performance of analog communication systems, and to acquire the knowledge about information and capacity.*

UNIT- I

Elements of communication systems, need for Modulation, Modulation Methods, Baseband and carrier communication, Amplitude Modulation (AM), Generation of AM signals, Rectifier detector, Envelope detector, sideband and carrier power of AM, Double sideband suppressed carrier (DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Single sideband (SSB) transmission, VSB Modulation.

UNIT- II

Angle Modulation & Demodulation: Concept of instantaneous frequency, Generalized concept of angle modulation, Bandwidth of angle modulated waves – Narrow band frequency modulation (NBFM); and Wide band FM (WBFM), Phase modulation, Pre-emphasis, & De-emphasis, Illustrative Problems.

UNIT -III

Pulse Analog Modulation Techniques

Pulse analog modulation techniques, Generation and detection of Pulse amplitude modulation, Pulse width modulation, Pulse position modulation.

Multiple Access Techniques

Introduction to multiple access techniques, FDMA, TDMA, CDMA, SDMA: Advantages and applications.

UNIT IV

Digital Communication (Qualitative Approach only)

Pulse Code Modulation, DPCM, Delta modulation, Adaptive delta modulation, Overview of ASK, PSK, QPSK, BPSK and M- PSK techniques

Unit-V

Modern Communication Trends (Qualitative Approach only)

Basics of Spectrum utilizations, Comparison of 2G, 3G, Types of Ethernet, Modems – Types of Modems, 100Mbps, 1Gbps modems, Role of IPV6 in Present trends.

Course Outcomes:

This course provides the foundational education in Analog Communication systems, and applications. The students are provided the learning experience through class room teaching and solving assignment & tutorial problems. At the end of course, students should be able to:

1. *Acquire knowledge on the basic concepts of Analog Communication Systems.*
2. *Analyze the analog modulated and demodulated systems.*
3. *Verify the effect of noise on the performance of communication systems.*
4. *Know the fundamental concepts of information and capacity.*

TEXT BOOKS:

1. Sham Shanmugam, "Digital and Analog Communication Systems", Wiley-India edition, 2006.
2. Wayne Tomasi, Electronic Communications System: Fundamentals Through Advanced, 2nd editions, PHI, 2001.

REFERENCES:

1. Simon Hakin, "Communication Systems," Wiley India Edition, 4th Edition, 2011.
2. Bruce Carlson, & Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 5th Edition, McGraw-Hill International Edition, 2010.

III B.Tech II Semester

15AEC35-INDUSTRIAL ELECTRONICS

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objective:

1. *To get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.*
2. *To study the characteristics of AC to DC converters.*
3. *To know about the practical applications Electronics in industries.*

UNIT – I:

SEMICONDUCTOR DEVICES: Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open-circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes (LED)

UNIT – II:

JUNCTION TRANSISTORS: Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

UNIT – III:

AC TO DC CONVERTORS: AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Full wave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers, Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter, Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Short period Accuracy of Regulators, Long period Accuracy of Voltage Regulator, Principle of automatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C. Voltage Regulators, Series Voltage Regulators, Complete series voltage regulator circuit, Simple series voltage regulator.

UNIT – IV: INDUSTRIAL APPLICATIONS – I

Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding.

Induction heating: Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating

Dielectric heating: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

UNIT – V: INDUSTRIAL APPLICATIONS - II

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasoni8c waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physico-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

Course Outcome: *After completion of the course the students will be able to*

a. *Get an overview of semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.*
b. *Understand the characteristics of AC to DC converters.*
c. *Understand about the practical applications Electronics in industries.*

Text Books:

1. G. K. Mithal, "Industrial Electronics", Delhi, Khanna Publishers, 2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, "Industrial Electronics", Anuradha Publications, 2011.

Reference Books:

1. F. D. Petruzulla, "Industrial Electronics", Singapore, McGraw Hill, 1996.
2. M. H. Rashid, "power Electronics Circuits, Devices and Application", 3rd edition, PHI, 2004.

III B.Tech II Semester

15AEC36-NEURAL NETWORKS & FUZZY LOGIC

(Choice Based Credit Courses (Inter-department))

L	T	P	C
3	1	0	3

Course Objectives:

1. To Know the basics of Neural Networks and essentials of Artificial Neural Networks with Single Layer and Multilayer Feed Forward and Feedback Networks
2. To understand the Applications of Neural Networks in pattern recognition, speech and decision making.
3. To study the basic concepts of Fuzzy Logic, Fuzzy sets and Fuzzy system design implementation.
4. To Know the Associate Memories , FAM neural networks and encoding Adaptive Resource theory- network for ART

UNIT-I

Neural Networks Characteristics: History of Development in neural networks, Artificial neural net terminology, model of a neuron, Topology, Types of learning. Supervised, Unsupervised learning. Basic Learning laws, Hebb's rule, Delta rule, widrow and Hoff LMS learning rule, correlation learning rule instar and ouster learning rules.

UNIT-II

Unsupervised Learning: Competitive learning, K-means clustering algorithm, Kohonen's feature maps. Radial Basis function neural networks- recurrent networks, Real time recurrent and learning algorithm. Introduction to Counter propagation Networks- CMAC Network, ART networks, Application of NN in pattern recognition, optimization, Control, Speech and decision making.

UNIT-III

Neural Network models: neural network models, layers in neural network and their connections. Instar, outstar, weights on connections, threshold function, application- Adaline and madaline. Back propagation: feed forward back propagation network- mapping, layout, training, BPN applications

UNIT-IV

Fuzzy Logic: Basic concepts of Fuzzy logic, Fuzzy vs Crisp set, Linguistic variables, membership functions, operations of Fuzzy sets, Fuzzy if-then rules, Variables inference techniques, defuzzification techniques, basic Fuzzy interference algorithm, application of fuzzy logic , Fuzzy system design implementation , useful tools supporting design.

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UNIT-V

Bidirectional Associative Memory (BAM), inputs and outputs, weights and training. FAM-fuzzy associative memory, association, FAM neural networks, encoding Adaptive Resource theory-network for ART, processing in ART

Course Outcomes: After completion of the course, the student can able to

a. Comprehend the concepts of feed forward neural networks
b. Analyze the various feedback networks
c. Understand the concept of fuzziness involved in various systems and fuzzy set theory.
d. Comprehend the fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
e. Analyze the application of fuzzy logic control to real time systems.

Text Books:

1. Berkin Riza C and Trubatch, "Fuzzy System design principles- Building Fuzzy IF-THEN rule bases", IEEE Press.
2. Yegna Narayanan, "Artificial Neural Networks". 8th Printing, PHI, 2003.

Reference Books:

1. Simon Haykin, "Neural Networks," Pearson Education.
2. Yen and Langari, "Fuzzy Logic: Intelligence, Control and Information", Pearson Education.

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III B.Tech II Semester

15ACS35- MOBILE COMPUTING

(Choice based credit course of inter department)

L	T	P	C
3	1	0	3

Course Objective:

- To make the students understand the basic information about mobile computing and its concepts such as Applications, Impediments, Architecture, New Data Services like GPRS, CSHSD, DECT,Mobile IP Networks, MANET's and Linux for Mobile devices.
- To get acquaintance with the class of abstractions offered by the mobile computing system that develops the User App applications

UNIT-I

Introduction: Mobile Communications, Mobile Computing–Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices. GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS, CSHSD, DECT.

UNIT–II

Medium Access Control in Wireless (MAC): Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA. MAC protocols for GSM, Wireless LAN (IEEE802.11), Collision Avoidance (MACA, MACAW) Protocols. **Mobile IP Network Layer:** IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization,DHCP.

UNIT–III

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks.
Database Issues: Database Hoarding & Caching Techniques, C–S Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

UNIT–IV

Data Dissemination and Synchronization: Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination Broadcast Models, Selective Tuning and Indexing Methods, Digital Audio and Video Broadcasting (DAB & DVB). Data Synchronization –Introduction, Software, and Protocols

UNIT-V

Mobile Ad hoc Networks (MANETs): Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, etc., Mobile Agents, Service Discovery.
Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card, Palm OS, Windows CE, Symbian OS, Linux for Mobile Devices.

Course Outcome:

•Students able to use mobile computing more effectively

• Developing mobile application programs to exploit the mobile operating system

TEXTBOOKS:

1. Raj Kamal, "Mobile Computing", Oxford University Press, 2007, ISBN: 0195686772

REFERENCEBOOKS:

1. Jochen Schiller, "Mobile Communications", Addison-Wesley, Second Edition, 2004.
2. Stojmenovic and Cacute, "Handbook ofWireless Networks and Mobile Computing", Wiley, 2002, ISBN0471419028.
3. Reza Behravanfar, "Mobile Computing Principles: Designing and Developing Mobile Applications with UML and XML", ISBN: 0521817331, Cambridge University Press,Oct 2004,

III B.Tech II Semester

15ACS36- OPTIMIZATION TECHNIQUES

(Choice based credit course of inter department)

L	T	P	C
3	1	0	3

Course Objective:

• To understand the theory of optimization methods and algorithms developed for solving various types of optimization problems.

• To develop and promote research interest in applying optimization techniques in problems of Engineering and Technology.

• To apply the mathematical results and numerical techniques of optimization theory to concrete Engineering problems.

UNIT-I

Introduction to optimization: Requirements for the Application of Optimization Methods, Applications of Optimization in Engineering, Structure of Optimization Problems, Functions of a Single Variable: Properties of Single-Variable Functions, Optimality Criteria, Region Elimination Methods, Polynomial Approximation or Point Estimation Methods.

UNIT-II

Functions of a Several Variables: Optimality Criteria, Direct-Search Methods, Gradient Based Methods, Comparison of Methods and Numerical Results.2013-2014

UNIT-III

Linear Programming: Formulation of Linear Programming Models, Graphical Solution of Linear Programming in Two Variables, Linear Programming in Standard Form, Principles of the SimplexMethod,Applications.

UNIT-IV

Constrained Optimality Criteria: Equality-Constrained Problems, Lagrange Multipliers, Economic Interpretation of Lagrange Multipliers, Kuhn-Tucker Conditions, Kuhn-Tucker Theorems, Saddle point Conditions, Second-Order Optimality Conditions, Generalized Lagrange Multiplier Method, and Generalization of Convex Functions.

UNIT-V

Transformation Methods: Penalty Concept, Algorithms, Codes, and Other Contributions, Method of Multipliers, Constrained Direct Search: Problem Preparation, Adaptations of Unconstrained Search Methods, Random-Search Methods.

Course Outcomes: At the end of the course students will be able to:

• Use various optimization techniques such as Quadratic programming, Dynamic Programming and select the ones most suitable to the problem at hand.

• Subdivide a complex system in to smaller disciplinary models, manage their interfaces and reintegrate them in to an overall system model.

• Rationalize and quantify a system architecture or product design problem by selecting appropriate objective function, design variables, parameters and constraints.

- Interpret the mathematical conditions for optimality and give physical explanation.
- Make recommendations based on solutions, analysis and limitations of models.

TEXTBOOKS:

1. Engineering Optimization- Methods and Applications, A.Ravindran, K. M. Ragsdell, G.V. Reklaitis, Second Edition, Wiley India Edition.

2. Introductory Operation Research- Theory and Applications, H.S. Kasana, K.D. Kumar, Springer International Edition.

REFERENCES:

1. Optimization Methods in Operations Research and Systems Analysis, K.V. Mital and C. Mohan, New Age International (P)Limited, Publishers, Third Edition, 1996.
2. Operations Research, Dr. J.K.Sharma, Mc Millan.

3. Operations Research: An Introduction, H.A. Taha, PHI Pvt. Ltd.,

III B.Tech II Semester

15ACS37-MACHINE LEARNING

(Choice based credit course of inter department)

L	T	P	C
3	1	0	3

Course Objectives:

1. Machine Learning is the discipline of designing algorithms that allow machines (e.g.,a computer)
2. To learn patterns and concepts from data without being explicitly programmed.
3. This course will be an introduction to the design (and some analysis) of Machine Learning Algorithms, with a modern outlook focusing on recent advances, and examples of real-world applications of Machine Learning algorithms.

UNIT I

Introduction- Well-posed learning problems, Designing a learning system, Perspectives and issues in machine learning.

Concept learning and the general to specific ordering – Introduction, A concept learning task, Concept learning as search, Find-S: finding a maximally specific hypothesis, Version spaces and the candidate elimination algorithm and Their Remarks,

UNIT II

Decision Tree learning – Introduction, Decision tree representation, Appropriate problems and issues for decision tree learning, The basic decision tree learning algorithm, Hypothesis space search in decision tree learning,

Artificial Neural Networks – Introduction, Neural network representation, Appropriate problems for neural network learning, Perceptions, Multilayer networks and the back propagation algorithm with their Remarks.

Evaluation Hypotheses – Motivation, Estimation hypothesis accuracy, Basics of sampling theory, A general approach for deriving confidence intervals, Difference in error of two hypotheses, Comparing learning algorithms.

UNIT III

Bayesian learning – Introduction, Bayes theorem and concept learning, Maximum likelihood and least squared error hypotheses, Maximum likelihood hypotheses for predicting probabilities, Minimum description length principle, Bayes optimal classifier, Gibs algorithm, Naïve Bayes classifier, An example learning to classify text, Bayesian belief networks The EM algorithm.

Computational learning theory–introduction: probably approximately correct (PAC) learning. Sample complexity: quantifying the number of examples needed to PAC learn. Computational complexity of training.Sample complexity for finite hypothesis spaces, kDNF, and kCNF. Sample complexity for infinite hypothesis spaces, Vapnik-Chervonenkis dimension

Genetic Algorithms – Motivation, Genetic Algorithms, An illustrative Example, Hypothesis Space Search, Genetic Programming, Models of Evolution and Learning, Parallelizing Genetic Algorithms

UNIT IV

Learning Sets of Rules – Introduction, Sequential Covering Algorithms, Learning Rule Sets: Summary, Learning First Order Rules, Learning Sets of First Order Rules: FOIL, Induction as Inverted Deduction, Inverting Resolution.

Analytical Learning - Introduction, Learning with Perfect Domain Theories: Prolog-EBG Remarks on Explanation-Based Learning, Explanation-Based Learning of Search Control Knowledge.

UNIT V

Combining Inductive and Analytical Learning – Motivation, Inductive-Analytical Approaches to Learning, Using Prior Knowledge to Initialize the Hypothesis, Using Prior Knowledge to Alter the Search Objective, Using Prior Knowledge to Augment Search Operators.

Reinforcement Learning – Introduction, The Learning Task, Q Learning, Non-Deterministic, Rewards and Actions, Temporal Difference Learning, Generalizing from Examples, Relationship to Dynamic Programming.

Course Outcomes:

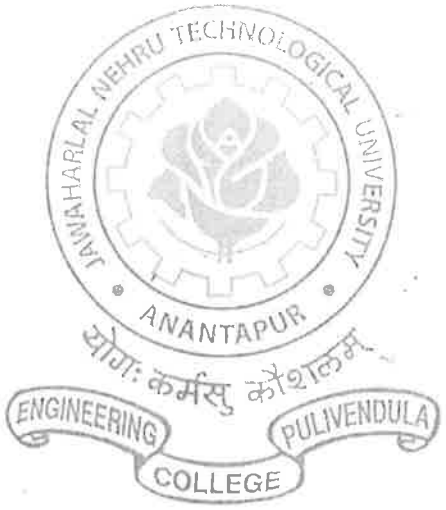
1. Develop an appreciation for what is involved in learning from data.
2. Understand a wide variety of learning algorithms.
3. Understand how to apply a variety of learning algorithms to data.
4. Understand how to perform evaluation of learning algorithms and model selection.

TEXT BOOKS:

1. Machine Learning – Tom M. Mitchell, - MGH.
2. Machine Learning: An Algorithmic Perspective, Stephen Marsland, Taylor & Francis (CRC)
3. Bishop.C(2006)pattern recognition and machine learning .Berlin:Springer-Verlag.

REFERENCES:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc., 2001.
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.
4. Baldi.P and Brunak.S(2002) Bioinformatics : A Machine Learning Approach Cambridge:
5. HalDaumé III, A Course in Machine Learning, 2015



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B.Tech. in Civil Engineering Course Structure and Syllabi under R19 Regulations

CIVIL ENGINEERING

S.No	Course Name	Category	L-T-P-C
1	Physical Activities, Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counseling	MC	2-0-2-0
3	Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch --corresponding labs, tools and platforms	MC	2-0-3-0
5	Proficiency Modules & Productivity Tools	MC	2-1-2-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	MC	2-1-2-0
10	Concepts of Programming	MC	2-0-2-0

B.Tech I Year I Semester

Semester –1					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19ABS06	Linear Algebra and Calculus	BS	3-1-0	4
2	19ACS03	Python Programming	ES	3-1-0	4
3	19ABS01	Engineering Physics	BS	3-0-0	3
4	19AME01	Engineering Graphics	LC	1-0-3	2.5
5	19AME02	Engineering Workshop	ES	0-0-3	1.5
6	19ABS02	Engineering Physics Lab	BS	0-0-3	1.5
7	19ACS04	Python Programming Lab	ES	0-0-3	1.5
				Total	**18**

B.Tech I Year II Semester

Semester –2					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19ABS07	Differential Equations and Vector Calculus	BS	3-1-0	4
2	19ABS05	Engineering Chemistry	BS	3-0-0	3
3	19AHS01	Communicative English-I	HS	2-0-0	2
4	19ACE01	Strength of Materials-I	PC	3-0-0	3
5	19ACE03	Building Materials and Construction	PC	3-1-0	4
6	19AHS02	Communicative English –I Lab	HS	0-0-2	1
7	19ABS08	Engineering Chemistry Lab	BS	0-0-3	1.5
8	19ACE04	Civil Engineering Workshop	LC	0-0-3	1.5
9	19ACE02	Strength of Materials Lab	LC	0-0-3	1.5
				Total	**21.5**

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B.Tech II Year I Semester

Semester – 3					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19ABS11	Complex Variables, Transforms and Applications to PDE	BS	2-1-0	3
2	19AHS03	Universal Human Values	HS	2-0-0	2
3	19ACE05	Strength of Materials-II	PC	2-1-0	3
4	19ACE06	Fluid Mechanics	PC	2-1-0	3
5	19ACE07	Engineering Geology	PC	2-1-0	3
6	19ACE09	Structural Analysis-I	PC	2-1-0	3
7	19ACE10	Surveying	PC	3-1-0	4
8	19ACE08	Engineering Geology Lab	PC	0-0-2	1
9	19ACE11	Surveying Lab	PC	0-0-3	1.5
10	19ABS14	Environmental Science	MC	3-0-0	0
				Total	**23.5**

B.Tech II Year II Semester

Semester - 4					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19ABS15	Numerical Methods, Probability and Statistics	BS	3-0-0	3
2	19ACE12	Water Resource Engineering -I	PC	2-1-0	3
3	19AME12	Hydraulics and Hydraulic Machinery	PC	2-1-0	3
4	19ACE13	Structural Analysis-II	PC	2-1-0	3
5	19ACE14	Concrete Technology	PC	2-1-0	3
6	19ACE16	Building Planning and Drawing	PC	1-2-0	3
7	19ACE15	Concrete Technology Lab	PC	0-0-2	1.0
8	19AME13	Fluid Mechanics and Hydraulic Machinery Lab	PC	0-0-3	1.5
9	19ACE17	Computer Aided Drafting Lab	PC	0-0-2	1.0
10	19AHS04	Constitution of India	MC	3-0-0	0
				Total	**21.5**

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B.Tech III Year I Semester

Semester - 5					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19ACE51	Soil Mechanics	PC	2-1-0	3
2	19ACE52	Highway Engineering	PC	2-1-0	3
3	19ACE53	Design of reinforced concrete structures	PC	3-0-0	3
4	19ACE54	Professional Elective I	PE	3-0-0	3
	19ACE54a	Remote Sensing and GIS			
	19ACE54b	Repair and Rehabilitation of Structures			
	19ACE54c	Water Resources Engineering-II			
5	19ACE55	Open Elective I (Interdisciplinary) - **ANNEXURE-I**	OE	3-0-0	3
6	19AHS14	Humanities Elective I	HS	3-0-0	3
	19AHS14a	MEFA			
	19AHS14b	Entrepreneurship & Innovation Management			
7	19ACE56	Soil Mechanics lab	PC	0-0-3	1.5
8	19ACE57	Highway Engineering lab	PC	0-0-2	1.0
9	19ACE59	Socially Relevant Project (30 hours/sem)	PR	-------	1.0
10	19AHS16	Organizational Behavior	MC	2-0-0	0
			Total :		**21.5**

B.Tech III Year II Semester

Semester - 6					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19AHS12	English Language Skills	HS	2-0-0	2
2	19ACE61	Foundation Engineering	PC	2-0-0	2
3	19ACE62	Design of Steel Structures	PC	2-1-0	3
4	19ACE63	Environmental Engineering	PC	2-1-0	3
5	19ACE64	Professional Elective II	PE	3-0-0	3
	19ACE64a	Advanced RCC			
	19ACE64b	Ground Improvement Techniques			
	19ACE64c	Transportation Engineering			
6	19ACE65	Open Elective II (Interdisciplinary) - **ANNEXURE-II**	OE	3-0-0	3
7	19AHS15	Humanities Elective II	HS	3-0-0	3
	19AHS15a	Management Science			
	19AHS15b	Business Environment			
8	19AHS13	English Language Skills lab	HS	0-0-3	1.5
9	19ACE66	Environmental engineering lab	PC	0-0-2	1
10	19AHS17	Research Methodology	MC	3-0-0	0
11	Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions *		PR	4 Weeks Summer Internship	
				Total	**21.5**

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B.Tech IV Year I Semester

Semester - 7					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	19ACE71	Estimating and costing	PC	3-0-0	3
2	19ACE72	Construction technology and Project Management	PC	3-0-0	3
3	19ACE73	Advanced Structural Engineering	PC	3-0-0	3
4	19ACE74	Professional Elective III	PE	3-0-0	3
	19ACE74a	Bridge Engineering			
	19ACE74b	Earthquake Resistant design of Structures			
	19ACE74c	Air pollution and control			
5	19ACE76	Professional Elective IV	PE	3-0-0	3
	19ACE76a	Advanced foundation Engineering			
	19ACE76b	Prestressed Concrete			
	19ACE76c	Design and Drawing of Irrigation Structures			
6	19ACE75	Open Elective III - **ANNEXURE-III**	OE	3-0-0	2
7	19ACE77	Computer aided drafting lab	PC	0-0-3	1.5
8	19ACE78	Industrial Training/ Internship/ Research Projects in National Laboratories/Academic Institutions *	PR	--------	2
9	19ACE79	Project Stage-I	PR	---------	2
				Total	**22.5**

B.Tech IV Year II Semester

Semester - 8					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1.	19ACE81	Professional Elective V /MOOCS	PE	3-0-0	3
2.	19ACE82	Open Elective IV/ MOOCS	OE	3-0-0	3
3.	19ACE89	Project Stage - II	PR	--------	6
					12

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ANNEXURE – I
Open Elective I (Interdisciplinary)

Branch	Subject Code	Subject
Humanities	19AHS10	Campus Recruitment Training & Soft Skills
Mathematics	19ABS20	Mathematical Modeling
	19ABS21	Fuzzy Set Theory, Arithmetic and Logic
	19ABS22	Number Theory
Physics	19ABS31	Sensors And Actuators for Engineering Applications
	19ABS32	Physics of Electronic Materials
Chemistry	19ABS41	Chemistry of Energy Materials
	19ABS42	Advanced Polymers and Their Applications
	19ABS43	Marine Chemistry
EEE	19AEE55a	Basics of Non-Conventional Energy Sources
	19AEE55b	Electrical Measurements & Sensors
	19AEE55c	Electric Vehicle Engineering
ME	19AME55a	Introduction to Hybrid and Electric Vehicles
	19AME55b	Rapid Prototyping
	19AME55c	Design for Manufacturing and Assembly
	19AME55d	Power Plant Operation and Control
	19AME55e	Smart Materials
	19AME55f	Supply Chain Management
ECE	19AEC55a	Fundamentals of Electronics and Communication Engineering
	19AEC55b	Transducers and Sensors
	19AEC55c	Principles of Communications
CSE	19ACS55a	Object Oriented Programming Concepts Through Java
	19ACS55b	Introduction to Internet Of Things
	19ACS55c	Introduction to Operating Systems

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ANNEXURE – II
Open Elective II (Interdisciplinary)

Branch	Subject Code	Subject Name
Humanities	19AHS11	Competitive &Spoken English
Mathematics	19ABS23	Integral Transforms And ITS Applications
	19ABS24	Numerical Analysis
	19ABS25	Optimization Techniques
Physics	19ABS33	Functional Nanomaterials For Engineers
	19ABS34	Materials Characterization Techniques
Chemistry	19ABS44	Green Chemistry and Catalysis for Sustainable Environment
	19ABS45	Chemistry of Nanomaterials and Applications
	19ABS46	Environmental Management and Audit
EEE	19AEE65a	Energy Conservation and Management
	19AEE65b	PLC & ITS Applications
	19AEE65c	System Reliability Concepts
ME	19AME65a	Automobile Electronics, Sensors & Drives
	19AME65b	Programming of Robots and Control
	19AME65c	Sensors in Intelligent Manufacturing
	19AME65d	Non-Conventional Sources of Energy
	19AME65e	NEMS & MEMS
	19AME65f	Optimization Techniques Through MAT lab
ECE	19AEC65a	Introduction to Microcontrollers & Applications
	19AEC65b	Principles of Digital Signal Processing
	19AEC65c	Introduction to Image Processing
CSE	19ACS65a	Introduction to Machine Learning
	19ACS65b	Introduction to Computer Networks
	19ACS65c	Web Design and Management

ANNEXURE – III-Open Elective III

Branch	Subject Code	Subject Name
CIVIL	19ACE75a	Architecture and town planning
	19ACE75b	Experimental stress analysis
	19ACE75c	Finite element methods
EEE	19AEE75a	Electrical engineering materials
	19AEE75b	Digital signal processors and applications
	19AEE75c	IOT applications in electrical engineering
ME	19AME75a	Special types of vehicles
	19AME75b	Six sigma and lean manufacturing
	19AME75c	Reverse engineering
	19AME75d	Energy auditing
	19AME75e	Introduction to composite materials
	19AME75f	Customer relationship management
ECE	19AEC75a	Embedded systems & IOT
	19AEC75b	Electronic instrumentation
	19AEC75c	Basics of VLSI design
CSE	19ACS75a	Mobile application development
	19ACS75b	Real time operating systems and applications
	19ACS75c	Fundamentals of block chain and applications

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF MATHEMATICS
I B.TECH – I SEMESTER (Common to all Branches of Engineering)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Linear Algebra and Calculus	3	1	-	4

COURSE OBJECTIVES	
1	This course will illuminate the students in the concepts of calculus and linear algebra.
2	To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

COURSE OUTCOMES	
CO1	develop the use of matrix algebra techniques that is needed by engineers for practical applications
CO2	Utilize mean value theorems to real life problems
CO3	familiarize with functions of several variables which is useful in optimization
CO4	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems
CO5	Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

Unit I: Matrix Operations and Solving Systems of Linear Equations **10 hrs**

Rank of a matrix by echelon form, solving system of homogeneous and non-homogeneous equations linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Unit II: Mean Value Theorems **06 hrs**

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin's theorems with remainders (without proof);

Unit III: Multivariable calculus **08 hrs**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers for three variables

Unit IV: Double Integrals **08 hrs**

Double integrals, change of order of integration, change of variables, areas enclosed by plane curves

Unit V: Multiple Integrals and Special Functions **08 hrs**

Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates, Beta and Gamma functions and their properties, relation between beta and gamma functions.

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.

References:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

1.

2.

3.

4.

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6.

7.

Python Programming

SEMESTER - I **L-T-P-C: 3-1-0-4**

Course Objectives:

1. To introduce programming through Visual programming tool - Scratch
2. To teach problem solving through Flow charting tool - Raptor
3. To elucidate problem solving through python programming language
4. To introduce function-oriented programming paradigm through python
5. To train in development of solutions using modular concepts
6. To teach practical Pythonic solution patterns

Unit – 1: Computer Fundamentals: What is a Computer? , Introduction to Operating systems, and Operational overview of a Central Processing Unit.
Introduction to Programming, Algorithms and Flowcharts: Programs and Programming,Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Classification of Programming languages,Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Learning Outcomes: Student should be able to

1. Know the basics of Computers and programming languages
2. Solve Computational problems
3. Apply Algorithmic approach to solving problems

Unit – 2: Flowchart design through Raptor

Flow chart symbols, Input/Output, Assignment, operators, conditional if, repetition, function and sub charts. Example problems(section 1) – Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD of 2 numbers, Factorial of a number, sum of even and sum of odd numbers between 1 to n.

Example problems (section 2) - Fibonacci number generation, prime number generation. Minimum, Maximum and average of n numbers, linear search, Binary Search.

Learning outcomes: Student should be able to

1. Select flowchart symbols for solving problems.
2. Develop basic flowcharts for performing Input, Output and Computations
3. Solve numerical problems using Raptor
4. Analyze problems by modular approach using Raptor

Text Book:

https://raptor.martincarlisle.com/

1. Download and Install Raptor software
2. Use the tool to draw flowcharts for the problems given.

Head of Computer Science & Engineering Department
JNTUA College of Engineering
PULIVENDULA-516 390

Unit – 3: Introduction to Python

Python – Numbers, Strings, Variables, operators, expressions, statements, String operations, Math function calls, Input/Output statements, Conditional If, while and for loops, User defined Functions, parameters to functions, recursive functions.

Learning outcomes

1. Interpret numbers, strings, variables, operators, expressions and math functions using Python Interactive Mode.
2. Solve simple problems using control structures, input and output statements.
3. Develop user defined functions (recursive and non-recursive).
4. Build Python programs for section 1 raptor flowcharts.
5. Develop Python programs for creating various graphical shapes using turtle graphics.

Text Book:

http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

Unit – 4: Data Structures and Idiomatic Programming in Python

Lists, Tuples, Dictionaries, Strings, Files and their libraries. Beautiful idiomatic approach to solve programming problems.

Learning outcomes: Student should be able to

1. Summarize the features of lists, tuples, dictionaries, strings and files.
2. Demonstrate best practices of "Beautiful Idiomatic Python".
3. Build Python programs for section 2 raptor flowcharts.

http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

Unit – 5: Event driven Programming

Turtle Bar Chart, Event Driven programming, Key press events, Mouse events, timer events, Turtle Graphics.

Learning outcomes: Student should be able to

1. Develop python programs to draw bar charts using turtle graphics.
2. Apply event driven programming and timers using Python

Text Books:

1. "Introduction to Python Programming" by Y. Daniel Liang, Georgia Southern University, Pearson Education, 2013.
2. "Computer Fundamentals and Programming in C" by Prof. P. Chenna Reddy, JNTUA, BSP Publications.
3. https://raptor.martincarlisle.com/
4. "A Practical Introduction toPython Programming" by Brian Heinold, Mount St Mary's University 2012.
5. "Introduction to Computation and Programming Using Python: with applications to understanding Data" by John. V. Guttag, 2nd Edition, the MIT Press.
6. "How to Think like a Computer Scientist: Learning with Python 3 documentation" by Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, 3rdEdition, 2012.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF PHYSICS
I B.TECH – I SEMESTER (common to CIVIL & MECH)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Engineering Physics	3	0	-	3

COURSE OBJECTIVES	
1	Understand the basic concepts of mechanics and oscillations in correlation to engineering application.
2	To familiarize the concepts of theoretical acoustics to practical use in engineering field. To explain the significance of ultrasound and its application in NDT for diversified engineering application.
3	To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
4	To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.
5	To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nanomaterials, their properties and applications in modern emerging technologies are to be elicited.

COURSE OUTCOMES	
CO1	**Identify** forces and moments in mechanical systems using scalar and vector techniques (L3). **Interpret** the equation of motion of a rigid rotating body (torque on a rigid body), Simple harmonic oscillators, Damped harmonic oscillator, Heavy, Forced oscillations , Resonance for consideration in designing technological applications. (L3)
CO2	**Explain** sound waves and its is propagation /interaction with construction material in design of buildings (L2). **Analyze** acoustic parameters of typically used materials in buildings (L4). **Recognize** sound level disruptors and their application in architectural acoustics (L2). **Identify** the use of ultrasonics in diversified fields of engineering (L3)
CO3	**Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** engineering applications of interference including homodyne and heterodyne detection (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary polarized light and extraordinary polarized light (L2)The different realms of physics and their applications in both scientific and technological systems are achieved through the study of physical optics.
CO4	**Explain** various types of emission of radiation (L2). **Identify** the role of laser in engineering applications (L3). **Describe** the construction and working principles of various types of lasers (L1). **Explain** the working principle of optical fibers (L2). **Classify** optical fibers based on refractive index profile and mode of propagation (L2). **Identify** the applications of optical fibers in medical, communication and other fields (L2). **Apply** the fiber optic concepts in various fields (L3).
CO5	**Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics (L2). **Classify** the magnetic

	materials based on susceptibility and their temperature dependence (L2). **Explain** the applications of dielectric and magnetic materials (L2). **Apply** the concept of magnetism to magnetic devices (L3) **Identify** the nano size dependent properties of nanomaterials (L2). **Illustrate** the methods for the synthesis and characterization of nanomaterials (L2). **Apply** the basic properties of nanomaterials in various Engineering branches (L3).

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS OF ENGINEERING PHYSICS

Unit-I: Introduction to Mechanics and Oscillations

Introduction to Mechanics and Oscillations-Basic laws of vectors and scalars-Rotational frames-Conservative forces – F = - grad V, torque and angular momentum – Simple harmonic oscillators-Damped harmonic oscillator-Heavy, critical and under damping- Energy decay in damped harmonic oscillator- Forced oscillations – Resonance.

Unit-II: Acoustics and Ultrasonics

Acoustics: Reverberation – Reverberation time– Sabine's formula (Qualitative) - Absorption coefficient and its determination –Factors affecting acoustics of buildings and their remedies.

Ultrasonics: Properties and Production by magnetostriction & piezoelectric methods - acoustic grating -Non Destructive Testing – pulse echo system through transmission and reflection modes - A,B and C – scan displays, Medical applications

Unit-III: Wave Optics

Interference-Principle of superposition –Interference of light – Conditions for sustained interference-interference in thin films- Colors in thin films-Newton's Rings-Determination of wavelength and refractive index- Applications

Diffraction- Fresnel and Fraunhofer diffraction-Fraunhofer diffraction due to single slit and double slit – Diffraction grating- Grating spectra-Applications

Polarization-Polarization by double refraction-Nicol's Prism--Half wave and Quarter wave plates-Applications.

Unit-IV: Lasers and Fiber optics

Lasers: Characteristics of laser – Spontaneous and stimulated emission of radiation – Einstein's coefficients – Population inversion – Pumping mechanisms – Nd:YAG laser – He-Ne laser – CO_2 Laser, Applications of lasers.

Fiber optics- Total Internal Reflection-Critical angle of propagation-Acceptance Angle-Numerical Aperture-Classification of fibers based on refractive index profile –Propagation of electromagnetic

wave through optical fibers – Modes -Importance of V-number-Fiber optic sensors (Pressure/temperature/chemical change)

UNIT V: Engineering Materials

Dielectric Materials: Dielectric polarization- Dielectric constant- Types of polarizations: Electronic, Ionic and Orientation Polarizations (Qualitative) - Lorentz (Internal) field- Clausius-Mosotti equation-Applications of Dielectrics: Ferroelectricity and Piezoelectricity.

Magnetic Materials: Magnetic dipole moment-Magnetization-Magnetic susceptibility and permeability- Origin of permanent magnetic moment -Classification of Magnetic materials-Hysteresis - Soft and hard magnetic materials-Applications.

Nanomaterials: Surface area and quantum confinement –Physical properties: electrical and magnetic properties- Synthesis of nanomaterials: Top-down: Ball Milling, Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

Prescribed Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company

2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.

Reference Books:

1. Engineering Physics – K.Thyagarajan, MacGraw Hill Publishers, 2016
2. Introduction to modern optics – Grant R Fowles
3. A text book on Optics – Brijlal & Subramanyam
4. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons
5. Introduction to Nanotechnology – C P Poole and F J Owens, Wiley
6. Engineering Physics – M.R.Srinivasan, New Age Publications
7. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
8. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
9. Engineering Physics – M. Arumugam, Anuradha Publications

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA

DEPARTMENT OF MECHANICAL ENGINEERING

(Common to all branches)

Subject Code	Title of the Subject	L	T	P	C
19A03102	Engineering Graphics	1	0	3	2.5

	COURSE OBJECTIVES
1	To bring awareness that Engineering Drawing is the Language of Engineers.
2	To familiarize how industry communicates technical information.
3	To teach the practices for accuracy and clarity in presenting the technical information.
4	To develop the engineering imagination essential for successful design.
5	To instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
6	To train the usage of 2D and 3D modeling.
7	To instruct graphical representation of machine components.

COURSE OUTCOMES	
CO1	**Draw** various curves applied in engineering.
CO2	**Show** projections of Lines, planes and solids..
CO3	**Draw** the sections of solids and development of surfaces of solids.
CO4	**Use** computers as a drafting tool.
CO5	**Draw** isometric and orthographic drawings.

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	1	3	1						1	1
CO2	3	3	1	3	1						1	1
CO3	3	3	1	3	1						1	1
CO4	3	3	1	3	1						1	1
CO5	3	2	1	3	1						1	1

UNIT – I:

Introduction to Engineering Graphics: Principles of Engineering Graphics and their significance – Conventions in drawing – Lettering – BIS conventions.

a) Conic sections including the rectangular hyperbola – general method only.
b) Cycloids, Epicycloids and Hypocycloids.
c) Involutes

(2L + 6P hrs)

1. V. Veeru Reddy
3. CWG
4. Bhanu
5. L. Tej Chandra Reddy
6. —
7. —
8. A. Damodar Reddy
9. MEG

UNIT – II:

Projection of Points, Lines and Planes: Projection of points in any quadrant, Lines inclined to one and both planes, Finding true lengths, Angle made by line. Projections of regular plane surfaces.

(2L + 6P hrs)

UNIT – III:

Projections of Solids: Projections of regular solids inclined to one and both planes by rotational and auxiliary views method.

Sections of Solids: Section planes and sectional view of right regular solids – Prism, Cylinder, Pyramid and Cone. True shapes of the sections. **(2L + 6P hrs)**

UNIT – V:

Development of Surfaces: Development of surfaces of right regular solids – Prism, Cylinder, Pyramid, Cone and their sectional parts. **(1L + 6P hrs)**

UNIT – V:

Orthographic Projections: Systems of projections, Conventions and Application to Orthographic Projections.

Isometric Projections: Principles of Isometric Projection – Isometric scale, Isometric views – Lines, Planes, Figures, Simple and Compound Solids. **(5L + 15P hrs)**

Text Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013.
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

I YEAR I SEMESTER
ENGINEERING WORKSHOP (19AME02)
(Common to CE, MECH & CSE)

L	T	P	C
0	0	3	1.5

Course Objectives:

- To bring awareness about workshop practices for Engineers.
- To familiarize how wood working operations can be performed.
- To teach the practices for sheet metal operations.
- To develop the technical skills related to fitting and electrical wiring.

Section 1 : Wood Working

Familiarity with different types of woods and tools used in wood working and make following joints

a) Half – Lap joint
b) Mortise and Tenon joint
c) Corner Dovetail joint or Bridle joint

Section 2 : Sheet Metal Working

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing

Section 3 : Fitting

Familiarity with different types of tools used in fitting and do the following fitting exercises

a) V-fit b) Dovetail fit c) Semi-circular fit
d) Bicycle tire puncture and change of two wheeler tyre

Section 4 : Electrical Wiring

Familiarities with different types of basic electrical circuits and make the following connections

a) Parallel and series b) Two way switch c) Godown lighting d) Tube light
e) Three phase motor f) Soldering of wires

Text Books:

1. K.Venkata Reddy., Workshop Practice Manual, 6/e BS Publications.
2. Kannaiah P. and Narayana K.L., Workshop Manual, 2/e, Scitech publishers.
3. John K.C., Mechanical Workshop Practice. 2/e, PHI 2010.

Course Outcomes:

At the end of this Course the student will be able to

- Apply wood working skills in real world applications. (L6)
- Apply fitting operations in various applications. (L6)
- Build different parts with metal sheets in real world applications. (L5)
- Demonstrate soldering and brazing. (L4)
- Apply basic electrical engineering knowledge for house wiring practice. (L6)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

Engineering Physics Laboratory

(Common to I B.Tech I Semester CIVIL & MECH)

L	T	P	C
0	0	3	1.5

Course Objectives:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

EXP No.1: Determination of the thickness of thin object using wedge shape method

Learning Outcomes:

At the end of this experiment, the student will be able to

- **Operates** optical instrument like travelling microscope **L2**
- **Estimate** the thickness of the wire using wedge shape method **L2**
- **Identifies** the formation of interference fringes due to reflected light from non-uniform thin film. **L2**

EXP No. 2 : Determination of the radius of curvature of the lens by Newton's rings

Learning Outcomes:

At the end of this experiment, the student will be able to

- **Operates** optical instrument like travelling microscope. **L2**
- **Estimate** the radius of curvature of the lens **L2**
- **Identifies** the formation of interference fringes due to reflected light from non-uniform thin film. **L2**
- **Plots** the square of the diameter of a ring with no. of rings **L3**

EXP No. 3: Determination of wavelengths of various spectral lines of mercury source using diffraction grating in normal incidence method

Learning Outcomes:

At the end of this unit, the student will be able to

- **Operates** optical instrument like spectrometer. **L2**
- **Estimate** the wavelength of the given source **L2**
- **Identifies** the formation of grating spectrum due diffraction. **L2**

EXP No. 4: Determination of dispersive power of grating.

Learning Outcomes:

At the end of this unit, the student will be able to

- **Operates** optical instrument like spectrometer. **L2**
- **Estimate** the refractive index and dispersive power of the given prism **L2**
- **Identifies** the formation of spectrum due to dispersion. **L2**

EXP No. 5: Determination of wavelength using diffraction grating by laser source.

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instrument **L2**
- **Estimate** the wavelength of laser source **L2**
- **Identifies** the formation of grating spectrum due diffraction. **L2**

EXP No. 6: Determination of particle size by laser source

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instrument **L2**
- **Estimate** the Particles size using laser **L2**
- **Identifies** the application of laser **L2**

EXP No. 7: Determination of numerical aperture and acceptance angle of an optical fiber

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the numerical aperture and acceptance angle of a given optical fiber. **L2**
- **Identifies** the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications **L2**

EXP No. 8: Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method.

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the magnetic field along the axis of a circular coil carrying current. **L2**
- **Plots** the intensity of the magnetic field of circular coil carrying current with distance **L3**

EXP No. 9: Study of B-H curve of Ferromagnetic material.

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instruments and connect them as per the circuit. **L2**
- **Estimate** the hysteresis loss, coercivity and retentivity of the ferromagnetic material **L2**
- **Classifies** the soft and hard magnetic material based on B-H curve. **L2**
- **Plots** the magnetic field H and flux density B **L3**

EXP No. 10: Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)

Learning Outcomes:
At the end of this unit, the student will be able to

- **Operates** various instruments **L2**
- **Estimate** the rigidity modulus of the given material **L2**
- **Identifies** the applications of Torsional pendulum **L2**

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand

Publishers, 2017
2. R. Padma Suvarna, K. Thyagarajan “Engineering Physics Practicals” – NU Age Publishing House.

Course Outcomes:

At the end of this Course the student will be able to

- **Operate** optical instruments like microscope and spectrometer **L2**
- **Determine** thickness of a hair/paper with the concept of interference **L2**
- **Estimate** the wavelength of different colors using diffraction grating and resolving power **L2**
- **Plot** the intensity of the magnetic field of circular coil carrying current with distance **L3**
- **Evaluate** the acceptance angle of an optical fiber and numerical aperture **L3**

Python Programming Laboratory

SEMESTER - I **L-T-P-C: 0-0-3-1.5**

1. Download and install the Python IDLE.
2. Construct flowcharts to
    a. Calculate the maximum, minimum and average of N numbers
    b. Develop a calculator to convert time, distance, area, volume and temperature from one unit to another
3. Construct flowcharts with separate procedures to
    a. calculate simple and compound interest for various parameters specified by the user
    b. calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user
4. Construct flowcharts with procedures to
    a. generate first N numbers in the Fibonacci series
    b. generate N Prime numbers
5. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)
6. *** Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
7. Design a flowchart to determine the number of characters and lines in a text file specified by the user
8. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
9. Design a Python script to determine if a given string is a Palindrome using recursion
10. Design a Python script to sort numbers specified in a text file using lists.
11. *** Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.
12. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
13. *** Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)
14. *** Design a Python Script to find the value of (Sine, Cosine, Log, PI, *e*) of a given number using infinite series of the function.
15. *** Design a Python Script to convert a given number to words
16. *** Design a Python Script to convert a given number to roman number.
17. *** Design a Python Script to generate the frequency count of words in a text file.
18. *** Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
19. *** Design a Python Script to implement Gaussian Elimination method.
20. *** Design a Python script to generate statistical reports(Minimum, Maximum, Count, Average, Sum etc) on public datasets.

21. *** Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorizing them into distinction, first class, second class, third class and failed.

Text Book:
http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf

Course outcomes: Student should be able to

1. Create interactive visual programs using Scratch. (L4)
2. Develop flowcharts using raptor to solve the given problems. (L4)
3. Develop Python programs for numerical and text based problems (L4)
4. Develop graphics and event based programming using Python (L4)
5. Develop Python programs using beautiful Pythonic idiomatic practices (L4)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) :: PULIVENDULA
DEPARTMENT OF MATHEMATICS
I B.TECH – II SEMESTER (Common to all Branches of Engineering)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Differential Equations and Vector Calculus	3	1	-	4

COURSE OBJECTIVES	
1	To enlighten the learners in the concept of differential equations and multivariable calculus
2	To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

COURSE OUTCOMES	
CO1	solve the differential equations related to various engineering fields
CO2	Identify solution methods for partial differential equations that model physical processes
CO3	interpret the physical meaning of different operators such as gradient, curl and divergence
CO4	estimate the work done against a field, circulation and flux using vector calculus

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

UNIT I: Linear Differential Equations of Higher Order

Definitions, complete solution, operator D, rules for finding complimentary function, inverse operator, rules for finding particular integral, method of variation of parameters.

UNIT II: Equations Reducible to Linear Differential Equations and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients, Applications: Mass spring system and L-C-R Circuit problems.

UNIT III: Partial Differential Equations **08 hrs**

First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

UNIT IV: Multivariable Calculus (Vector differentiation)

Scalar and vector point functions, gradient, divergent, curl and their properties (Identities and applications)

UNIT V: Multivariable Calculus (Vector integration)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof).

Textbooks:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

References:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
3. Michael Greenberg, Advanced Engineering Mathematics, 2/e, Pearson, 2018
4. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
5. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CHEMISTRY
I B.TECH – I SEMESTER (common to CE , ME & CHEMICAL)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
19A53101	Engineering Chemistry	3	0	-	3

COURSE OBJECTIVES	
1	To familiarize engineering chemistry and its applications
2	To impart the concept of soft and hard waters, softening methods of hard water
3	To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

COURSE OUTCOMES	
CO1	**list** the differences between temporary and permanent hardness of water, **explain** the principles of reverse osmosis and electrodialysis. **compare** quality of drinking water with BIS and WHO standards. **illustrate** problems associated with hard water - scale and sludge**. explain** the working principles of different Industrial water treatment processes
CO2	**apply** Nernst equation for calculating electrode and cell potentials, **apply** Pilling Bedworth rule for corrosion and corrosion prevention, **demonstrate** the corrosion prevention methods and factors affecting corrosion, **compare** different batteries and their applications
CO3	**explain** different types of polymers and their applications, **Solve the numerical problems based on Calorific value, select** suitable fuels for IC engines, **explain** calorific values, octane number, refining of petroleum and cracking of oils
CO4	explain the constituents of Composites and its classification Identify the factors affecting the refractory material, Illustrate the functions and properties of lubricants, demonstrate the phases and reactivity of concrete formation, identify the constituents of Portland cement, enumerate the reactions at setting and hardening of the cement
CO5	**summarize** the applications of SEM, TEM and X-ray diffraction in surface characterization, **explain** the synthesis of colloids with examples, **outline** the preparation of nanomaterials and metal oxides **identify** the application of colloids and nanomaterials in medicine, sensors and catalysis

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

Unit 1: Water Technology (8 hrs)

Introduction –Causes and types of hardness of water, Estimation of hardness of water by EDTA Method - Boiler troubles , Industrial water treatment (Ion exchange process, Internal treatment of water) specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, zeolite and ion-exchange processes - desalination of brackish water, reverse osmosis (RO) and electrodialysis.

Unit 2: Electrochemistry and Applications(10 hrs)

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zn-MnO_2 (Leclanche cell), Li Battery. Secondary cells – lead acid and lithium ion batteries- working of the batteries including cell reactions.

Fuel cells- Basic Principles and Working Principles of hydrogen-oxygen, methanol -oxygen fuel cells, Applications of Fuel cells.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry corrosion, Pilling Bedworth rule and uses, Factors affecting corrosion, Corrosion Control -cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Unit 3: Polymers and Fuel Chemistry:(12 hrs)

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth and coordination polymerization,

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of PVC and Bakelite, Biodegradable polymers

Fuels – Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal, Liquid Fuels refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane numbers, cracking of oils; alternative fuels- propane, methanol and ethanol, bio fuels.

UNIT-4 Basic Engineering Materials(8Hrs)

(i)Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

(ii)Refractories- Classification, Properties, Factors affecting the refractory materials and Applications

(iii)Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils and Applications

(iv)Building materials- Portland Cement, constituents, phases and reactivity of clinker, Setting and Hardening of cement.

Unit 5: Surface Chemistry and Applications (10 hrs)

Introduction to surface chemistry, colloids, micelle formation, synthesis of colloids (any two methods with examples), chemical and electrochemical methods (not more than two methods) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, solid-gas interface, solid-liquid interface, adsorption isotherm, applications of colloids and nanomaterials – catalysis, medicine, sensors.

Text Books:

1. Engineering Chemistry by KNJayaveera, GVSubba Reddy and C. Ramachandraiah, McGraw Hill Higher Education, Foruth Edition, New Delhi
2. A Text Book of Engineering Chemistry, Jain and Jain, Dhanapathi Rai Publications, New Delhi

References:

1. 1. A Text book of Engineering Chemistry by K. Sesha Maheswaramma and Mridula Chugh, Pearson's Publications Pvt. Ltd., (PAN India Title)
2. A Text book of Engineering Chemistry by SS Dhara, S. Chand Publications, New Delhi
3. Engineering Chemistry by K.B.Chandra Sekhar, UN.Das and Sujatha Mishra, SCITECH Pubblications India Pvt Limited.
4. A Text book of Engineering Chemistry by Prasanta Rath, B. Rama Devi, Ch.Venkata Ramana Reddy and Subhendu Chakroborty, Cengage learning India Pvt.Ltd.
5. Chemistry of Engineering Materials, C.V.Agarwal, C.Parameswaramurthy and Andranaidu
6. Text Book of Engineering Chemistry, Shashichawla, Dhanapathirai Publications.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CHEMISTRY
I B.TECH – I SEMESTER (common to CE, ME & CHEMICAL)
(ENGINEERING CHEMISTRY LAB)

Subject Code	Title of the Lab	L	T	P	C
19A53103	Engineering Chemistry lab	-	-	4	2

COURSE OBJECTIVES	
1	Verify the fundamental concepts with experiments

COURSE OUTCOMES	
CO1	**determine** the cell constant and conductance of solutions (L3)
CO2	**prepare** advanced polymer materials (L2)
CO3	**determine** the physical properties like surface tension, adsorption and viscosity (L3)
CO4	**estimate** the Iron and Calcium in cement (L3)
CO5	**calculate** the hardness of water (L4)

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

LIST OF EXPERIMENTS

1. Determination of Hardness of a groundwater sample.
2. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of a polymer
7. Determination of percentage of Iron in Cement sample by colorimetry
8. Estimation of Calcium in port land Cement
9. Adsorption of acetic acid by charcoal
10. Determination of percentage Moisture content in a coal sample
11. Determination of Viscosity of lubricating oil by Red Wood Viscometer 1
12. Determination of Flash and Fire points of fuels
13. Determination of Calorific value of gases by Junker's gas Calorimeter

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson Education.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA - 516390, A.P, INDIA.
HUMANITIES & SOCIAL SCIENCES DEPARTMENT

COMMUNICATIVE ENGLISH - 1

Subject Code	Title of the Subject	L	T	P	C
	Communicative English - 1	2	0	0	2

COURSE OBJECTIVES	
1	Facilitates effective listening skills for better comprehension of academic lectures and English spoken by native speakers.
2	Helps to improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations.
3	Imparts effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information.
4	Provides knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing.

COURSE OUTCOMES	
CO1	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
CO2	Apply grammatical structures to formulate sentences and correct word forms
CO3	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO4	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO5	Create a coherent paragraph interpreting a figure/graph/chart/table

Introduction

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. On successful completion of the compulsory English language course/s in B.Tech., learners would be confident of appearing for international language qualification/proficiency tests such as IELTS, TOEFL, or BEC, besides being able to express themselves clearly in speech and competently handle the writing tasks and verbal ability component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

Unit 1

Lesson: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions. **Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others. **Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information. **Reading for Writing :**Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of the module, the learners will be able to

- understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
- ask and answer general questions on familiar topics and introduce oneself/others
- employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
- recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
- form sentences using proper grammatical structures and correct word forms

Unit 2

Lesson: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts. **Speaking:** Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together. **Writing:** Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters. **Grammar and Vocabulary:** Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of the module, the learners will be able to

- comprehend short talks on general topics
- participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
- understand the use of cohesive devices for better reading comprehension
- write well structured paragraphs on specific topics
- identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit 3

Lesson: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to. **Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed **Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension. **Writing:** Summarizing - identifying main idea/s and rephrasing what is read; avoiding redundancies and repetitions. **Grammar and Vocabulary:** Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

At the end of the module, the learners will be able to

- comprehend short talks and summarize the content with clarity and precision
- participate in informal discussions and report what is discussed
- infer meanings of unfamiliar words using contextual clues
- write summaries based on global comprehension of reading/listening texts
- use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit4

Lesson: Inspiration: Chindu Yellamma

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video. **Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions. **Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data. **Writing:** Information transfer; describe, compare, contrast, identify significance/trends based on information provided in figures/charts/graphs/tables. **Grammar and Vocabulary:** Quantifying expressions - adjectives and adverbs; comparing and contrasting; degrees of comparison; use of antonyms

Learning Outcomes

At the end of the module, the learners will be able to

- infer and predict about content of spoken discourse
- understand verbal and non-verbal features of communication and hold formal/informal conversations
- interpret graphic elements used in academic texts
- produce a coherent paragraph interpreting a figure/graph/chart/table
- use language appropriate for description and interpretation of graphical elements

Unit 5
Lesson: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension. **Speaking:** Formal oral presentations on topics from academic contexts - without the use of PPT slides. **Reading:** Reading for comprehension. **Writing:** Writing structured essays on specific topics using suitable claims and evidences. **Grammar and Vocabulary:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Learning Outcomes
At the end of the module, the learners will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Prescribed Text:

1. English all round: Communication Skills for Undegurdation Learners Vol. I, Orient BlackSwan Publisers, First Edition 2019, Authored by Y.Prabhavathi, M.Lalitha Sridevi and Ruth Z Hauzel.

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- Oxford Learners Dictionary, 12th Edition, 2011.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CIVIL ENGINEERING
I B.TECH – II SEMESTER (R19)

Subject Code	Title of the Subject	L	T	P	C
	STRENGTH OF MATERIALS-I	3	1	--	4

OBJECTIVE: *The subject provides the knowledge how to resolve forces and moments in a given system, analyze various types of friction for moving bodies, determine the centroid and second moment of area, simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.*

COURSE OUTCOMES	
CO1	Understand the frictional forces on bodies
CO2	Determine the centroid and moment of inertia for different cross-sections
CO3	Understand the concepts of stress, strain, generalized Hooke's law, elastic moduli and strain energy.
CO4	Develop shear force and bending moment diagrams for different load cases.
CO5	Compute the flexural stresses for different load cases and different cross-sections.

UNIT-I

Introduction to Mechanics: Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space Resultant -Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial systems- Analysis of trusses by Method of Joints & Sections- **Friction**: Types of friction -Limiting friction -Laws of Friction -static and Dynamic Frictions -Motion of Bodies.

UNIT-II

Centroid and Center of Gravity: Introduction – Centroids of rectangular, circular, I, L and T sections - Centroids of built up sections. **Area moment of Inertia**: Introduction – Definition of Moment of Inertia of rectangular, circular, I, L and T sections - Radius of gyration. Moments of Inertia of Composite sections.

UNIT – III

Simple Stresses and Strains:

Types of stresses and strains – Hooke's law – Stress – strain diagram for mild steel – working stress – Factor of safety – lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of Varying section – Composite bars – Temperature stresses. Strain energy – Resilience – Gradual, Sudden, impact and shock loadings – simple applications.

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UNIT – IV

Shear Force and Bending Moment:

Definition of beam – types of beams – Concept of Shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and over changing beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – point of contra flexure – Relation between S.F, B.M and rate of loading at section of a beam.

UNIT – V

Flexural Stresses:

Theory of simple bending – Assumptions – Derivation of bending equation: $M/I = f/Y = E/R$ – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hallow), I, T, Angle and Channel Sections – Design of simple beam sections.

TEXT BOOKS:

1. R.K Bansal, Engineering Mechanics, Lakshmi Publications 6th edition.
2. R. Subramanian, Strength of Materials, Oxford University Press 3rd edition.

REFERENCES:

1. Shesagiri Rao, Engineering Mechanics, Universities Press, Hyderabad.
2. S. Timoshenko, Strength of Materials, elementary theory and problems, Part-1 3rd edition.
3. R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd.
4. Sadhu Singh, Strength of Materials, Khanna Publishers 11th edition 2015.

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YSR(KADAPA) Dist 516 390, (A.P) INDIA
I B.TECH – II SEMESTER (R19)

Subject Code	Title of the Subject	L	T	P	C
	BUILDING MATERIALS AND CONSTRUCTION	3	1	--	4

OBJECTIVES: *To give the students a basic idea about the traditional and modern construction materials a brief knowledge on building components and its construction methodologies.*

COURSE OUTCOMES	
CO1	Identify and characterize the properties of various building materials.
CO2	Be aware of various Traditional, Organic and Modern building materials emerging materials in the field of civil engineering construction.
CO3	Understand the manufacturing process of various building materials like stones, Bricks, Ceramics, Glass and Plastic.
CO4	Understand the basic principles of low-cost, Alternate and Sustainable materials and capable to practice Eco friendly Civil engineering materials.
CO5	Analyze and design the masonry buildings using IS-code provisions.

UNIT – I
INTRODUCTION TO BUILDING MATERIALS
Traditional & Organic Building Materials – Stone – Dressing of Stones – Modern Building Materials – Bricks – Manufacturing process – Ceramic Products – Manufacturing Process – Building Materials for Low Cost Housing – Utilisation of Wastes for Alternative Building Materials –Sustainable Materials in Construction, Concepts of energy efficient building envelopes as per ECBC – National Standards.

UNIT – II
GLASS:
Introduction to Fenestration - Functions of Glass in Buildings – Constituents and Classification of Glass – Manufacturing Process –Properties of Glass – Common Types of Glass – Special Glass – Advantages and Disadvantages of Glass – National Standards such as ECBC.
PLASTIC:
Introduction – Polymerisation – Classification of Plastics – Commonly Used Plastics – Moulding and Fabricating for Plastic Products – Applications – Advantages – Disadvantages – Intelligent Use of Plastics in Buildings – National Standards such as ECBC.

UNIT – III
INSULATING MATERILAS
Thermal Insulating Materials: Introduction – Thermal Insulation – Heat Transfer Fundamentals – Thermal Properties of Insulating Materials – Selection of Insulating Materials – Classification of Insulation materials – Reflective Insulation Systems – Commonly Used Building Insulation Materials – Insulation that Should not be Used – National Standards such as ECBC.

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Sound Insulating Materials: Introduction – Basics of Acoustics – Sound Absorption or Insulation – Green Insulation – Cool Roof, Green Roof, Power Roof – National Standards such as ECBC.

UNIT – IV

STRUCTURAL COMPONENTS:–

Foundations – classification of Foundations – consideration in selection of foundation types – Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards such as ECBC.

UNIT – V

INTERNAL CONSTRUCTION AND FINISHES

Internal elements – Internal walls – Construction joints – Internal walls, fire protection – separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door sets – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints – Emulsion Paints – Whitewash and Colourwash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards such as ECBC.

TEXT BOOKS:

1. Building Material by S K Duggal – New Age International Publishers Fifth Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd Eleventh Edition., New Delhi
3. A Textbook on Building Construction by S.K.Sharma, S.Chand Pubilishers.
4. Building Materials by M.L.Gambhir, TMH Pubilishers.
5. ECBC (Energy Conservation Building Code).

REFERENCES:

1. Building construction by W.B.Mckay, Vol. I, II, III & IV Pearson Publications, 2013 edition.
2. R.Chudly "Construction Technology – Volumes I and II" 2nd Edition, Longman, UK, 1987.
3. Building materials by S.C.Rangawala, Charotar Pubilishing House, Anand- INDIA.
4. Building Construction by S.C.Rangawala, Charotar Pubilishing House, Anand-INDIA
5. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
6. BEE (Bureau of Energy Efficiency) Manuals on Energy efficient building envelope concepts.

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COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA - 516390, A.P, INDIA.
HUMANITIES AND SOCIAL SCIENCES DEPARTMENT

COMMUNICATIVE ENGLISH - 1 LAB

Subject Code	Title of the Subject	L	T	P	C
	Communicative English - 1 Lab	0	0	2	1

COURSE OBJECTIVES	
1	To expose the students to variety of self-instructional, learner friendly modes of language learning.
2	To help the students cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
3	To enable them to learn better pronunciation through stress, intonation and rhythm.
4	To train them to use language effectively to face interviews, group discussions, public speaking.
5	To initiate them into greater use of the computer in resume preparation, report writing, format making etc.

COURSE OUTCOMES	
CO1	To remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
CO2	To apply communication skills through various language learning activities.
CO3	To analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
CO4	To evaluate and exhibit acceptable etiquette essential in social and professional settings.
CO5	To create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Unit 1

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Learning Outcomes

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2

1. JAM
2. Small talks on general topics
3. Debates

Learning Outcomes

At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit 3

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

Learning Outcomes

At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit4

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Learning Outcomes

At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit 5

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

Learning Outcomes

At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

Suggested Software

- Young India Films
- Walden Infotech
- Orell

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CHEMISTRY
I B.TECH – I SEMESTER (common to CE& ME)
(ENGINEERING CHEMISTRY LAB)

Subject Code	Title of the Lab	L	T	P	C
19A53103	Engineering Chemistry lab	-	-	4	2

COURSE OBJECTIVES	
1	Verify the fundamental concepts with experiments

COURSE OUTCOMES	
CO1	**determine** the cell constant and conductance of solutions (L3)
CO2	**prepare** advanced polymer materials (L2)
CO3	**determine** the physical properties like surface tension, adsorption and viscosity (L3)
CO4	**estimate** the Iron and Calcium in cement (L3)
CO5	**calculate** the hardness of water (L4)

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

LIST OF EXPERIMENTS

1. Determination of Hardness of a groundwater sample.
2. pH metric titration of (i) strong acid vs. strong base, (ii) weak acid vs. strong base
3. Determination of cell constant and conductance of solutions
4. Potentiometry - determination of redox potentials and emfs
5. Determination of Strength of an acid in Pb-Acid battery
6. Preparation of a polymer
7. Determination of percentage of Iron in Cement sample by colorimetry
8. Estimation of Calcium in port land Cement
9. Adsorption of acetic acid by charcoal
10. Determination of percentage Moisture content in a coal sample
11. Determination of Viscosity of lubricating oil by Red Wood Viscometer 1
12. Determination of Flash and Fire points of fuels
13. Determination of Calorific value of gases by Junker's gas Calorimeter

TEXT BOOKS:

1. Vogel's Text book of Quantitative Chemical Analysis, Sixth Edition – J. Mendham et al, Pearson Education.
2. Chemistry Practical – Lab Manual by Chandra Sekhar, GV Subba Reddy and Jayaveera

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CIVIL ENGINEERING
I B.TECH – II SEMESTER (R19)

Subject Code	Title of the Subject	L	T	P	C
	Civil Engineering Workshop	0	0	3	1.5

1) Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape only.

2) Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape and cross staff.

3) Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.

4) Construct a wall of height 50 cm and wall thickness 2 bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.

5) Computation of Centre of gravity and Moment of inertia of a given rolled steel section by actual measurements.

6) Installation of plumbing and fixtures like Tap, T-Joint, Elbow, Bend, Threading etc;

7) Plastering and Finishing of wall

8) Application of wall putty and painting a wall

9) Application of base coat and laying of Tile flooring of one square meter

10) Preparation of soil cement blocks for masonry and testing for compressive strength

11) Casting and testing of Fly ash Blocks

12) Preparation of cover blocks for providing cover to reinforcement

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DEPARTMENT OF CIVIL ENGINEERING
I B.TECH – II SEMESTER (R19)

Subject Code	Title of the Lab	L	T	P	C
	STRENGTH OF MATERIALS LAB	0	0	3	1.5

OBJECTIVE: *The object of the course to make the student to understand the behaviour of materials under different types of loading for different types structures.*

COURSE OUTCOMES	
CO1	To acquire the knowledge and behaviour in finding the properties of different materials
CO2	An ability to understand the testing procedure of mild steel, HYSD specimens.
CO3	To know the hardness number of different materials
CO4	To know the shear resistance capacity, torsion resistance of mild steel specimens
CO5	Ability to know how to test the strength of wood specimen.

LIST OF EXERCISES:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test.
5. Hardness test.
6. Spring test.
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

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B.Tech – II-I SEM (R19)

L	T	P	C
3	0	0	3

COMPLEX VARIABLES, TRANSFORMS & APPLICATIONS TO PARTIAL DIFFERENTIAL EQUATIONS

(Common to MECH & CIVIL)

Course Objective:
This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The aim is to analyze the solutions of partial differential equations.

Unit-I: Complex Variables – Differentiation:

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations in Cartesian and Polar coordinates (without proof), analytic functions, harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method.

Properties of elementary functions of exponential, trigonometric, hyperbolic, and logarithm. Conformal mappings-standard and special transformations (z^2, sin z, cos z, e^z, lnz) Mobius transformations (bilinear) and their properties.

Unit Outcomes:
Students will be able to

- Understand functions of Complex variable and its properties.
- Find derivatives of complex functions.
- Understand the analyticity of complex functions.
- Understand the conformal mappings of complex functions.

Unit-II: Complex Variables – Integration:

Line integral-Contour integration, Cauchy's integral theorem (with proof), Cauchy Integral formula, generalized Cauchy Integral formula (All theorems without Proof).

Power series expansions: Taylor's series and Laurent's series (without proof); zeros of analytic functions, singularities.

Residues: Evaluation of residue by formula and by Laurent's series, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi-circle with f(z) not having poles on real axis).

Unit Outcomes:

Students will be able to

- Understand the integration of complex functions.
- Apply Cauchy's integral theorem and Cauchy's integral formula.
- Understand singularities of complex functions.
- Evaluate improper integrals of complex functions using Residue theorem.

Unit-III: Laplace Transforms

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Unit Outcomes:

Students will be able to

- Understand the concept of Laplace transforms and finds the Laplace transforms of elementary functions.
- Find the Laplace transforms of general functions using its properties.
- Understand Laplace transforms of special functions (Unit step function, Unit Impulse & Periodic).
- Apply Laplace transforms to solve Differential Equations.

Unit-IV: Fourier series &Fourier transforms

Fourier Series : Fourier coefficients (Euler's formulae) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions.

Fourier Integrals & Fourier Transforms: Fourier integral theorem (without proof) – Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem – Finite Fourier Sine and Cosine transforms.

Unit Outcomes:

Students will be able to

- Understand finding Fourier series expression of the given function.
- Determine Fourier coefficients (Euler's) and identify existence of Fourier series of the given function.
- Expand the given function in Fourier series given in Half range interval.
- Find Fourier Sine and cosine integrals.
- Understand Fourier transforms.
- Apply properties of Fourier transforms.

Unit-V: Partial Differential Equations & Applications

Solution of PDEs by Method of separation of variables –Solutions of one dimensional wave equation, one dimensional heat equation and Laplace equation in two dimensions under initial and boundary conditions.

Unit Outcomes:

Students will be able to

- Understand the method of separation of variables.
- Solve applications of Partial Differential Equations.

Course Outcomes:

After the completion of course, students will be able to

- Understand the analyticity of complex functions and conformal mappings.
- Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
- Understand the usage of Laplace Transforms.
- Evaluate the Fourier series expansion of periodic functions.
- Formulate/solve/classify the solutions of Partial differential equations and also find the solution of one dimensional wave equation and heat equation.

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V.Ramana, "Higher Engineering Mathematics", McGraw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

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COLLEGE OF ENGINEERING PULIVENDULA(AUTONOMOUS) -PIN: 516390(A.P.)

L	T	P	C
2	0	0	2

UNIVERSAL HUMAN VALUES

OBJECTIVES

- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values and Loyalty
- To appreciate the rights of Others

Unit I: HUMAN VALUES

Morals, Values and Ethics-Integrity-Work Ethic-Service learning – Civic Virtue – Respect for others – Living Peacefully – Caring – Sharing – Honesty - Courage- Co Operation – Commitment – Empathy –Self Confidence Character – Self interest - Spirituality, Moral dilemmas- Consensus and controversy.

Unit II: PERSONALITY DEVELOPMENT

Concept of personality, types of personalities, Knowing of self(SWOT), improving personality – techniques, interpersonal skills, intrapersonal skills, building right attitude, developing the spirit of universal human goodness.

Unit III: ENGINEERING AS SOCIAL EXPERIMENTATION AND

Engineering As Social Experimentation – Framing the problem – Determining the facts – Codes of Ethics – Clarifying Concepts – Application issues – Common Ground - General Principles – Utilitarian thinking respect for persons.

RESPONSIBILITY FOR SAFETY AND RISK

Safety and risk – Assessment of safety and risk – Risk benefit analysis and reducing risk- Safety and the Engineer- Designing for the safety.

UNIT IV: UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY.

Understanding Harmony in the family – the basic unit of human interaction, Understanding the meaning of Vishwas; Difference between intention and competence, Understanding the harmony

in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astitva as comprehensive Human Goals, Visualizing a universal harmonious order in society- Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha)- from family to world family.

UINIT V: GLOBAL ISSUES

Globalization – Cross culture issues- Environmental Ethics – Computer Ethics – Computers as the instrument of Unethical behavior – Computers as the object of Unethical acts – Autonomous Computers- Computer codes of Ethics – Weapons Development - Ethics and Research – Analyzing Ethical Problems in research – Intellectual property Rights(IPR).

Outcomes:

- Identify and analyze an ethical issue in the subject matter under investigation or in a relevant field.
- Identify the multiple ethical interests at stake in a real-world situation or practice.
- Articulate what makes a particular course of action ethically defensible.
- Assess their own ethical values and the social context of problems.
- Identify ethical concerns in research and intellectual contexts, including academic integrity, use and citation of sources, the objective presentation of data, and the treatment of human subjects.
- Demonstrate knowledge of ethical values in non-classroom activities, such as service learning, internships, and field work.
- Integrate, synthesize, and apply knowledge of ethical dilemmas and resolutions in academic settings, including focused and interdisciplinary research.

Text Books

1. "**Engineering Ethics"** by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.
2. **Engineering Ethics includes Human Values**" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.
3. **"Ethics in Engineering"** by Mike W. Martin and Roland Schinzinger – Tata McGraw-Hill– 2003.
4. **"Professional Ethics and Morals**" by Prof.A.R.Aryasri, Dharanikota Suyodhana-Maruthi Publications.
5. **"Professional Ethics and Human Values**" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.
6. **"Indian Culture, Values and Professional Ethics"** by PSR Murthy-BS Publication.

7. **"Professional Ethics and Human Values"** by Prof.D.R.Kiran.

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B.Tech (R-19 Civil Engineering)
Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	STRENGTH OF MATERIALS – II	2	1	--	3

Course Objectives

1) To teach the student with basic concepts for determination of principal stresses and strains in various structural elements.
2) To demonstrate analytical methods for determining strength & stiffness and assess stability of structural members.
3) To make the student analyze circular shafts subjected to torsion
4) To make the student determine critical loads for columns with different end conditions.

UNIT-I

SHEAR STRESSES: Derivation of formula for Shear stress distribution – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections.

Compound Stresses and Strains:

Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, and its applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain.

UNIT -II

Deflection of Beams:

Uniformbending – slope, deflection and radius of curvature – Differential equation for elastic line of a beam – Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. uniformly varying load-Mohr's theorems – Moment area method – application to simply supported and overhanging beams-

Propped cantilevers:

Analysis of propped cantilever beams under UDL and point loads.

UNIT -III

Torsion:

Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft – Torsional moment of resistance – Polar section modulus – power transmission through shafts – Combined bending and torsion –. Springs -Types of springs – deflection of close coiled helical springs under axial pull and axial couple – Carriage or leaf springs.

UNIT -IV

Direct and Bending stresses:

Introduction-eccentric loading – Columns with eccentric loading – Symmetrical columns with eccentric loading about one axis –about two axes – Unsymmetrical columns with eccentric loading – limit of eccentricity.

Theories of failure:

Maximum Principal stress theory- Maximum shear stress theory- Maximum strain theory- Maximum strain energy theory-Maximum distortion energy theory

UNIT -V

Columns and Struts:

Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Eccentric loading and Secant formula - Prof. Perry's formula.

TEXT BOOKS:

1. Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.
2. Strength of Materials by R.K Rajput, S.Chand& Company Ltd.
3. Strength of materials by Dr. Sadhu Singh, Khanna Publishers.

REFERENCES:

1) R. K. Bansal, A Text book of Strength of materials, Laxmi Publications (P) Ltd., New Delhi.

2) Strength of Materials, Fourth edition, S.S. Bhavikatti, Vikas Publishing House, Pvt. Ltd.

3) D. S. Prakasa Rao Strength of Materials by, Universities Press Pvt Ltd, Hyderabad.

4) Schaum's outline series Strength of Materials, McGraw hill International Editions.

5) L.S. Srinath, Strength of Materials, Macmillan India Ltd., New Delhi.

6) S. Basavarajaiah and P. Mahadevappa, Strength of Materials in SI units, Universities Press Pvt Ltd,Hyderabad. 3rd Edition 2010.

Course Outcomes:

On completion of the course, the student will be able to:

- Understand principal stresses and principal planes.
- Determine deflection at any point on a beam under simple and combined loads
- Analyze members under torsion, deformation in springs,
- Know the effect of eccentricity of load in columns, apply failure criteria to implement in design of structural members.
- Know the crippling load for the columns.

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B.Tech (R-19 Civil Engineering)

Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	FLUID MECHANICS	2	1	0	3

Course Objectives:

To explain concepts of fluid mechanics used in Civil Engineering.

1) To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
2) To impart ability to solve engineering problems in fluid mechanics
3) To enable the students measure quantities of fluid flowing in pipes, tanks and channels
4) To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
5) To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

UNIT -I:

Basic concepts and definitions:

Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapor pressure, boiling point, surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Fluid statics:

Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer, pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

UNIT -II:

Fluid kinematics:

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three -dimensional continuity equations in Cartesian coordinates.

UNIT -III:

Fluid Dynamics:

Surface and body forces; Equations of motion - Euler`s equation; Bernoulli`s equation – derivation; Energy Principle; Practical applications of Bernoulli`s equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

UNIT -IV:

Analysis Of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length - Pipes in Parallel and Series.

Unit-V

DIMENSIONAL ANALYSIS: Introduction, dimensions Dimensional homogeneity, Methods of dimensional analysis- Rayleigh's method Buckingham Pi theorem, model analysis, similitude-types of similarities. Model laws partially submerged objects types of models, Scale effect

BOUNDARY LAYER THEORY & DRAG AND LIFT: Boundary layer - concepts, Prandtl's contribution, Characteristics of boundary layer along a thin flat plate laminar and turbulent Boundary layers, separation of BL, expression for drag and lift Lift and Drag Coefficients, pressure drag and friction drag.

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.

REFERENCES:

1. Fluid Mechanics and Hydraulic Machines, S.C.Gupta, Pearson publication
2. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi.
3. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill
4. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
5. K. Subramanya, Open Channel flow, Tata Mc.Grawhill Publishers.

6.S K SOM and G Biswas, "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw Hill,New Delhi

Course Outcomes:

At the end of the course, the student will be able to:

- Understand the principles of fluid statics, kinematics and dynamics
- Familiarize basic terms used in fluid mechanics
- Understand flow characteristics and classify the flows
- Apply the continuity, momentum and energy principles
- Estimate various losses in flow through channels

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	ENGINEERING GEOLOGY	3	0	0	3

OBJECTIVES: *Theobjectives of this is to give the basic knowledge of Geology that is required for construction of various Civil Engineering Structures. The syllabus includes the basics of Geology. Geological hazard's and gives a suitable picture on the Geological aspects that are to be considered for the planning and construction of major Civil Engineering projects.*

COURSE OUTCOMES	
CO1	The students would have the knowledge of principles of engineering geology.
CO2	The students would have the knowledge of properties of soil, various rocks and minerals
CO3	The students would be able to judge the suitability of sites for various civil engineering structures.
CO4	The students would exhibit the ability to use the knowledge of geological strata in the analysis and design the civil engineering structures.
CO5	The students would have the knowledge for deciding the suitability of water and soil conservation projects.

UNIT – I

INTRODUCTION:

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS : Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"

MINERALOGY:

Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT – II

PETROLOGY:

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous, Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY:

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT – III

GROUND WATER,EARTH QUAKE &LAND SLIDES:-

Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT –IV

GEOPHYSICAL STUDIES:-

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivitymethods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT – V

GEOLOGY OF DAMS,RESERVOIRS AND TUNNELS :

Types of dams and importance of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

TEXT BOOKS:

1) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005

2) Engineerring Geology by VasudevKanthi, Universities press, Hyderabad.

REFERENCES:

1. Engineerring geology by Prabinsingh, KatsonPubilcations
2. Engineering geology by Duggal, TMH Publishers.
3. Engineering Geology by SubinoyGangopadhyay, Oxford University press.
4. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
5. K. S. Valdiya, " Environmental Geology",, Tata McGraw Hill.

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	STRUCTURAL ANALYSIS – I	2	1	0	3

OBJECTIVE: *To make the students to understand the principles of analysis of structures of static and moving loads by various methods.*

COURSE OUTCOMES	
CO1	Ability to understand the concepts of various classical methods for indeterminate structures.
CO2	Ability to analyse whether a structures is statically determinate or in-determinates.
CO3	Ability to analyse statically determinate trusses, beams and frames and obtain internal reactions.
CO4	Ability to determine shear and moment functions and diagrams for beams for beam structures.
CO5	Ability to evaluate deflection of beams and frames using classical methods.

UNIT – I

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT – II

ANALYSIS OF INDETERMINATE STRUCTURES : Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's theorem.

UNIT – III

FIXED BEAMS & CONTINUOUS BEAMS : Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT – IV

SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations-application to continuous beams with and without settlement of supports- Analysis of single bayportal frames without sway.

UNIT – V

MOMENT DISTRIBUTION METHOD: Introduction to moment distribution method-Application to continuous beams with and without settlement of supports-Analysis of single bay storey portal frames without sway.

TEXT BOOKS:

(1) Analysis of Structures – Vol-I&II by V.N.Vazirani&M.M.Ratwani, Khanna Publications, New Delhi.
(2) Structural Analysis by S SBhavikatti – Vikas Publishing House.
(3) Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

REFERENCES :

(1) Structural analysis – Hibbler – Pearson education
(2) Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
(3) Structural Analysis – D.S.Prakasarao - Univeristy press.
(4) Introduction To Structural Analysis-Nautial- New Age Pubilishers
(5) Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, NewDelhi.
(6) Structual analysis Vol.I and II by Dr. R.Vaidyanathan and Dr.PPerumal – Laxmi publications.
(7) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	SURVEYING	3	1	--	4

Course Objectives:

- To make the student to get well conversant with the fundamentals of various basic methods and instruments of surveying.
- To introduce to the students in identifying reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings.
- To make the student to use angular measuring instruments for horizontal and vertical control.
- To enable the student to set simple horizontal curves.
- To introduce the knowledge construction surveys and usage of modern instrument such as total station.

UNIT– I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying. Measurement of Distances and Directions Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods- E.D.M. method.

Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip.

Plane table surveying: Introduction, accessories, setting up of plane table, techniques, testing, adjustments, errors, advantages and disadvantages.

UNIT - II

Levelling - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary, Planimeter. Volumes - Computation of areas for level section

and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

UNIT - IV

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves.

UNIT - V

Construction surveys: Introduction-staking out buildings-pipelines and sewers-highways-culverts. Bridge surveys-determining the length of a bridge-locating centres of piers- surface surveys and tunnel alignment-underground surveys-connection of surface and underground surveys-levelling in tunnels.

Total station Surveying: Basic principles, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments.

Course Outcomes:

At the end of the course, the student will be able to:

- Calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments
- Estimate the volumes of earth work
- Able to use modern survey instruments.

Text Books:

1. S.S Bhavikatti, "Surveying theory and Practice", 2nd edition, Dreamtech press, Wiley distributors.
2. C.Venkatramaiah, "Text book of surveying", 2nd edition, Universities press, 2018

References:

1. Arthur R Benton and Philip J Taety, "Elements of Plane Surveying", McGraw Hill 2000.
2. Arora K R "Surveying" Vol 1, 2 & 3, Standard Book House, Delhi, 2004.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain,"Surveying" (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Bhavikatti "Surveying" Vikas publishing house ltd.
6. S K Duggal, "Surveying" (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. R. Agor Khanna Publishers 2015 "Surveying and leveling".
8. R. Subramanian, "Surveying and levelling" Oxford university press, New Delhi.
9. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
10. S.S Bhavikatti "Surveying and Levelling", Vol. 1 and 2, Dreamtech press, Wiley distributors.

11.Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System – "Theory and Practice", Springer -Verlag Publishers, 2001.

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COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	ENGINEERING GEOLOGY LAB	0	0	3	1.5

COURSE OUTCOMES	
CO1	The study and identification of minerals, rocks and structures with their utilization in civil engineering works.
CO2	Ability to solve the problems related to strike and Dip problems
CO3	Ability to study and identify the minerals , rocks by their physical properties
CO4	To know the electrical resistivity surveys and to understand interpretation of resistivity data and assessment of bed rock and ground water table.
CO5	Ability to analyze the geological maps & thickness of beds.

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

Text Books:-

1. Elementary Exercises in Geology by CVRK Prasad, Universities press.
2. B.S.Satyanarayana Swamy, Engineering Geology Laboratory Manual , Dhanpat Rai Sons, New Delhi

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	SURVEYING LAB	-	-	3	1.5

Course objectives:

By performing this laboratory, the student will be able to know the usage of various surveying equipments and their practical applicability.

- Setting up of Right angles using cross staff
- Plane table survey; finding the area of a given boundary
- Two Point Problem by the plane table survey.
- Fly levelling: Height of the instrument method and rise and fall method.
- Fly levelling: Longitudinal Section and Cross sections of a given road profile.
- Theodolite Survey: Determining the Horizontal and Vertical Angles
- Finding the distance between two inaccessible points using Theodolite
- Tachometric survey: Heights and distance problems using tachometric principles.
- One Exercise on Curve setting.
- Total Station Determination of area using total station. Traversing and Contouring
- Total Station: Determination of Remote height.
- Developing a Contour map

Course Outcomes:

By performing the various tests in this laboratory the student will be able to know the principles of surveying in chain surveying, compass surveying, plane table surveying, levelling, thedolite surveying and total station.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CHEMISTRY
II B.TECH – I/II SEMESTER Mandate Course (MC)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Environmental Science	3	0	-	0

COURSE OBJECTIVES	
1	To make the student understand multi disciplinary nature of environment and its components.
2	To investigate the relationship between human life and environment from scientific prospective.
3	To impart knowledge to the students about fundamental concepts of Ecosystem and Biodiversity
4	Necessasity of analyzing regional, national and global environmental problems
5	To understand and apply the fundamentals of Environmental science to important local, regional, national and global environmental problems and potential issues

COURSE OUTCOMES	
CO1	Able to solve the environmental problems based fundamental concepts of Environmental Science.
CO2	Enable the students to understand the structure and function of significant environmental systems
CO3	Knowledge of concepts makes them differentiate Natural and Polluted environment..
CO4	Enable to apply the Pyramid of number, mass and Energy, understand about Renweable energy resources. Illustrate the Forest ecosystem, Discuss about Grass and Net biomass productivity
CO5	Differentiate between Forest and desert Ecosystems, Critically evaluate arguments regarding environmental issues. Illustrate the Food chain and food web, Identify the applications of rain water harvesting, Interpret advantages of In-situ and Ex-situ conservation of biodiversity

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

SYLLABUS

UNIT-I:

i) Multidisciplinary nature of environmental studies

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

ii) Natural Resources:

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Dams, benefits and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water

c) Earth: Geomorphology, Weathering, Structure of Earth - inner core, outer core, mantle and the crust, magma.

d) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

e) Food resources: World food problems, changes caused by agriculture, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

UNIT-II:

i) Ecosystems

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids.

Types of some ecosystems: -

a. Forest ecosystem b. Desert ecosystem

d. Aquatic ecosystems (ponds, rivers, oceans, estuaries).

ii) Biodiversity and its Conservation

Introduction-Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values, India as a mega-diversity nation.

Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III:

Environmental Pollution and Disaster management:

Definition - Causes, effects and control measures of:

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution

e. Noise pollution f. Thermal pollution g. Nuclear hazards

Disaster management: floods, earthquake, cyclone and landslides.

Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust.

UNIT-IV:

Social Issues and the Environment

From Unsustainable to Sustainable development. Water conservation, rain water harvesting, watershed management.

Resettlement and rehabilitation of people; its problems and concerns. Case studies.

Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.

Issues involved in enforcement of environmental legislation. Public awareness.

UNIT-V:

i) Human Population and the Environment

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health, Women and Child Welfare, Role of information Technology in Environment and human health, Case Studies.

ii) Field Work

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Text Books:

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4th edition, 2014

2. De A.K., Environmental Chemistry, Wiley Eastern Ltd , 2012

Reference Books

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad -380013, India, Email: mapin@icenet. net (R).

2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.

3. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA
B.Tech – II-II Sem (R19)

L	T	P	C
3	0	0	3

Numerical Methods, Probability and Statistics
(Common to CIVIL, ME, EEE& CSE)

Course Objectives:

1) To familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.
2) To impart knowledge in basic concepts and few techniques in probability and statistics in various applications in engineering.

Unit I: Solution to algebraic and transcendental equations& Interpolation

Solution of algebraic and transcendental equations: bisection method, Newton-Raphson method and Regula-Falsi method, Finite differences, relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Learning Outcomes:

After completion of this unit student able to

- find approximate roots of the an equation by using different numerical methods
- explain various discrete operators and find the relation among operators
- apply Newton forward and backward formulas for equal and unequal intervals

Unit II: Numerical differentiation, integration & Solution of Initial Value Problems to Ordinary Differential Equations of first order.

Numerical Differentiation and Numerical integration: Numerical differentiation using Newton's forward & backward interpolation formulae; Numerical Integration by trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.

Numerical Solutions of Ordinary differential equation: Solution by Taylor's series, Picard's method of successive approximations, Euler's method, modified Euler's method and Runge-Kutta method of fourth order.

Learning Outcomes:

After completion of this unit student able to

- find integration of a function by different numerical methods
- solve ordinary differential equations using different numerical schemes

Unit III: Probability & Random Variables

Probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem.

Random variables (discrete and continuous), probability distribution: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties. (All concepts without proofs)

Learning Outcomes:

At the end of this unit, the student will be able to

- explain the terms sample space, random variable, expected value
- apply probability theory via Baye's theorem
- identify the notations of discrete and continuous distribution functions
- evaluate Binomial and Poisson distributions
- explain the properties of normal distribution

Unit IV: Testing of hypothesis

Formulation of hypothesis, critical region, level of significance. Large sample tests: test for single proportion, difference of two proportions, test for single mean and difference of two means.

Learning Outcomes:

At the end of this unit, the student will be able to

- explain the concept of testing of hypothesis
- apply the concept of hypothesis testing for large samples

Unit V: Small Sample Tests

Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - test for independence of attributes and goodness of fit.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply the concept of testing hypothesis for small samples
- estimate the goodness of fit

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008
3. S.S.Sastry, "Introductory methods of Numerical Analysis", 5th edition, PHI, 2012.

References:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons publications, 2012.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. P. Kandasamy, K. Thilagavathy, S. Gunavathy, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.

Course Outcomes:

Students will be able to

- apply different methods to find roots of the equations
- find approximate the solutions of ordinary differential equations
- apply the Laplace transform for solving differential equations
- explain the concepts of probability and their applications
- apply discrete and continuous probability distributions in practical problems
- use the statistical inferential methods based on small and large sampling tests

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
B.Tech (R-19 Civil Engineering)

Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	WATER RESOURCES ENGINEERING	3	0	0	3

OBJECTIVE:

To study the concepts of

i. *Engineering Hydrology and its applications like Runoff estimation, estimation of design discharge and flood routing.*
ii. *Irrigation Engineering – Water utilization for Crop growth, canals and their designs.*

UNIT – I

INTRODUCTION TO HYDROLOGY: Engineering hydrology and its applications; Hydrologic cycle; precipitation- types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.

DESCRIPTIVE HYDROLOGY: Evaporation- factors affecting evaporation, measurement of evaporation; Infiltration- factors affecting infiltration, measurement of infiltration, infiltration indices; Run off- Factors affecting run- off, Computation of run-off; Design Flood; Estimation of maximum rate of run-off; separation of base flow.

UNIT – II

HYDROGRAPH ANALYSIS: Hydrograph; Unit Hydrograph- construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.

GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; aquifer parameters- porosity, Specific yield, Specific retention; Divisions of sub–surface water; Water table; Types of aquifers; storage coefficient-coefficient of permeability and transmissibility

UNIT – III

IRRIGATION: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation water. Duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty.

WATER REQUIREMENT OF CROPS: Types of soils, Indian agricultural soils, preparation of land for Irrigation; soil fertility; Soil-water-plant relationship; vertical distribution of soil moisture; soil moisture tension; soil moisture stress; various soil moisture constants; Limiting soil moisture conditions; Depth and frequency of irrigation; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; crop seasons and crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Assessment of Irrigation water. Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT – IV

CHANNELS – SILT THEORIES: Classification; Canal alignment; Inundation canals; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories–Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedy's theory; Lacey's regime theory- Lacey's theory applied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

WATER LOGGING AND CANAL LINING: Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, advantages and disadvantages; Types of lining; Design of lined canal.

UNIT – V

WELL HYDRAULICS

Steady and unsteady flow to a well in a confined and unconfined aquifer - Partially penetrating wells - Wells in a leaky confined aquifer - Multiple well systems - Wells near aquifer boundaries - Hydraulics of recharge wells

TEXT BOOKS:

1. Irrigation and water power engineering by Punmia&Lal, Laxmi publications pvt. Ltd., New Delhi
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers, Delhi.

REFERENCES:

1. Engineering Hydrology by K.Subramanya, The Tata Mcgraw Hill Company, Delhi
2. Engineering Hydrology by Jayarami Reddy, Laxmi publications pvt. Ltd., New Delhi
3. Irrigation and Water Resources & Water Power by P.N.Modi, Standard Book House.

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COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
B.Tech (R-19 Civil Engineering)

Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	HYDRAULICS AND HYRAULIC MACHINERY	2	1	0	3

Course Objectives:

1) To Introduce concepts of laminar and turbulent flows
2) To teach principles of uniform and non-uniform flows through open channel.
3) To impart knowledge on design of turbines.
4) To impart knowledge on design of pumps.

UNIT -I:

Laminar & Turbulent flow in pipes:

Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law. Measurement of viscosity. Reynolds experiment. Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram – Introduction to boundary layer theory.

UNIT -II:

Uniform flow in Open Channels:

Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section.Hydraulically efficient channel sections: Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors.

UNIT III:

Non-Uniform flow in Open Channels:

Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity –Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics-Energy dissipation.

UNIT -IV:

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - velocity triangles at inlet and outlet - Work done and efficiency

Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects.

UNIT -V:

Pumps:

Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies.

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. K. Subramanya, Open channel Flow, Tata McGraw Hill.

REFERENCES:

1. Rajput, Fluid mechanics and fluid machines , S. Chand & Co
2. D. S. Kumar Fluid Mechanics & Fluid Power Engineering, Kataria& Sons.
3. Srinivasan, Open channel flow by, Oxford University Press
4. Banga& Sharma, Hydraulic Machines, Khanna Publishers.
5. Fluid Mechanics and Hydraulic Machines, S.C.Gupta, Pearson publications,
6. R.K. Bansal, "A Text book of Fluid Mechanics and Hydraulic Machines". Laxmi Publications, New Delhi

Course Outcomes:

At the end of the course, the student will be able to

- Understand characteristics of laminar and turbulent flows.
- Analyze characteristics for uniform and non-uniform flows in open channels.
- Design different types of turbines
- Design centrifugal and multi stage pumps.



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B.Tech (R-19 Civil Engineering)

Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	STRUCTURAL ANALYSIS – II	2	1	0	3

OBJECTIVE: *Indeterminate structures are subjected to different loading with different supported conditions; hence it is necessary to study the behaviour of the structures.*

COURSE OUTCOMES	
CO1	To demonstrate the behaviour of arches and their methods of analysis
CO2	To use various classical methods for analysis of indeterminate structures
CO3	Ability to analyse the beam and frames for vertical and horizontal loads and draw SFD and BMD
CO4	To determine the effect of support settlements for indeterminate structures. Able to calculate forces in members of truss due to load by stiffness method.
CO5	Ability to analyse and perform plastic analysis on various structural elements.

UNIT I
ARCHES : Three hinged and Two hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature-Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses.

UNIT-II
MOMENT DISTRIBUTION METHOD FOR FRAMES:-Analysis of single bay single storeyportal frame including side sway–Substitute frame analysis by two cycle method.

UNIT – III
KANI'S METHOD:-
Analysis of continuous beams with and without settlement of supports -Single bay single storey portal frames with and without side sway.

UNI T – IV
FLEXIBILITY METHOD :-
Flexibility methods- Introduction- Application to continuous beams including support settlements—Analysis of Single bay single storey portal frames without and with side sway.

UNIT – V

STIFFNESS METHOD:

Stiffness methods- Introduction-application to continuous beams including support settlements- Analysis of Single bay single storey portal frames without and with side sway.

TEXT BOOKS:

1. Analysis of structures by Vazrani&Ratwani – Khanna Publications.
2. Theory of structures by Ramamuratam, jain book depot , New Delhi.

REFERENCES :

1.Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.

2. Basic Structural Analysis by K.U.Muthu*et al.*, I.K.International Publishing House Pvt.Ltd

3.Theory of Structures by Gupta S P, G S Pundit and R Gupta, Vol II, Tata McGrawHill Publications company Ltd.

4.D S Prakash Rao, **"Structural Analysis: A Unified Approach"**, Universities Press

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B.Tech (R-19 Civil Engineering)

Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	CONCRETE TECHNOLOGY	3	0	0	3

Course Objectives:

- Lot of advances is taking place in the concrete technology as par with development taking place in the engineering.
- The present day industry needs the knowledge of concrete technology thoroughly.
- The subject is designed to give the basic knowledge as well as latest developments in concrete technology.

UNIT I

CEMENTS ,CONCRETE AND ITS COMPONENTS :

Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test's on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures. AGGREGATES: Classification of aggregate – Particle shape & texture - Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis - Fineness modulus - Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

UNIT – II

FRESH & HARDENED CONCRETE:

Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.Water / Cement ratio – Abram"s Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compressive & tensile strength - Curing.Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests –

UNIT – III

ELASTICITY, CREEP &SHRINKAGE:– Modulus of elasticity – Dynamic modulus of elasticity – Poisson"s ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of creep – Effects of creep – Shrinkage – types of shrinkage. Introduction to Non-destructive testing methods – Rebound Hammer – Ultra Pulse Velocity method – Pullout - Codal provisions for NDT

UNIT – IV.

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

UNIT – V

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – Bacterial concrete(self healing concrete)

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand& Co. : 2004

REFERENCES:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete: Micro structure, Properties and Materials - P.K.Mehta and J.M.Monteiro, McGraw Hill Publishers
3. Design of Concrete Mix by Krishna Raju, CBS pubilishers.

Outcomes:

After completing the course, the student should be able to do the following:

1. The students should be able to check and recommend different constituent of concrete.
2. The students should be able to test strength and quality of plastic and set concrete.
3. The students should have understanding of application admixture and its effect on properties of concrete.
4. The students should be able to design mix of concrete according to availability of ingredients and design needs.
5. The students should be able to test various strength of concrete by destructive and nondestructive testing method

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B.Tech (R-19 Civil Engineering)

Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	Building Planning and Drawing	1	2	0	3

OBJECTIVE: *This subject provides the knowledge of building by laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.*

COURSE OUTCOMES	
CO1	The scope of this course is to introduce the concepts of building planning and drawing with emphasis on architectural planning.
CO2	This subject is designed as an introduction for subjects who wish to develop their competence and skills in the preparation of architectural and building drawings.
CO3	Able to know the requirements of different rooms and characteristics of various types of residential buildings.
CO4	Able to know about building byelaws and regulations.
CO5	Ability to draw line sketch and planning and bi section of a building.

PART-A

UNIT -I

PLANING OF BUILDINGS: Types of buildings, types of residential buildings. site selection for residential building, orientation of buildings; aspect; prospect; privacy; furniture requirement;grouping;circulation;sanitation;lighting;ventilation;cleanliness;flexibility;elegancy;Economy; practical considerations.

BUILDING BYELAWS AND REGULATIONS: Introduction- Terminology :Objectives of building byelaws; Minimum plot sizes; Open space requirements ;Plinth area, floor area, carpet area; Floor area ratio (FAR), Floor space Index (FSI) ;areas for different units; Principles underlying building byelaws ; built up area limitations – Height of Buildings ,Wall thickness, lighting and ventilation requirement, safety from fire, drainage and sanitation; applicability of the bye-laws.

UNIT –II

PLANNING OF RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings

PLANNING OF PUBLIC BUILDING: Planning of Educational institutions, Hospitals, Office buildings, Banks, Industrial buildings, Hotels and Motels, Hostels, Bus Station.

UNIT -III

BUILDINGS: SAFETY AND COMFORT: aspects of safety-structural, health, fire and constructional safety. Components of building automation system - HVAC, electrical lighting, Security, fire-fighting, communication etc. design for thermal comfort, ventilation comfort, air conditioning comfort, lighting comfort, noise and acoustic comfort.

PART-B

UNIT -IV

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, and white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond; odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

DOORS WINDOWS, VENTILATORS AND ROOFS: Paneled Door – paneled and glazed door; glazed windows – paneled windows; Swing ventilator – Fixed ventilator; Couple roof – Collar roof; Kind Post truss – Queen post truss.

UNIT –V

Given line diagram with specification to draw plan, section and elevation of the following :

1. Residential Building
2. Hospital
3. Schools
4. Post office
5. Corporate Office Building
6. Hotels
7. Bank buildings
8. Bus stations
9. Industrial buildings

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part- A and Part-B. Part- A consists of three questions with either or choice from three units in planning portion .Each question carries 10 marks. Total marks for Part-A is 30 marks. Part- B consists of

two questions with either or choice from drawing portion. Question from unit-IV carries 10 marks and question from unit-V carries 30 marks. Total marks for Part-B is 40 marks.

TEXT BOOKS:

1. Planning and Designing and Scheduling – Gurucharan Singh and Jagadish Singh- Standard publishers.

2. Building Planning and Design – N.KumaraSwamy and A.Kameswara Rao. Charotar publications.

REFERENCE:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code

2. Building drawing with an integrated approach to building environment-M.G.Saha. G.M.Kale. S.Y.patki-Tata McGraw Hill

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COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
B.Tech (R-19 Civil Engineering)

Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	CONCRETE TECHNOLOGY LABORATORY	0	0	2	1.0

To know the concept and procedure of different type of tests to be conducted on cement, aggregate and finished concrete and designing the concrete mix of given specification of its ingredients along with appropriate water cement ratio and admixtures.

Course outcomes	
CO 1	*To be able to determine the importance of testing of cement and its properties*
CO 2	*To be able to assess the different properties of aggregate*
CO 3	*To be able to summarize the concept of workability and testing of concrete*
CO 4	*To be able to assess the properties of hardened concrete*

SYLLABUS:

1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement.
4. Soundness of cement.
5. Compressive strength of cement.
6. Workability test on concrete by compaction factor,
7. Workability test on concrete by slump
8. Workability test on concrete by Vee-bee test
9. Young's modulus and compressive strength of concrete.
10. Specific Gravity and Water Absorption of Coarse aggregate.
11. Bulking of Fine aggregate.
12. Non-Destructive testing on concrete (for demonstration)
13. Fineness modulus of sand and importance of zoning
14. Bulk density of Coarse Aggregate.
15. Bulk density of Fine Aggregate.

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B.Tech (R-19 Civil Engineering)

Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	FLUID MECHANICS AND HYDRAULIC MACHINERY LAB	0	0	3	1.5

OBJECTIVE: *The object of the course to make the students understand the fluid flow concepts and get familiarity with flow measuring devices.*

COURSE OUTCOMES	
CO1	To calibrate the flow measuring devices.
CO2	To calculate loss coefficients for use in the pipe-flow analysis.
CO3	To prepare the characterstics for curves of the pumps and turbines.
CO4	To find the performance of francis, pelton wheel turbines.
CO5	To understand the efficiency of centrifugal, reciprocating pumps, and to calibrate venturimeter, orifice meter.

SYLLABUS:

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Verification of Bernoulli's equation.
8. Impact of jet on vanes.
9. Study of Hydraulic jump.
10. Performance test on Pelton wheel turbine.
11. Performance test on Francis turbine.
12. Efficiency test on centrifugal pump.

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
-	**Computer Aided Drafting Lab**	0	0	3	1.5

Course outcome / Course Objectives:
1. After completion of the course A student will able to know how to apply engineering drawing using computers
2. A student can understand about the scope of Auto CAD software
3. A student will know what is plan and how it should drawn in auto CAD software.

LIST OF EXERCISES:

1. Introduction to computer aided drafting
2. Software for CAD – Introduction to different software‘s
3. Practice exercises on CAD software
4. Drawing of plans of buildings using software for Single storied buildings
5. Drawing of plans of buildings using software for multi storied buildings
6. Developing sections and elevations for Single storied buildings
7. Developing sections and elevations for multi storied buildings
8. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software
9. Exercises on development of working of buildings.

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L	T	P	C
3	0	0	0

Constitution of India

Course Objectives:

1. To enable the student to understand the importance of constitution.
2. To understand philosophy of fundamental rights and duties.
3. To understand the structure of executive, legislature and judiciary.
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5. To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the concept of Indian constitution.
2. Apply the knowledge on directive principle of state policy.
3. Analyze the History, features of Indian constitution.
4. Evaluate Preamble Fundamental Rights and Duties.

UNIT-II

Democratic forms of Constitution, Union Government and its Administration Structure of the Indian Union: Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the structure of Indian government.
2. Differentiate between the state and central government.
3. Explain the role of President and Prime Minister.
4. Know the Structure of supreme court and High court.

UNIT-III

Federalism, Political relations, Financial relations of State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the structure of state government.
2. Analyze the role Governor and Chief Minister.
3. Explain the role of state Secretariat.
4. Differentiate between structure and functions of state secrateriate.

UNIT-IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the local Administration.
2. Compare and contrast district administration role and importance.
3. Analyze the role of Myer and elected representatives of Municipalities.
4. Evaluate Zilla panchayat block level Organisation.

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate , State Election Commission, Supreme Court, High Court.

Learning Outcomes:

At the end of this unit students will be able to:

1. Know the role of Election Commission apply knowledge.
2. Contrast and compare the role of Chief Election commissioner and Commissiononerate.
3. Analyze role of state election commission.
4. Evaluate various commissions of viz SC/ST/OBC and women.

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government & Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication.
6. J.C. Johari, Indian Government and Politics Hans.

Course Outcomes:

1. Understand historical background of the constitution making and its importance for building a democratic India.
2. Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.
4. Analyze the decentralization of power between central, state and local self-government.
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
6. Know the sources, features and principles of Indian Constitution.
7. Learn about Union Government, State government and its administration.
8. Get acquainted with Local administration and Pachayati Raj.
9. Be aware of basic concepts and developments of Human Rights.
10. Gain knowledge on roles and functioning of Election Commission.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE51- SOIL MECHANICS

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To enable the student to find out the index properties of the soil and classify it.
- To enable the student to determine permeability of soils using various methods.
- To impart the concept of seepage of water through soils and determine the seepage discharge.
- To enable the students to differentiate between compaction and consolidation of soils and to determine the consolidation settlement.
- To impart knowledge on soil exploration.
- To teach slope stability and safety assessment of earth retaining structures.
- To impart knowledge on bearing capacity and settlement of shallow foundations.
- To throw light on pile and well foundation designs.

UNIT – I:

INTRODUCTION: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass-volume relationship – Relative density.

INDEX PROPERTIES OF SOILS: Moisture Content, Specific Gravity, In-Situ density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the characteristics of soils
- Assess relationships between different parameters
- Determine soil properties
- Determine Liquid, Shrinkage and Plasticity Limits
- Characterize and classify soils based on different limits.

UNIT – II: PERMEABILITY:

Soil water – capillary rise – flow of water through soils – Darcy's law permeability – Factors affecting – laboratory and Field determination of coefficient of permeability –Permeability of layered systems.

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

Learning Outcomes:

At the end of this unit, the student will be able to

- Determine the permeability of soils and stratified soils
- Explain factors effecting permeability
- Estimate the rate of seepage using flow net

UNIT – III:STRESS DISTRIBUTION IN SOILS:

Boussinesq's and Westergaard's theories for point loads and areas of different shapes – New- mark's influence Chart.

COMPACTION:

Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compute stresses in soils under various loading conditions.
- Explain compaction of soils
- Compaction control can be understand.

UNIT – IV: CONSOLIDATION:

Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil – pre-consolidation pressure and its determination – Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the consolidations and settlement of soils.
- Differentiate compaction and consolidation
- Assessment of final settlements of soil
- Differentiate primary and secondary consolidation

UNIT – V: SHEAR STRENGTH OF SOILS:

Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio – Liquefaction- shear strength of clays.

Learning Outcomes:

At the end of this unit, the student will be able to

- Can able to determine the shear strength of the soil.
- To understand the various shear tests based on drainage conditions.

Text Books:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers and Distributors, Delhi.
2. Soil Mechanics and Foundation by byB.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., NewDelhi
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

Reference Books:

1. Basic and Applied Soil Mechanics by GopalRanjan& ASR Rao, New age International Pvt . Ltd, NewDelhi.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, PearsonPubilications
3. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special IndianEdition
4. Geotechnical Engineering by Brije.M.Das, Cengage Publications, New Delhi.
5. Geotechnical Engineering by Brije.M.Das, Cengage Publications, NewDelhi.

Course Outcomes:

At the end of this Course the student will be able to

- Carry out soil classification
- Solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram
- Estimate the stresses under any system of foundation loads
- Solve practical problems related to consolidation settlement and time rate of settlement

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE52- HIGHWAY ENGINEERING

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To impart knowledge on highway development.
- To teach concepts of Geometric design and alignment.
- To throw light on different traffic surveys.
- To teach design of highway intersections
- To impart knowledge on highway materials and design of pavements

UNIT – I: HIGHWAY DEVELOPMENT AND PLANNING:

Highway development in India – Necessity for Highway Planning-Jayakar Committee and its Recommendations - Different Road Development Plans- First, Second and Third Twenty Year Road Development Plans-Classification of Roads - Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys – Drawings and Reports.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand importance of highway development
- Classify highways based on hierarchy.

UNIT – II: HIGHWAY GEOMETRIC DESIGN

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements- Surface Characteristics, Carriageway, Shoulders, Formation, Right of way; Kerbs, foot paths, Medians- design specifications. Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients--Verticalcurves.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different aspects governing highway geometric design.
- Design vertical and horizontal alignment of highways

UNIT – III: TRAFFIC ENGINEERING

Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their interrelationship – Highway Capacity and Level of Service concept – Factors affecting Capacity and Level of Service - Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation- Parking Studies and Parking characteristics- Road Accidents- Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams- Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings- Specifications. Design of Traffic Signals –Webster Method –Saturation flow Rate-Phasing and Timing diagrams – Numerical problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify need and methods of Traffic Surveys.
- Understand importance of parking and related surveys.
- Understand the role of engineering in road safety

UNIT – IV: INTERSECTION DESIGN:

Conflicts at Intersections- Channelization: Objectives –Traffic Islands and Design criteria- Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the objectives of channelization.
- Understand the types of intersections and their design features.

UNIT – V: PAVEMENT DESIGN:

Types of Pavements – Difference Between Flexible And Rigid Pavements – Pavement Components – Sub Grade, Sub Base, Base And Wearing Course – Functions Of Pavement Components – Design Factors – Flexible Pavement Design Methods – G.I Method, CBR Method, (As Per IRC 37-2002)– Design Of Rigid Pavements – Critical Load Positions - Westergaard's Stress Equations – Computing Radius Of Relative Stiffness And Equivalent Radius Of Resisting Section – Stresses In Rigid Pavements – Design Of Expansion And Contraction Joints In CC Pavements. Design Of Dowel Bars And Tie Bars.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand about the pavement and its components
- Understand the design of Rigid pavement and Flexible pavements.

Text Books:

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition(2000).
2. Transportation Engineering, Volume – I by C.Venkataramaiah, UniversitiesPress, Hyderabad.
3. Principles and Practice of Highway Engineering Design – L.R.Kadiyali and Lal-Khanna Publications.

Reference Books:

1. Traffic Engineering and Transportation Planning by L.R.Kadiyali and Lal- Khanna Publications.
2. Highway Engineering – Dr.S.K.Sharma, S.ChandPublishers

Course Outcomes:

At the end of this Course the student will be able to

- On completion of the course, the students will be able to:
- Understand the importance of highways in economic development of nation.
- Understand the history of road development in India and various road developmentplans.
- Identify the highway materials and tests related to them.
- Design horizontal and vertical alignment aspects.
- Understand the surveys required for highway planning and design.
- Differentiate between types of pavements and their design features.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE53- DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize Students with different types of design philosophies.
- Equip student with concepts of design of flexural members.
- Understand Concepts of shear, bond and torsion.
- Familiarize students with different types of compressions members and Design.
- Understand different types of footings and their design.

UNIT – I:

Introduction: RCC design philosophy–Different methods of design **Working stress Design:** working stress method, design constants; Design singly reinforced**Limit state design:** Concepts of limit state design – Comparison between two methods- Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars.

Learning Outcomes:

At the end of this unit, the student will be able to

- Familiarize with working stress and limit stress method of design.

UNIT – II:

Limit State Design:–Assumptions in limit state design-stress - block parameters – limiting moment of Resistance- Limit state design of singly reinforced doubly reinforced. **Beams:**, T and L sections by limit state method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand stress block parameters in methods of analysis
- Design of beams of varying cross sections adopting IS Code

UNIT – III:

Shear, Torsion, Bond, & Serviceability: Limit state design of section for shear and torsion – concept of bond, anchorage and development length, Limit state design of serviceability for deflection, cracking and codal provision

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand behavior of beams under shear and torsion
- Visualize importance of bond and anchorage
- Design and Detail RC beams under due to shear and torsion adopting IS Code.

UNIT – IV:

Slabs: Design of one way slab - Two-way slab, continuous slab- **Stair cases:** Types of stair cases -Design of Dog-legged stair cases

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify understand performance of slabs based on dimensions

- Design reinforced concrete slabs & Stair cases as per IS codal provisions.

UNIT – V:

Columns & Footings: Short columns – under axial loads, uni-axial bending and **biaxial bending(Not for Examination)**, I S Code provisions. Different types of footings – Design of isolated, square, Rectangular, stepped and sloped footings

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify footings based on shape and utility
- Examine the field conditions and suggest appropriate footings
- Design reinforced concrete footings.

Text Books:

1. Design of Reinforced Concrete Structures (Limit State) – A.K.Jain, 1st Edition, NemchandBrothers,Roorkee.
2. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.Ltd., NewDelhi.
3. Reinforced concrete structures – I.C. Syal&A.K.Goel, S.ChandPublishers.
4. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., NewDelhi.

Reference Books:

1. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
2. Reinforced concrete design by S.Unnikrishna Pillai &DevdasMenon, Tata Mc.Graw Hill, New Delhi.
3. Limit state designed of reinforced concrete – P.C.Varghese, Prentice Hall of India, New Delhi.
4. Design of concrete structures – Arthus H.Nilson, David Darwin, and Chorles W. Dolar, Tata Mc.Graw-Hill, 3rd Edition, 2005.
5. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers.

Course Outcomes:

At the end of this Course the student will be able to

- Will be able to understand the basic concepts of reinforced concrete analysis and design.
- Will be able to understand the behavior and various modes of failure of reinforced concrete members.
- Will be able to analyze and design various reinforced concrete members.
- Will be able to understand and analyze the effect of various support conditions on design of structures.
- Will be able to implement the knowledge in using analysis and design softwares.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE54a- REMOTE SENSING AND GIS

(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the basic principles of Remote Sensing and GIS techniques.
- Teach various types of satellite sensors and platforms
- Impart concepts of visual and digital image analyses
- Teach concepts of principles of spatial analysis
- Teach about the application of RS and GIS in Civil engineering

UNIT – I:

Introduction to photogrammetric: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concepts of photogrammetry
- Estimate heights and distances

UNIT – II:

Remote sensing: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand advantages of remote sensing
- Demonstrate concepts of remote sensing.

UNIT – III:

Geographic information system: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concepts of GIS.
- Explain data collection and data interpretation
- Develop terrain characteristics using Mapping

UNIT – IV:

GIS spatial analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know applications of GIS and data interpretation

UNIT – V:

Water resources applications: Land use/Land cover in water resources, Surface water mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites for artificial Recharge structures - Inland water quality survey and management, water depth estimation and bathymetry.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know applications of RS & GIS in water resources applications.
- Study technological problems like reservoir sedimentation ground water identification

Text Books:

1. Remote Sensing and GIS by B.Bhatta, Oxford University Press,NewDelhi.
2. Advanced surveying : Total station GIS and remote sensing – SatheeshGopi – Pearson publication.

Reference Books:

1. Fundamentals of remote sensing by gorge Joseph , Universities press,Hyderabad.
2. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall(India) Publications.
3. Basics of Remote sensing & GIS by S.Kumar, LaxmiPublications.
4. Remote sensing and GIS by M.Anjireddy ,B.S.Pubiliications,NewDelhi.
5. Remote Sensing and its applications by LRA Narayana University Press1999.
6. GIS by Kang – tsungchang, TMH Publications &Co.,
7. Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell, Oxford Publishers2004

Course Outcomes:

At the end of this Course the student will be able to

- Comparing with ground, air and satellite based sensor platforms.
- Interpret the aerial photographs and satellite imageries.
- Create and input spatial data for GIS application.
- Apply RS and GIS concepts in water resources engineering.
- Applications of various satellite data.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE54b- REPAIR AND REHABILITATION OF STRUCTURES

(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To describe causes of distress in concrete structures and plan repair strategies.
- To explain issues on serviceability and durability of concrete.
- To throw light on various repair materials and their characteristics.
- To demonstrate repair techniques and protection measures.
- To illustrate suitable retrofitting schemes.

UNIT – I:

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage- case studies of failure –Loss Assessment

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand importance and requirement of maintenance
- Gain knowledge on quantification of repairs and documentation

UNIT – II:

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena of Desiccation.-case studies of failure

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the corrosion and its effects on concrete
- Understand the damage of concrete from fire

UNIT – III:

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand how to diagnose distress from symptoms
- Understand how to diagnose distress through NDT

UNIT – IV:

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain techniques for repair and rehabilitation.
- Understand methods of corrosion protection and inhibition

UNIT – V:

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for health monitoring of structures

Text Books:

1. Concrete Technology by A.R. Santakumar, Oxford Universitypress
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta, Standard Publications.

Reference Books:

1. Defects and Deterioration in Buildings, EF & N Spon,London
2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981)
4. Building Failures : Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991).

Course Outcomes:

At the end of this Course the student will be able to

- Understand evaluation procedure and plan for repair.
- Design suitable rehabilitation scheme for serviceability and durability.
- Choose suitable repair material for different magnitudes of distress.
- Apply efficient repair and retrofitting schemes.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE54c- WATER RESOURCES ENGINEERING-II

(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about
To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, designs, etc.

UNIT – I:

CANAL REGULATION WORKS:Canal falls: Necessity and location of falls; Types of falls; classification of falls; cistern design; roughening devices; design of sarada type fall. Canal regulators: off-take alignment; head regulators and cross-regulators; design of cross- regulator and distributary headregulator.

Learning Outcomes:

At the end of this unit, the student will be able to

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UNIT – II:

STREAM GAUGING: Necessity; Selection of gauging sites; methods of Discharge Measurement Area-Velocity method; Slope-Area method; Tracer method, Electromagnetic induction method, Ultrasonic method; Measurement of depth –Sounding rod, Echo-sounder; Measurement of velocity: Floats – Surface floats, Sub–surface float or Double float, Velocity rod; Pitottube; Current meter-rating of current meter, measurement of velocity; chemical method; Measurement of stage-Staff gauge, wire gauge, water stage recorder, bubble gauge recorder; stage-discharge curve.

RIVER ENGINEERING: Classification of rivers; Meandering; Causes of meandering; Basic factors controlling process of meandering; Aggrading type of river; Degrading type of River; River training: objectives, Classification of river training works; Types of River training works : Guide banks, Marginal embankments ,Groynes or spur, levees, bank protection, pitched islands.

Learning Outcomes:

At the end of this unit, the student will be able to

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UNIT – III:

RESERVOIR PLANNING: Introduction; Investigations for reservoir planning; Selection ofsitefor a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curveand demand curve; Calculation of reservoir capacity for a specified yield from the mass inflowcurve; Determination of safe yield from a reservoir of a given capacity; Sediment flow instreams:Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Flood routing;Methodsof flood routing-Graphical Method (Inflow – storage discharge curves method).

DAMS :GENERAL: Introduction; Classification according to use; classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.

Learning Outcomes:

At the end of this unit, the student will be able to

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UNIT – IV:

GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams;.

EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; suitable and available materials for Seepage control measures; Slope protection. Seepage through earth dam

Learning Outcomes:

At the end of this unit, the student will be able to

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UNIT – V:

SPILLWAYS: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates-Types and description only.

Learning Outcomes:

At the end of this unit, the student will be able to

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Text Books:

1. Irrigation and Water Power Engineering by Dr. B.C.Punmia& Dr. Pande B.B. Lal;Laxmi Publications pvt. Ltd., NewDelhi.
2. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna publishers,Delhi.

Reference Books:

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication, NewDelhi.
3. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers

Course Outcomes:

At the end of this Course the student will be able to

- Design various channel systems
- Design head and cross regulator structures
- Identify various types of reservoir and their design aspects
- By the Establishes the understanding of cross drainage works and its design
- Design different types of dams
- Design gravity dam and earthen dam
- Design the canal systems

B.Tech III Year I semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS10-CAMPUS RECRUITMENT TRAINING & SOFT SKILLS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To prepare to face global competition for employment and excellence in profession.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

UNIT – 1: SOFT SKILLS: INTRODUCTIUON

Soft Skills: Definition-Meaning--Importance- Why skill gap -Analysis—Personality Developments. Soft Skills- Learning Methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Developing self-motivation, raised aspirations and belief in one's own abilities, defining and committing to achieving one's goals. **L1**
- Learning to keep going when things don't go according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict **L2**

UNIT – II: PERSONAL SKILLS

Intra-Personal: Definition-Meaning-Importance-SWOT analysis- Goal Setting- Emotional Intelligence- Right thinking- Problem Solving-Time management.

Inter-Personal: Definition-Meaning-Importance-Communications skills- Team Work-Negotiation Skills-Leadership skills.

Learning Outcomes:

At the end of this unit, the student will be able to

- A commitment to ethics and integrity in academic and professional relationships, within the community and the environment. **L1**
- Describe how good communication with other can influence our working relationships **L2**

UNIT – III:VERBAL AND NON VERBAL SKILLS

Verbal Skills: Definition and Meaning-Importance-Improving Tips for Listening, Speaking, Reading-Writing Skills.

Non Verbal Skills: Definition and Meaning-Importance- Dress Code- Facial Expressions- Eye Contact- Proxemics - Haptics-Posture-Kinetics- Para Language.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compares verbal and nonverbal communication **L1**
- Understand the functions of nonverbal communication **L2**

UNIT – IV: FINISHING SCHOOL

Before Interview: Bridging between Campus and Corporate-Preparation of Resume-Cover Letter-Statement of Purpose-E-mail writing-Corporate Etiquettes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learner will be able to prepare his/ her own Resume and Cover letter. **L1**
- Learner will understand the importance of etiquettes and learn the nuances of expected behaviour within a group, a social class and society at general **L2**

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UNIT – V: DURING INTERVIEW

Interview Skills: Importance-Purpose- Types of interviews –Preparation for interviews - Top Questions- Body Language in Interview Room-Do's and Don't s of interview.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learner will be able to face interview questions and effectively present his /her. skills **L1**
- Learner will manage how to plan and organize personal and professional life. **L2**

Reference Books:

1. Sherfield, M. Robert at al **CornerstoneDeveloping Soft Skills**, 4th ed. Pearson Publication,New Delhi, 2014.
2. Alka Wadkar, **Life Skills for Success,** Sage Publications India Private Limited; First edition (1 May 2016)
3. Sambaiah.M. **Technical English**, Wiley publishers India. New Delhi. 2014.
4. GANGADHAR JOSHI, **From Campus to Corporate**, SAGE TEXT.
5. Alex.K, **Soft Skills,** 3rd ed. S. Chand Publication, New Delhi, 2014.
6. Meenakshi Raman and Sangita Sharma, **Technical Communication: Principle and Practice**, Oxford University Press. 2009.
7. Shalini Varma, **Body Language for Your Success Mantra**, 4th ed, S. Chand Publication, New Delhi, 2014.
8. Stephen Covey, **Seven Habits of Highly Effective People**, JMD Book, 2013.

Course Outcomes:

At the end of this Course the student will be able to

- The students will be able to assimilate and understood the meaning and importance of soft skills and learn how to develop them. **L1**
- The students will understand the significance of soft skills in the working environment for professional excellence. **L2**
- The students will be prepared to undergo the placement process with confidence and clarity. **L3**
- The students will be ready to face any situation in life and equip themselves to handle them effectively. **L4**
- The students will understand and learn the importance of etiquettes in both professional and personal life **L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS20-MATHEMATICAL MODELING

(Open Elective -I)

L	T	P	C
3	0	0	3

Course Objectives:

- To provide the basic knowledge to understand a Mathematical model.
- To formulate a Mathematical model related to a real world problems of engineering, biological science etc.

UNIT – 1: Mathematical Modeling & Mathematical modeling Through Ordinary differential equations of First Order : **9 Hrs**

Mathematical Modeling : Need, Techniques, Classifications and Simple illustrations,

Mathematical modeling Through Ordinary differential equations of First Order :

Mathematical modeling Through differential equations; Linear growth and decay models; Non-Linear Growth and Decay models; Mathematical modeling in dynamics through ordinary differential equations of first order.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn various mathematical techniques in modeling a problem. **L2**
- Learn modeling in dynamics through ordinary differential equations of first order. **L3**

UNIT – II: Mathematical modeling Through System of Ordinary differential equations of First Order:

Mathematical modeling in population dynamics; Mathematical modeling of Epidemics through system of ordinary differential equations of first order; Compartment models through Systems of ordinary differential equations; Mathematical modeling in dynamics through systems of ordinary differential equations of first order.

Learning Outcomes:

At the end of this unit, the student will be able to

- Develop a modeling of Epidemics through system of ordinary differential equations of first order. **L4**
- Analyze a modeling in dynamics through systems of ordinary differential equations of first order. **L3**

UNIT – III: Mathematical modeling Through Ordinary differential equations of Second Order:

Mathematical modeling of Planetary motion; Mathematical modeling of Circular motion and motion of satellites; Mathematical modeling through linear differential equations of second order.

Learning Outcomes:

At the end of this unit, the student will be able to

- Evaluate a mathematical modeling of planetary motion. **L5**
- Analyze a mathematical modeling of Circular motion and motion of satellites **L3**

UNIT – IV: Mathematical modeling Through Difference equations :

Need for Mathematical modeling Through Difference equations and simple models; Basic theory of Linear difference equations with constant coefficients; Mathematical modeling Through Difference equations in population dynamics and genetics; Mathematical modeling Through Difference equations in Probability theory.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze mathematical modeling through difference equations in population dynamics and genetics. **L4**
- Analyze mathematical modeling through difference equations in probability theory. **L4**

UNIT – V: Mathematical modeling Through Functional, Integral, Delay- Differential and Differential-Difference Equations :

Mathematical modeling Through Functional equations; Mathematical modeling Through Integral equations; Mathematical modeling Through Delay- Differential and Differential-Difference Equations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze a mathematical modeling through functional equations and integral equations. **L4**
- Analyze a mathematical modeling Through Delay- Differential and Differential-Difference Equations **L4**

Text Books:

1. J. N. Kapoor. Mathematical Modeling , New Age International Publishers.

Reference Books:

1. A. C. Fowler. Mathematical Models in Applied Sciences, Cambridge University Press.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts in mathematical modeling. **L1**
- Have better insight of the real word problems through mathematical modeling. **L2**
- Apply various concepts of mathematics in modeling. **L3**
- Analyze the real word problems through the techniques of modeling. **L4**
- Evaluate the real word problems through mathematical modeling. **L5**

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B.Tech III year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS21-FUZZY SET THEORY, ARITHMETIC AND LOGIC

(Open Elective -I)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing

- the basic knowledge to understand Fuzzy set theory and Arithmetic. and
- Logic, related to a real word problems of engineering, Science etc.

UNIT – 1: Classical (Crisp) Sets To Fuzzy Sets & Fuzzy Sets Versus Crisp Sets **9 Hrs**

Classical (Crisp) Sets To Fuzzy Sets:

Introduction: Crisp Sets: An Overview, Fuzzy Sets: Basic Types, Fuzzy Sets: Basic Concepts, Characteristics and Significance of the Paradigm Shift.

Fuzzy Sets Versus Crisp Sets:

Alpha -Cuts :Additional Properties of alpha -Cuts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets

Learning Outcomes:

At the end of this unit, the student will be able to

- The basic concepts of Sets and Fuzzy sets **L2**
- Analyze the Fuzzy Sets Versus Crisp Sets **L3**

UNIT – II: Operations On Fuzzy Sets:

Types of Operations, Fuzzy Complements, Fuzzy Intersections: t-Norms Fuzzy Unions: t- Conorms, Combinations of Operations, Aggregation Operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Do some operations on Fuzzy sets **L2**
- Assess t-Norms Fuzzy Unions **L3**

UNIT – III: Fuzzy Arithmetic & Fuzzy Relations:

Fuzzy Arithmetic :

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Relations:

Crisp versus Fuzzy Relations, Projections and Cylindric Extensions, Binary Fuzzy Relations, Binary Relations on a Single Set, Fuzzy Equivalence Relations, Fuzzy Compatibility Relations, Fuzzy Ordering Relations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Perform arithmetic operations on Fuzzy numbers and equations. **L2**
- Analyze Fuzzy Relations, Projections and Cylindric Extensions etc. **L3**

UNIT – IV: Fuzzy Relation Equations & Possibility Theory

Fuzzy Relation Equations:

General Discussion ,Problem Partitioning , Solution Method , Fuzzy Relation Equations Based on Sup-i Compositions , Fuzzy Relation Equations Based on Inf- ω_i Compositions

Possibility Theory:

Fuzzy Measures, Evidence Theory, Possibility Theory, Fuzzy Sets and Possibility Theory, Possibility Theory versus Probability Theory.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve Fuzzy relation equations. **L3**
- Analyze Possibility Theory **L4**

UNIT – V: Fuzzy logic

Classical Logic: An Overview, Multivalued Logics, Fuzzy Propositions, Fuzzy Quantifiers, Linguistic Hedges, Inference from Conditional Fuzzy Propositions, Inference from Conditional and Qualified Propositions, Inference from Quantified Propositions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Fuzzy logic. **L1**
- Analyze the Inferences from Conditional, Qualified, and Quantified Propositions. **L4**

Text Books:

1. Fuzzy Sets and Fuzzy Logic, Geoge J. Klir and Bo Yuan

Reference Books:

1. Fuzzy Mathematical Models in Engineering and Management Science, A. Kaufmann and M.M. Gupta
2. Fuzzy Logic, Timothy J. Ross
3. Fuzzy Set Theory, H.J. Zimmermann
4. Introduction to Fuzzy Logic and Fuzzy Sets, J.J. Buckley and E. Eslami

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts of Fuzzy sets and logic. **L1**
- Do some operations of Fuzzy sets. **L2**
- Solve Fuzzy relation equations. **L3**
- Analyze the Inferences from Conditional, Qualified, and Quantified Propositions. **L4**
- Analyze the real word problem through the technique of Fuzzy set theory and logic to have better insight of the real word problems. **L5**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS22-NUMBER THEORY

(Open Elective -I)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the basic knowledge

- To understand basic concepts of Number theory and
- To analyze the applications of Riemann Zeta Function and Dirichlet L Function of Number theory related to real word problems of engineering, biological science etc.

UNIT – 1: Divisibility and Primes & Congruences **9 Hrs**

Divisibility and Primes:

Division algorithm, Euclid's algorithm for the greatest common divisor- Linear Diophantine equations - Prime numbers, fundamental theorem of arithmetic, infinitude of primes- Distribution of primes, twin primes, Goldbach conjecture - Fermat and Mersenne primes - Primality testing and factorization.

Congruences:

Modular arithmetic- Linear congruences- Simultaneous linear congruences, Chinese Remainder Theorem- An extension of Chinese Remainder Theorem (with non-coprime moduli).

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn Division algorithm, Euclid's algorithm etc. **L2**
- Analyze linear congruences- Simultaneous linear congruences, and Chinese Remainder Theorem. **L3**

UNIT – II: Congruences with a Prime-Power Modulus, Euler's Function and RSA Cryptosystem, and Units Modulo an Integer

Congruences with a Prime-Power Modulus:

Arithmetic modulo p, Fermat's little theorem, Wilson's theorem - Pseudo-primes and Carmichael numbers- Solving congruences modulo prime powers.

Euler's Function and RSA Cryptosystem:

Definition of Euler function, examples and properties - Multiplicative property of Euler's function - RSA cryptography.

Units Modulo an Integer:

The group of units modulo an integer, primitive roots- Existence of primitive roots.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the Congruences with a Prime-Power Modulus **L3**
- Analyze the Euler's Function, RSA Cryptosystem and Units Modulo an Integer **L4**

UNIT – III: Quadratic Residues and Quadratic Forms

Quadratic residues, Legendre symbol, Euler's criterion- Gauss lemma, law of quadratic reciprocity- Quadratic residues for prime-power moduli and arbitrary moduli- Binary quadratic forms, equivalent forms- Discriminant, principal forms, positive definite forms, indefinite forms- Representation of a number by a form, examples- Reduction of positive definite forms, reduced forms- Number of proper representations, automorph, class number.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the Quadratic residues **L3**
- Analyze the Quadratic Forms **L4**

UNIT – IV: Sum of Powers, Continued Fractions and Pell's Equation

Sum of Powers:

Sum of two squares, sum of three squares, Waring's problem- Sum of four squares-Fermat's Last Theorem.

Continued Fractions and Pell's Equation:

Finite continued fractions, recurrence relation, Euler's rule- Convergents, infinite continued fractions, representation of irrational numbers- Periodic continued fractions and quadratic irrationals- Solution of Pell's equation by continued fractions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compute sum of powers and learn Fermat's last theorem. **L3**
- Solve Pell's equation by continued fractions **L4**

UNIT – V: Arithmetic Functions, The Riemann Zeta Function and Dirichlet L Function

Arithmetic Functions:

Definition and examples, multiplicative functions and their properties- Perfect numbers, Mobius function and its properties- Mobius inversion formula- Convolution of arithmetic functions.

The Riemann Zeta Function and Dirichlet L Function:

Historical background for the Riemann Zeta function, Euler product formula, convergence. - Applications to prime numbers- Dirichlet L-functions, Products of two Dirichlet L functions, Euler product formula.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the arithmetic functions **L3**
- Analyze the Riemann Zeta function and its Applications to prime numbers **L4**

Text Books:

1. G. A. Jones & J.M. Jones, Elementary Number Theory, Springer UTM, 2007.
2. Niven, H. S. Zuckerman & H.L. Montgomery, Introduction to the Theory of Numbers, Wiley, 2000.
3. D. Burton; Elementary Number Theory, McGraw-Hill, 2005

Reference Books:

1. Tom M. Apostol, Introduction to Analytical Number theory, Narosa Publishing house, 1998.
2. Elementary number theory and its applications, BEL laboratories.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts such as Learn Division algorithm, Euclid's algorithm etc. **L1**
- Analyze the Congruences with a Prime-Power Modulus and RSA Cryptosystem. **L2**
- Analyze the Quadratic residues and Quadratic forms. **L3**
- Solve Pell's equation by continued fractions **L4**
- Analyze the real word problem through the technique of Number theory. **L5**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS31-SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To provide exposure to various kinds of sensors, actuators and their Engineering applications.
- Capable of understanding the principles and physics of various kinds of sensors from macro to micro/nano level.

UNIT – 1: Introduction to sensors **9 Hrs**

Content of the Unit – I

Sensors, Sensor systems, Nanosensors, -Types of sensors(based on Functions, temperature, pressure, strain, ranging and motion, time- active and passive sensors). Materials used and their fabrication process (Deposition, Pattern and Etching), General characteristics of sensors. Actuators, Functional diagram of actuators, Design of Actuators, Types of actuators (Hydraulic, Pneumatic, Mechanical, Electromagnetic, EAP and EM actuators). Applications of Actuators.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify different types of Sensors, Actuators and their characteristics
- Identifies the applications of Actuators in different fields
- Explain about different fabrication process of Sensors
- Illustrate functional diagram of Actuators

UNIT – II: Mechanical sensors **9 Hrs**

Content of the Unit – II

Principles of mechanical sensors (piezoresistivity, piezoelectricity, capacitive, inductive and resonant techniques), Displacement sensors, velocity sensors, Torque sensors, flow sensors, Micro and nanosensors, Multimodal nanosensors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize various types of Mechanical sensors
- Explain the working principle of different types mechanical sensors
- Identifies the applications of Mechanical sensors in different environmental conditions
- Understand the basic concepts of micro and nano sensors

UNIT – III: Thermal sensors and Magnetic sensors **9 Hrs**

Content of the Unit – III

Introduction – Principles of Thermal sensors, Thermocouples, Types of thermocouples, Bi-metallic thermometer, Resistance Temperature Detectors (RTD), Advantages and Applications of these temperature sensors.

Introduction, Difference between conventional and magnetic sensors, Types of magnetic sensors (Low field, Earth field and BIAS magnetic field sensors), Working of variable reluctance sensors, Inductive sensors (LVDT), Eddy current sensors, Hall effect sensors, Applications of magnetic sensors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyse the difference between conventional sensors and magnetic sensors
- Explain the working principle of different magnetic sensors
- Identifies the applications of Thermal and Magnetic sensors
- Summarize various types of thermal and magnetic sensors

UNIT – IV: Electronic and Optical Sensors-I **9 Hrs**

Content of the Unit – IV

Introduction, Block diagram of electronic sensor system, Microelectronic sensors, semiconductor strain gauge, Gas sensors – Basic principle and working, Applications of electronic sensors – Electronic nose. Optical system components, Solid state optical systems, Optical radiation sources.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the working and principle of various electronic and optical sensors
- Explain the block diagram of electronic sensor system
- Identifies the applications Electronic sensors in various fields
- Identify the various optical, solid state system components

UNIT – V: Electronic and Optical Sensors –II **9 Hrs**

Content of the Unit – V

Optical system components, Solid state optical systems, Optical transmitter and filters type (Geometrical optics, Fiber optics, optical Filters), Solid state photoelectric sensors, Photoconductive cells, Photo junction sensors, photon couplers, Example: MEMS transducers, Sensors calibration and compensation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the optical system components and solid state optical systems
- Classify different types of Optical filters
- Explain the solid state photoelectric sensors, photo junction sensors and photoconductive cells
- Understand basics of MEMS transducers, sensors calibration and compensation

Text Books:

1. Sensors and Signal Conditioning Wiley-Blackwell, 2008 Jacob Fraden,
2. Piezoelectric Sensors and Actuators: Fundamentals and Applications, Springer,2018Senturia S. D.

Reference Books:

1. Doebelin, "Measurement Systems: Application and Design", McGraw Hill Kogakusha Ltd.
2. Julian W. Gardner, Vijay K. Varadan, Osama O. Awadelkarim "Microsensors, MEMS and Smart Devices", New York: Wiley, 2001.
3. Henry Bolte, "Sensors – A Comprehensive Sensors", John Wiley.
4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch.
5. Microsystem Design, Kluwer Academic Publisher, 2001 J.D. Plummer, M.D. Deal, P.G. Griffin

Course Outcomes:

At the end of this Course the student will be able to

- recognize the need of sensors
- types of sensors which they will able to utilize for the concerned engineering application

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS32-PHYSICS OF ELECTRONIC MATERIALS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- Be able to explain the fundamentals of materials.
- Be able to explain the kinds of semiconductor materials, their physical properties, and their applications.
- Be able to explain the kinds of magnetic materials, their physical properties, advances and their applications.
- Be able to explain the kinds of dielectric materials, their physical properties, advances and their applications.

UNIT – 1: Fundamentals of Materials **9 Hrs**

Content of the Unit – I

Introduction, Phase rule, Phase Diagram, Elementary idea of Nucleation and Growth, Methods of crystal growth. Elementary idea of point, line and planar defects. Concept of thin films, preparation of thin films, Deposition of thin film using sputtering methods (RT and glow discharge).

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic concepts of Phase and Phase diagram
- Understand the straight forward information of Nucleation and Growth
- Explain the preparation and deposition of Thin film using various methods
- Illustrate the methods of Crystal growth
- Summarize the different defects in crystal growth

UNIT – II: Semiconductors **9 Hrs**

Content of the Unit – II

Introduction, charge carriers in semiconductors, effective mass, Diffusion and drift, diffusion length, diffusion and recombination. The Fermi level & Fermi dirac distribution, Temperature dependence of carrier concentration, Invariance of the Fermi level at equilibrium. Band structure, PN junctions and their typical characteristics under equilibrium and under bias, Transistors, MOSFETs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics concepts regarding drift, diffusion, diffusion length and recombination.
- Classifies the energy bands of a Semiconductors
- Analyse how the position of the fermi level changes with carrier concentration and temperature.
- Explain the concepts regarding PN junctions, Transistors and MOSFETs.

UNIT – III: Optoelectronics **9 Hrs**

Content of the Unit – III

Introduction, Optoelectronic concepts, Hetrostructure p-n junction, Schottky junction and Ohmic contacts, Light emission and absorption, amplification and modulation in semiconductors, Semiconductor Light sources [Light emitting diodes (LEDs) , LASER, vertical cavity surface emitting laser (VCSEL), Quantum well laser {device structure – characteristics – Materials and applications}] and semiconductor Photo detectors [General Characteristics, Responsivity and Impulse response, photoconductors, semiconductor photodiodes].

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic concepts of PN junction and Schottky junction

- Explain about absorption, emission, amplification and modulation
- Illustrate various semiconductor light sources and their structure
- Identifies the characteristics and applications of optoelectronic devices
- Elucidate semiconductor photodetectors

UNIT – IV: Dielectric Materials and their applications **9 Hrs**

Content of the Unit – IV

Introduction, Dielectric properties, Electronic polarisability and susceptibility, dielectric constant and frequency dependence of polarization, Dielectric strength and dielectric loss, Piezoelectric properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of dielectric constant, polarisability, susceptibility
- Describe how the polarisation of the dielectric constant depends on the frequecy
- Explain about dielectric strength and dielectric loss
- Comprehend dielectric and piezoelectric properties

UNIT – V: Magnetic Materials and their applications **9 Hrs**

Content of the Unit – V

Introduction, Magnetism & various contributions to para and dia magnetism, Fero and Ferri magnetism and ferrites, concepts of Spin waves and Magnons, antiferromagnetism, domains and domain walls, coercive force, hysteresis, Nanomagnetism, Superparamagnetism – Properties and applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate different types of magnetic materials depending upon their properties
- Understand the concepts of Spin waves and Magnons
- Interpret the concepts of domains and domain walls
- Explain about the properties of Nanomagnetism, Super paramagnetism
- Identify the applications of magnetic materials

Text Books:

1. S.O. Kasap Principles of Electronic Materials and Devices, 3rd edition, McGraw-Hill Education (India) Pvt. Ltd., 2007.
2. Electrical Engineering Materials",by A.J. Dekker, PHI Pub.
3. "Electronic Components and Materials" Grover and Jamwal, DhanpatRai and Co.

Reference Books:

1. B.G. Streetman and S. Banerjee, Solid State Electronic Devices, 6th edition, PHI Learning,
2. Eugene A. Irene, Electronic Materials Science, Wiley, 2005
3. Wei Gao, Zhengwei Li, Nigel Sammes, An Introduction to Electronic Materials for Engineers, 2nd Edition, World Scientific Publishing Co. Pvt. Ltd., 2011
4. W D Callister, Materials Science and Engineering – An Introduction, Jr., John Willey and Sons, Inc, New York, 7th edition, 2007.
5. "A First Course In Material Science" by Raghvan, McGraw Hill Pub.
6. "Solid State Physics" by S.O.Pillai,New Age Publication.
7. 'The Science and Engineering of materials' by Donald R.Askeland,Chapman& Hall Pub.

Course Outcomes:

At the end of this Course the student will be able to

- Recognize the need of semiconductors
- Dielectric and magnetic materials which they will able to utilize for the concerned engineering application

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS41-CHEMISTRY OF ENERGY MATERIALS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To make the student understand basic electrochemical principles such as standard electrode potentials, EMF and applications of electrochemical principles in the design of batteries.
- To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.
- To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquefaction method
- Necessasity of harnessing alternate energy resources such as solar energy and its basic concepts.
- To understand and apply the basics of calculations related to material and energy flow in the processes.

UNIT – 1: Electrochemical Systems **9 Hrs**

Galvanic cell, standard electrode potential, application of EMF, Electrode mechanism, polarization, Batteries-Lead-acid and Lithium ion batteries.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve the problems based on electrode potential L3
- Describe the Galvanic Cell L2
- Differentiate between Lead acid and Lithium ion batteries L2
- Illustrate the electrical double layer L2

UNIT – II: : Fuel Cells

Basic design of fuel cell, Fuel cell working principle, Fuel cell efficiency Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), and their applications

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the working Principle of Fuel cell L2
- Explain the efficiency of the fuel cell L2
- Discuss about the Basic design of fuel cells L3
- Classify the fuel cell L2

UNIT – III: Hydrogen Storage

Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF), Carbon structures (Carbon nano tubes, fullerenes), metal oxide porous structures, hydrogen storage by high pressure methods. Liquefaction method

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate Chemical and Physical methods of hydrogen storage L2
- Discuss the metal organic frame work L3
- Illustrate the carbon and metal oxide porous structures L2
- Describe the liquification methods L2

UNIT – IV: Solar Energy

Solar energy introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar Fuels – Hydrogen: Ammonia& Hydrazine, Solar cells (Si-Te& Cd-Te), advantages and disadvantages.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the photo voltaic technology L3
- Demonstrate about solar energy and prospects L2
- Illustrate the Solar cells L2
- Discuss about concentrated solar power L3

UNIT – V: Photo and Photoelectrochemical Conversions

Photochemical cells and applications of photochemical reactions, specificity of photo electrochemical cell, advantage of photoelectron catalytic conversions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate between Photo and Photo electrochemical Conversions L2
- Illustrate the photochemical cells L2
- Identify the applications of photochemical reactions L3
- Interpret advantages of photoelectron catalytic conversion L2

Text Books:

1. Bahl and Bahl and Tuli, Essentials of Physical Chemistry, S. Chand Publications, New Delhi, 28th Edition, 2020.
2. US Department of Energy (EG&G technical services and corporation), Fuel Cell Hand Book 7th Edition, 2004.

Reference Books:

1. Ira N. Levine, Physical chemistry 6th Edition, McGraw Hills Education, New Delhi, 2009.
2. Silver and Atkins, Inorganic Chemistry, , 7th Edition, Oxford University Press, 2018.
3. Michael Hirscher, Hand book of Hydrogen Storage: New materials for future energy, storage, Wiley-VCH Verlag GmbH & Co. KGaA, 2010
4. Klaus Jagar et.al., Solar energy fundamental, technology and systems, UIT-Cambridge publishers, 2016

Course Outcomes:

At the end of this Course the student will be able to

- Understand to perform simultaneous material and energy balances **L1**
- Lists about various electrochemical and energy systems **L1**
- Classify solid, liquid and gaseous fuels **L3**
- Analyze the energy demand of world, nation and available resources to fulfill the demand **L3**
- Evaluate the conventional energy resources and their effective utilization **L3**
- To be able to understand and perform the various characterization techniques of fuels **L1**
- Explain knowledge of modern energy conversion technologies **L2**
- To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively **L1**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS42-ADVANCED POLYMERS AND THEIR APPLICATIONS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand the basic principles of polymers
- To synthesize the different polymeric materials and their characterization by various instrumental methods.
- To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
- To enumerate the applications of polymers in engineering

UNIT – 1: Polymers-Basics and Characterization **9 Hrs**

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization mechanisms: condensation, addition, radical chain, ionic and coordination copolymerization, Zeigler-Natta and Ring opening metathesis polymerization. Average molecular weight concepts: number, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers, Characterization of polymers by XRD, DSC.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify the polymers **L3**
- Explain polymerization mechanism **L2**
- Differentiate addition, condensation polymerizations **L2**
- Describe measurement of molecular weight of polymer **L2**

UNIT – II: : Synthetic Polymers

Polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization. Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications.

Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate Bulk, solution, Suspension and emulsion polymerization **L2**
- Describe fibers and elastomers **L2**
- Identify the thermosetting and thermo polymers **L3**

UNIT – III: Natural Polymers & Modified cellulosics

Natural Polymers: Chemical & Physical structure, properties, source, important chemical modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins. Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the properties and applications of polymers **L2**

- Interpret the properties of cellulose, lignin, starch, rosin, latex etc., **L2**
- Discuss the special plastics of PES, PAES, PEEK etc., **L3**
- Explain modified cellulosics **L2**

UNIT – IV: Hydrogels of Polymer networks and Drug delivery

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, **Applications** of hydrogels in drug delivery. Introduction to drug systems including, drug development, regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify types of polymer networks **L3**
- Describe methods involve in hydrogel preparation **L2**
- Explain applications of hydrogels in drug delivery **L2**
- Demonstrate the advanced drug delivery systems and controlled release **L2**

UNIT – V: Surface phenomena

Surface tension, adsorption on solids, electrical phenomena at interfaces including electro-kinetics, micelles, reverse micelles, solubilization. XPS principle-application of photoelectron spectroscopy, ESCA and Auger spectroscopy to the study of surfaces.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate electrical phenomena at interfaces including electrokinetics, miselles, reverse micelles etc., **L3**
- Explain photoelectron spectroscopy **L2**
- Discuss ESCA and Auger spectroscopy to the study of surfaces **L3**
- Differentiate micelles and reverse micelles **L2**

Text Books:

1. Fred W.Billmayer, A Text book of Polymer science, 3rd Edition, Wiley India, 2007.
2. K.J.Saunders, Organic polymer Chemistry, Chapman and Hall, 1973.

Reference Books:

1. B.Miller, Advanced Organic Chemistry, Prentice Hall, 2nd Edn, 2003.
2. Ambikanandan Misra, Aliasgar Shahiwala, Applications of polymers in Drug delivery system, Elsevier Pub., 2020.
3. Gowarikar, Polymer Chemistry –New Age International Publications, 2019.
4. Physical Chemistry , Samel Galsstone, Lan Caster Press, 1970.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the state of art synthesis of Polymeric materials **L1**
- Understand the hydro gels preparation, properties and applications in drug delivery system. **L2**
- Characterize polymers materials using XPS. **L2**
- Analyze surface phenomenon of micelles and characterize using photoelectron spectroscopy, ESCA and Auger spectroscopy. **L3**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS43-Marine Chemistry

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To classify the different dissolved gases in sea water.
- To predict the role of biological processes in affecting oceanic carbonate system.
- To describe chemical and pharmacological properties of bioactive substances in marine organisms.
- To determine micro-nutrient elements (N, P, Si) in seawater.
- To identify dissolved elements in the estuary.

UNIT – 1: Dissolved gases in seawater **9 Hrs**

Dissolution of gases in seawater and their solubility; classification of dissolved gases and factors affecting their concentration in seawater; distribution of dissolved oxygen in seawater and affecting factors, Apparent Oxygen Utilization (AOU) and oxygen minimum zone formation in the ocean, origin and consequences of ocean hypoxia, Methane hydrate, clathrates

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the factors affecting on the dissolution of gases **L1**
- Understand apparent oxygen utilization and ozygen minimum zone formation in ocean. **L1**
- Compare the distribution of dissolved gaseous in sea water **L4**
- Analyze origin and consequences of ocean hypoxia, methane hydrate and clathrates **L3**

UNIT – II: : Carbonate systems in the ocean

Acid base equilibria in seawater, carbon dioxide system – absorption of carbon dioxide, carbon cycle; parameters of carbonate systems and their distribution in the ocean; role of biological processes in affecting oceanic carbonate system; precipitation and dissolution of calcium carbonate in seawater, lysocline and carbonate compensation depth; Ocean acidification

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic principle of acid-base equibria in sea water **L1**
- Explain the concept of carbon cycle **L1**
- Lists the various biological process in affecting oceanic carbonate, pptn and dissolution **L1**
- Analyze the parameters of carbonate system in oceanic water **L3**

UNIT – III: Chemistry of marine natural products

Biomedical aspects; chemical and pharmacological properties of bioactive substances in marine organisms, carbohydrates and their derivatives in red and brown algae, aliphatic acids and their derivatives in marine organisms, steroids and their use as biomarkers, nitrogenous compounds in invertebrates, nucleosides from sponges, biopolymer

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the chemical and pharmacological properties of bioactive substances in marine organism **L1**
- Explain the steroids and their use as biomarkers **L2**
- List the chemical properties in nitrogenous compounds in invertebrates **L1**

UNIT – IV: Micronutrients in seawater

Micro-nutrient elements (N, P, Si) in seawater, their forms, distribution and seasonal variation in the ocean. Stoichiometry of uptake and regeneration of nutrients elements and Apparent Oxygen Utilization (AOU)

Learning Outcomes:

At the end of this unit, the student will be able to

- List the micro-nutrients in sea water **L1**
- Understand the stoichiometry of uptake and regeneration of nutrients **L1**
- Differentiate the distribution of micronutrients with seasonal variation in the ocean **L2**

UNIT – V: Estuarine chemistry

Behavior of dissolved and particulate material during estuarine mixing, interaction among them and speciation of dissolved elements in the estuary; physico-chemical characteristics of estuarine sediment, anoxic sediments and pore water; heavy metals in estuaries and the processes affecting their distribution

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the behavior of dissolved and particulate matter in estuarine system **L1**
- Analyze the physicochemical characteristics of estuarine system **L3**
- Differentiate the effect of heavy metals in estuaries and affecting in distribution **L2**

Text Books:

1. Riley, J.P. and Chester, R., Introduction to Marine Chemistry, Academic Press, 1971.
2. Chester, R., Marine Geochemistry, Blackwell Science, 1990, 2000

Reference Books:

1. Riley, J.P., Skirrow, G, Chemical Oceanography (Vol.1,2, 3), Academic Press, 1975.
2. Horne, R.A, Marine Chemistry - The Structure of Water and the Chemistry of the Hydrosphere, 1969 Wiley- Interscience.
3. Seawater: Its composition, properties & behaviour, 2nd Edn, The Open University Team, 1989
4. Martin, D.F., Marcel Dekker, Marine Chemistry (Vol.2), 2nd Edition, Academic Press, NY, 1970.
5. Broecker and Peng, Tracers in the Sea, Lamont-Doherty Geological Observatory, 1982, NY.
6. Chemical Oceanography, 1992 – Millero, F. J. and Sohn, M.L., CRC Press
7. Burton ct al., Dynamic processes in the chemistry of the upper ocean, Plenum Press, 1986.
8. Heinrich D Holland, The Chemistry of the Atmosphere and Oceans, John Wiley & sons Inc, 1978.

Course Outcomes:

At the end of this Course the student will be able to

- List the various dissolved gases in sea water and factors affecting their. **L1**
- Demonstrate knowledge of concepts and principles of ocean acidification. Analyse and evaluate biomedical aspects of marine natural products. **L2**
- Integrate and apply the knowledge of stoichiometry of uptake and regeneration of nutrients elements. **L3**
- Reflect on the influence heavy metals in estuaries. **L4**
- Evaluate total findings in marine chemistry to solve engineering problems **L3**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE55a- BASICS OF NON-CONVENTIONAL ENERGY SOURCES

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Identify various sources of Energy and the need of Renewable Energy Systems
- Understand the concepts of Solar Radiation, Wind energy and its applications
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

UNIT – I: Solar Energy **10 Hrs**

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy thermal storage.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about solar thermal parameters
- To distinguish between flat plate and concentrated solar collectors
- To know about thermal storage requirements
- To know about measurement of solar radiation

UNIT – II: PV Energy Systems **10 Hrs**

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems..

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

UNIT – III: Wind Energy **10 Hrs**

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

UNIT – IV: Geothermal Energy **10 Hrs**

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India..

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Geothermal energy and its mechanism of production and its Applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

UNIT – V: Miscellaneous Energy Technologies **10 Hrs**

Ocean Energy: Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations.

Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

Text Books:

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

Reference Books:

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd,2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria& Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE55b- ELECTRICAL MEASUREMENTS & SENSORS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- The basic principles of different types of electrical instruments for the measurement of voltage, current, power factor, power and energy.
- The measurements of RLC parameters using bridge principles.
- The principles of magnetic measurements.
- The principle of working of CRO and its applications.
- Extending the range of an Instrument.

UNIT – I: Measuring Instruments **10 Hrs**

Classification – Ammeters and Voltmeters – PMMC, Dynamometer, Moving Iron Types – Expression for the Deflecting Torque and Control Torque – Errors and their Compensation, Extension of range–Numerical examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the operation of different in struments.
- Know the different types of errors and their compensation

UNIT – II: Measurement of Power, Power Factor and Energy **10 Hrs**

Single Phase Dynamometer Wattmeter, LPF and UPF, Double Element and Three Elements, Expression for Deflecting and Control Torques; P.F. Meters: Dynamometer and Moving Iron Type–1-phand3-ph Power factor Meters. Single Phase Induction Type Energy Meter-Driving and Braking Torques–Errors and their Compensation, Three Phase Energy Meter-Numerical examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the working principles and construction of different types of Energy meters
- Distinguish between low and high power factor ranges in wattmeters

UNIT – III: Instrument transformers, Potentiometers, and magnetic measurements **10 Hrs**

Current Transformers and Potential Transformers – Ratio and Phase Angle Errors – MethodsforReductionofErrors-DesignConsiderations.DCPotentiometers: Principle and Operation of D.C. Crompton's Potentiometer –Standardization – Measurement of unknown Resistance, Currents and Voltages. A.C. Potentiometers: Polar and Coordinate types-Standardization – Applications. Determination of B-H Loop Methods of Reversals – Six Point magnetic measurement Method–A.C.Testing–Iron Loss of Bar Samples –Numerical Examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish between CTs and PTs
- Understand the principles and working of various measuring instruments used to detect electrical circuit parameters R,L,C

UNIT – IV: D.C & A.C Bridges **10 Hrs**

Method of Measuring Low, Medium and High Resistances – Sensitivity of Wheat stone's Bridge – Kelvin's Double Bridge for Measuring Low Resistance, Measurement of High Resistance –Loss of Charge Method. Measurement of Inductance-Maxwell's Bridge, Anderson's Bridge. Measurement of Capacitance and Loss Angle – DeSauty Bridge. Wien's Bridge –Schering Bridge–Numerical Examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the bridge configurations and their applications for various ranges of resistance measurement
- Compute the unknown parameters of Inductance and Capacitance using the bridges

UNIT – V: CRO and Digital Meters **10 Hrs**

Cathode Ray Oscilloscope-Cathode Ray Tube-Time Base Generator-Horizontal and Vertical Amplifiers–Applications of CRO–Measurement of Phase, Frequency, Current and Voltage-Lissajous Patterns. Digital Voltmeters – Successive Approximation, Ramp, and Integrating Type-Digital Frequency Meter-Digital Multimeter- Digital Tachometer.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the operation of CRO and its parts
- Know about Digital voltmeters and Distinguish between an along and digital meters

Text Books:

1. Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications, 2007.
2. Electrical Measurements and measuring Instruments–by E.W.Golding and F.C.Widdis, 5th Edition, Reem Publications,2011.

Reference Books:

1. Electronic Instrumentation by H.S. Kalsi, Tata McGraw-Hill, 3rd Edition, 2011.
2. Electrical Measurements: Fundamentals, Concepts, Applications –by Reissland, M.U, New Age International (P) Limited,2010.
3. Electrical & Electronic Measurement & Instrumentation by R.K.Rajput,2nd Edition, S.Chand & Co., 2nd Edition,2013.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the working of various instruments and equipments used for the measurement of various electrical engineering parameters like voltage, current, power, phase etc in industry as well as in power generation, transmission and distribution sectors **L1**
- Analyze and solve the varieties of problems and issues coming up in the vast field of electrical measurements. **L2**
- Analyze the different operation of extension range ammeters and voltmeters, **L3**
- Design and development of various voltage and current measuring meters. **L4**
- Analyze DC and AC bridges for measurement of parameters and different characteristics of periodic and a periodic signals using CRO. **L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE55c- ELECTRIC VEHICLE ENGINEERING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To get exposed to new technologies of battery electric vehicles, fuel cell electric vehicles
- To get exposed to EV system configuration and parameters
- To know about electro mobility and environmental issues of EVs
- To understand about basic EV propulsion and dynamics
- To understand about fuel cell technologies for EV and HVEs
- To know about basic battery charging and control strategies used in electric vehicles

UNIT – I: Introduction to EV Systems and Parameters **10 Hrs**

Past, Present and Future EV, EV Concept, EV Technology, State-of-the Art EVs, EV configuration, EV system, Fixed and Variable gearing, single and multiple motor drive, in-wheel drives, EV parameters: Weight, size, force and energy, performance parameters.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about past, present and latest technologies of EV **L1**
- To understand about configurations of EV systems **L1**
- To distinguish between EV parameters and performance parameters of EV systems **L2**
- To distinguish between single and multiple motor drive EVs **L4**
- To understand about in-wheel EV **L5**

UNIT – II: EV and Energy Sources **10 Hrs**

Electro mobility and the environment, history of Electric power trains, carbon emissions from fuels, green houses and pollutants, comparison of conventional, battery, hybrid and fuel cell electric systems

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various types of EV sources **L1**
- To understand about e-mobility **L2**
- To know about environmental aspects of EV **L3**
- To distinguish between conventional and recent technology developments in EV systems **L4**

UNIT – III: EV Propulsion and Dynamics **10 Hrs**

Choice of electric propulsion system, block diagram, concept of EV Motors, single and multi motor configurations, fixed and variable geared transmission, In-wheel motor configuration, classification, Electric motors used in current vehicle applications, Recent EV Motors, Vehicle load factors, vehicle acceleration.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about what is meant by propulsion system **L1**
- To understand about single and multi motor EV configurations **L2**
- To get exposed to current and recent applications of EV **L3**
- To understand about load factors in vehicle dynamics **L4**
- To know what is meant acceleration in EV **L5**

UNIT – IV: Fuel Cells **10 Hrs**

Introduction of fuel cells, basic operation, model, voltage, power and efficiency, power plant system – characteristics, sizing, Example of fuel cell electric vehicle. Introduction to HEV, brake specific fuel consumption, comparison of series, series parallel hybrid systems, examples

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about fuel cell technology of EV **L1**
- To know about basic operation of FCEV **L2**
- To know about characteristics and sizing of EV with suitable example **L3**
- To get exposed to concept of Hybrid Electric Vehicle using fuel cells **L4**
- To know about the comparison of various hybrid EV systems **L5**

UNIT – V: Battery Charging and Control **10 Hrs**

Battery charging: Basic requirements, charger architecture, charger functions, wireless charging, power factor correction. Control: Introduction, modeling of electro mechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about basic requirements of battery charging and its architecture **L1**
- To know about charger functions **L2**
- To get exposed to wireless charging principle **L3**
- To understand about block diagram, modeling of electro mechanical systems of EV **L4**
- To be able to design various compensation requirements **L5**

Text Books:

1. C.C Chan, K.T Chau: Modern Electric Vehicle Technology, Oxford University PressInc., New York 2001.
2. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.

Reference Books:

1. Electric and Hybrid Vehicles Design Fundamentals, Iqbal Husain, CRC Press 2005.
2. Ali Emadi, Advanced Electric Drive Vehicles, CRC Press, 2015.

Course Outcomes:

At the end of this Course the student will be able to

- To understand and differentiate between conventional and latest trends in Electric Vehicles **L1**
- To know about various configurations in parameters of EV system **L2**
- To know about propulsion and dynamic aspects of EV **L3**
- To understand about fuel cell technologies in EV and HEV systems **L4**
- To understand about battery charging and controls required of EVs **L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55a – INTRODUCTION TO HYBRID AND ELECTRICAL VEHICLES

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Provide good foundation on hybrid and electrical vehicles.
- To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles.
- Familiarize energy storage systems for electrical and hybrid transportation.
- To design and develop basic schemes of electric vehicles and hybrid electric vehicles.

UNIT I: Electric Vehicle Propulsion And Energy Sources **12 hours**

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. Battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summaries the concepts of electrical vehicle propulsion and energy sources. **L2**
- Identify the types of power sources for electrical vehicles **L3**
- Demonstrate the design considerations for propulsion system. **L2**
- Solve the problems on tractive power and energy required. **L3**

UNIT II: Electric Vehicle Power Plant And Drives **10 hours**

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives- PWM, current control method. Switch reluctance machine drives - voltage control, current control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Choose a suitable drive scheme for developing electric vehicles depending on resources. **L1**
- List the various power electronic converters. **L1**
- Describe the working principle DC/DC converters and buck boost convertor. **L2**
- Explain about AC Drives. **L2**

UNIT III: Hybrid And Electric Drive Trains **10 hours**

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

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Learning Outcomes:
At the end of this unit, the student will be able to

- Identify the social importance of hybrid vehicles. **L3**
- Discus impact of modern drive trains in energy supplies. **L6**
- Compare hybrid and electric drive trains. **L2**
- Analyze the power flow control and energy efficiency. **L6**

UNIT IV: Electric And Hybrid Vehicles - Case Studies **8 hours**

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study –Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications. Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles

Learning Outcomes:
At the end of this unit, the student will be able to

- List the various electric and hybrid vehicles in the present market. **L1**
- Discuss lightly hybridized vehicle and low voltage systems. **L6**
- Explain about hybrid electric heavy duty vehicles and fuel cell heavy duty vehicles. **L2**

UNIT V: Electric And Hybrid Vehicle Design **8 hours**

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

Learning Outcomes:
At the end of this unit, the student will be able to

- Illustrate matching the electric machine and the internal combustion engine. **L2**
- Select the energy storage technology. **L3**
- Select the size of propulsion motor. **L3**
- Design and develop basic schemes of electric and hybrid electric vehicles. **L3**

Text Books:

1. Iqbal Hussein, Electric and Hybrid Vehicles: Design Fundamentals, 2/e, CRC Press, 2003.
2. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach, illustrated edition, John Wiley & Sons, 2014
3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design, CRC Press, 2004.

Reference Books:

1. James Larminie, John Lowry, Electric Vehicle Technology Explained, Wiley, 2003.
2. John G. Hayes, G.Abas Goodarzi, Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles, 1/e, Wiley-Blackwell, 2018.

Course Outcomes:
At the end of this Course the student will be able to

- Explain the working of hybrid and electric vehicles. **L2**
- Choose a suitable drive scheme for developing hybrid and electric vehicles depending on resources. **L3**
- Develop the electric propulsion unit and its control for application of electric vehicles. **L3**
- Choose proper energy storage systems for vehicle applications. **L3**
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles. **L3**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55b – RAPID PROTOTYPING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize techniques for processing of CAD models for rapid prototyping.
- Explain fundamentals of rapid prototyping techniques.
- Demonstrate appropriate tooling for rapid prototyping process.
- Focus Rapid prototyping techniques for reverse engineering.
- Train Various Pre – Processing, Processing and Post Processing errors in RP Processes

UNIT I **12 Hours**

Introduction: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

RP Software: Need for RP software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, SolidView, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain prototyping process. **L2**
- Classify different Rapid Prototyping Processes. **L2**
- Summarize RP software's and Represent a 3D model in STL format, other RP data formats. **L2**

UNIT II **10 Hours**

Solid and Liquid Based RP Systems: Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications. Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications. Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications. Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of Solid and Liquid based AM systems. **L2**
- Identify the materials for Solid and Liquid based AM systems. **L2**

UNIT III **8 Hours**

Powder Based RP Systems: Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Other RP Systems: Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballastic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

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Learning Outcomes:
At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. **L2**
- Understand the principles, advantages, limitations and applications of other Additive Manufacturing Systems such as 3D Printing, Ballistic Particle Manufacturing and Shape Deposition Modeling. **L2**

UNIT IV **8 hours**

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.

Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:
At the end of this unit, the student will be able to

- Classify Rapid Tooling methods. **L2**
- Explain the concepts of reverse engineering and scanning tools. **L2**

UNIT V **8 Hours**

Errors in RP Processes: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS, etc.

RP Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

Learning Outcomes:
At the end of this unit, the student will be able to

- Identify various Pre – Processing, Processing and Post – Processing errors in RP processes. **L2**
- Apply of RP in engineering design analysis and medical applications. **L3**

Text Books:

1. Chua C.K., Leong K.F. and Lim C.S., Rapid Prototyping: Principles and Applications, 2/e Edition, World Scientific Publishers, 2003.
2. Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1st Edition, Springer, 2010.
3. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.

Reference Books:

1. Liou W. Liou, Frank W., Liou, Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development, CRC Press, 2007.
2. Pham D.T. and Dimov S.S., Rapid Manufacturing; The Technologies and Application of RPT and Rapid tooling, Springer, London 2001.
3. Gebhardt A., Rapid prototyping, Hanser Gardener Publications, 2003.
4. Hilton P.D. and Jacobs P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2005.

Course Outcomes:
At the end of this Course the student will be able to

- Use techniques for processing of CAD models for rapid prototyping. **L3**
- Understand and apply fundamentals of rapid prototyping techniques. **L3**
- Use appropriate tooling for rapid prototyping process. **L3**
- Use rapid prototyping techniques for reverse engineering. **L3**
- Identify Various Pre – Processing, Processing and Post Processing errors in RP processes. **L3**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55c – DESIGN FOR MANUFACTURING AND ASSEMBLY

(Open Elective – I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Discuss various factors influencing the manufacturability of components and use of tolerances in manufacturing
- Explain various considerations in casting, welding, forging and machining processes.
- Demonstrate on the design factors dependent on the assembly methods.
- Teach the principles and rules of design for assembly.
-

UNIT I: INTRODUCTION TO DFM **12 Hours**

Significance of design, qualities of a designer and Design factors, Systematic working plan, The engineering problem to be solved, The basic design, Factors influencing choice of materials and the factors influencing manufacturing Process Capability Mean, Median, Variance, Mode, Standard Deviation, Normal Distribution and Process capability metrics, Process Capability, Tolerances-symbols and definition, Tolerances relevant to manufacturing, assembly and material condition, Tolerance stack-effects on assembly with examples, Methods of eliminating tolerance stack with examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the desirable qualities of a designer. **L2**
- List various factors influencing the choice of materials. **L1**
- Recall the concepts of Mean, Median, Variance and Mode. **L1**
- Discuss the methods of eliminating tolerance stack with examples. **L2**

UNIT II: FORM DESIGN-CASTING AND WELDING **10 Hours**

Influence of loading, Materials, Production methods on form design, Casting considerations, Grey iron castings, Steel castings, Aluminum Casting Requirements and rules for casting, Form design of pressure die castings, Welding considerations welding Processes, Requirements and rules for welding, Redesign of components for casting-pattern-mould- Parting Line, Redesign of components for welding, Case studies in form design-simple problems in form design.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall the function of various components (pattern, mould, parting line, etc) in casting **L1**
- Explain the various production methods on form design. **L2**
- Understand the requirements and rules for casting and welding. **L2**
- Make use of case studies to understand redesign of the components. **L3**

UNIT III: FORM DESIGN-FORGING AND MACHINING **8 Hours**

Forging considerations hammer forging drop forging, Requirements and rules for forging, Choice between casting, forging and welding, Machining considerations Drills, Milling-Keyways, Dwells and Dwelling Procedure Countersunk Head screws Requirements and rules for Machining considerations and Reduction of machined areas Redesign of components for Forging, Redesign of components for Machining, Simplification by separation and Simplification by amalgamation, Case studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Choose the manufacturing process depending upon the shape and size of the product. **L3**

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- Classify various machining processes **L2**
- Discuss the rules and design considerations of forging **L2**
- Recall the redesign concepts of forging and machining. **L1**

UNIT IV: INTRODUCTION TO DFA **8 hours**

DFA, Introduction, Distinction between assembly methods and processes, Factors Determining assembly methods and processes, Success and failure-Causes of failure, Product Design factors independent of methods and processes , Introduction-Number of operations in the product, Assembly Precedence, Standardization, Design factors dependent on Assembly methods , Introduction-Single Station Assembly Line Assembly, Hybrid Systems, Manual Assembly lines, Flexible Assembly lines, Design factors dependent on Assembly processes, Factors Influencing Production rate to Facility Ratio- Parts Presentation, Manual Assembly, Dedicated Assembly, Transportation, Separation and Orientation-Flexible Assembly, Gripping, Transferring, Part Insertion, Failures and Error Recovery

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate manual assembly lines and flexible assembly lines. **L2**
- Explain the product design factors independent of methods and processes **L2**
- Discuss the importance of standardization in design for assembly. **L2**
- List the design factors that are dependent and independent on the Assembly processes. **L1**

UNIT V: DESIGN FOR ASSEMBLY METHODS **8 Hours**

Approaches to design for assembly and Introduction, Approaches based on design principles and rules, Example DFA method using Design Principles, DFA Systems employing Quantitative evaluation procedures, IPA Stuttgart Method, DFA Methods employing a Knowledge based approach, Knowledge representation Computer Aided DFA methods, Part model, Feature, Processing. Assembly measures like Qualitative and Quantitative measures, Boothroyd and Dewhurst DFA method. Redesign of a simple product , Small consumer product and Fastener solution redesign using symmetry, Case Studies Designing of a disposal valve, Design of a lever-arch file mechanism

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain various approaches to design for assembly. **L2**
- Demonstrate on DFA systems employing quantitative evaluation procedures. **L2**
- Discuss DFA methods employing a knowledge based approach. **L2**
- Understand the qualitative and quantitative measures in assembly. **L2**

Text Books:

1. Harry Peck., "Design for Manufacture", Pittman Publications, 1983.
2. Alan Redford and chal, "Design for Assembly-Principles and Procedures", McGraw Hill International Europe, London, 1994.

Reference Books:

1. Robert Matousek, "Engineering Design A Systematic Approach", Blackie &sons Ltd., 1963
2. James G.Bralla, "Hand Book of Product design for Manufacturing", McGraw Hill Co., 1986
3. Swift, K.G., "Knowledge Based Design for Manufacture", Kogan Page Ltd., 1987

Course Outcomes:

At the end of this Course the student will be able to

- Recall the importance of Design for Manufacturing and Assembly. **L1**
- Explain the form design factors with the help of Case study. **L2**
- Evaluate how the factor of redesign affects the product life cycle. **L5**
- Make use of DFA methods proposed by Boothroyd and Dewhurst. **L3**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55d – POWER PLANT OPERATION AND CONTROL

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize with various methods of power generation.
- Outline the working components of power plants.
- Expose the students measuring of various controllable and uncontrollable factors in power plants.
- Explain the concepts of boiler and turbine control.

UNIT I : OVERVIEW OF POWER GENERATION 12 Hours

Survey of methods of power generation: Hydro, thermal, nuclear, solar and wind power - Importance of instrumentation in power generation - Thermal power plant - Building blocks - Combined cycle systems - Combined heat and power system - sub critical and supercritical boilers.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the various types of power plants. **L1**
- Illustrate the importance of instrumentation in power generation. **L4**
- Compare subcritical and supercritical boilers. **L2**

UNIT II: MEASUREMENTS IN POWER PLANTS 10 Hours

Measurement of feed water flow, air flow, steam flow and coal flow – Drum level measurement – Steam pressure and temperature measurement – Turbine speed and vibration measurement – Flue gas analyzer – Fuel composition analyzer

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe turbine speed and vibration measurements. **L2**
- Determine the steam flow and coal flow in power plants. **L3**
- Appraise the importance of flue gas and fuel composition analyzer in power plants. **L5**
- Illustrate the various controllable and uncontrollable factors that can be measure in power plants. **L2**

UNIT III : BOILER CONTROL – I 8 Hours

Combustion of fuel and excess air – Firing rate demand – Steam temperature control – Control of deaerator– Drum level control – Single, two and three element control – Furnace draft control – implosion – flue gas dew point control – Trimming of combustion air – Soot blowing.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the various boiler control methods. **L1**
- Describe the steam temperature control and drum level control. **L2**
- Demonstrate furnace draft control and drum level control. **L2**

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UNIT IV : BOILER CONTROL – II **8 hours**

Burners for liquid and solid fuels – Burner management – Furnace safety interlocks – Coal pulverizer control – Combustion control for liquid and solid fuel fired boilers – air/fuel ratio control – fluidized bed boiler – Cyclone furnace.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the burners for liquid and solid fuels. **L3**
- Describe the working principle of coal pulverizer control. **L2**
- Explain combustion control for liquid and solid fuel fired boiler. **L2**

UNIT V :CONTROL OF TURBINE **8 Hours**

Types of steam turbines – impulse and reaction turbines – compounding – Turbine governing system – Speed and Load control – Transient speed rise – Free governor mode operation – Automatic Load Frequency Control – Turbine oil system – Oil pressure drop relay – Oil cooling system – Turbine run up system.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the various types of steam turbines. **L1**
- Compare impulse and reaction turbines. **L2**
- Describe turbine governing system for speed and load control. **L2**
- Explain about oil cooling system in turbine. **L2**

Text Books:

1. Sam Dukelow, Control of Boilers, Instrument Society of America, 1991.
2. Everett Woodruff , Herbert Lammers, Thomas Lammers, Steam Plant Operation,9th Edition McGraw Hill, 2012.
3. Rajput R.K. A Text book of Power plant Engineering. 5th Edition, Lakshmi Publications, 2013.

Reference Books:

1. Liptak B.G., Instrumentation in Process Industries, Chilton Book Company, 2005.
2. Jain R.K., Mechanical and Industrial Measurements, Khanna Publishers, New Delhi, 1999.
3. P.K.Nag, Powerplant Engineering, Tata McGraw-Hill Education, 3rd edition, 2007.
4. Tamilmani, Power plant instrumentation, Sams Publishers, 2011.
5. Krishnaswamy.K and Ponnibala.M., Power Plant Instrumentation, PHI Learning Pvt.Ltd., New Delhi, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Outline sources of energy for various power plants. **L2**
- Explain boiler and turbine control. **L2**
- Describe working components of a steam power plant. **L2**
- Illustrate the working mechanism of Diesel and Gas turbine power plants. **L2**
- Summarize types of measuring parameters for controlling the power plant. **L2**
- Demonstrate the working principle of nuclear power plants. **L4**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55e – SMART MATERIALS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize the smart materials and its role in developing intelligent systems.
- Introduce the students with HBLS and LBHS smart materials.
- Expose the students in smart systems development and uses.
- Understand the working principle of smart actuators and smart sensors.

UNIT I **12 Hours**

Introduction to Smart Materials: What is Intelligence? Artificial intelligence Vs. embedded Intelligence, Definition of smart material, need for smart materials, classifications of smart systems, components of a smart systems, smart system applications, the role of Smart Materials in developing Intelligent Systems and Adaptive Structures.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall what is intelligence. **L1**
- Define smart materials. **L1**
- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Illustrate the applications of smart systems. **L2**

UNIT II: High bandwidth - Low strain generating (HBLS) Smart Materials **10 Hours**

Piezoelectric Materials – constitutive relationship, electromechanical coupling coefficients, piezoelectric constants, piezoceramic materials, variation of coupling coefficients in hard and soft piezoceramics, polycrystalline vs single crystal piezoelectric materials, polyvinyldene fluoride, piezoelectric composites.

Magnetostrictive Materials – constitutive relationship, magneto-mechanical coupling coefficients, Joule Effect, Villari Effect, Matteuci Effect, Wiedemann effect, Giant magnetostriction in Terfenol-D, Terfenol-D particulate composites, Galfenol and Metglas materials.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the constitutive relationship of piezoelectric materials. **L2**
- Compare polycrystalline and single crystal piezeoelectric materials. **L2**
- Explain concepts of Joule effect, Villari effect, Matteuci effect, Wiedemann effect. **L2**
- Discuss Galfenol and Metglas materials. **L6**

UNIT III **8 Hours**

Low bandwidth - High strain generating (LBHS) materials: Shape Memory Alloys (SMA) – Introduction, Phenomenology, Influence of stress on characteristic temperatures, Modelling of shape memory effect. Vibration control through shape memory alloys. Design considerations, multiplexing embedded NiTiNOL actuators. Electro-active Polymers (EAP)- Introduction, Phenomenology, Influence of stress on characteristic temperatures

Learning Outcomes:

At the end of this unit, the student will be able to

- List various types of LBHS smart materials. **L1**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**

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- Explain the concept of vibration control through shape memory alloys. **L2**
- Discuss design considerations of shape memory alloy. **L6**

UNIT IV: Smart actuators **8 hours**

Based on HBLS smart materials: Piezoelectric Actuators – Induced Strain actuation model, Unimorph and Bimorph Actuators, Actuators embedded in composite laminate, Impedance matching in actuator design, Feedback Control, Pulse Drive, Resonance Drive. Magnetostrictive Actuators – Magnetostrictive Mini Actuators, Thermal instabilities, Discretely distributed actuation, Manetostrictive Composites.

Based on LBHS Smart Materials - Shape Memory Alloy based actuators for Shape Control, Electro-active Polymers for Work-Volume Generation

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall working principle of actuators. **L1**
- Explain impedance matching in actuator design, feedback control, pulse drive and resonance. **L2**
- Describe the working principle of Piezoelectric Actuators & Magnetostrictive Actuators. **L2**
- Discuss the concepts of actuators based on HBLS and LBHS. **L6**

UNIT V: Smart sensors **8 Hours**

Sensors based on HBLS Smart Materials - Piezoelectric Sensors Magnetostrictive Sensors Techniques of Self Sensing MEMS Sensors.

Sensors based on LBHS Smart Materials - EAP based sensors, SMA based encoders, Optical Fibre based Sensing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Select the type of sensor required for smart systems. **L1**
- Explain techniques of self sensing MEMS sensors. **L2**
- Discuss EPA based and SMA based sensors. **L6**
- Explain optical based sensing system. **L2**

Text Books:

- M.V. Gandhi, B.D. Thompson" Smart Materials and Structures" Springer Science & Business Media, 31-May-1992.

Reference Books:

1. Brian Culshaw, Smart Structures and Materials, Artech House, 2000.
2. Gauenzi, P., Smart Structures, Wiley, 2009.
3. Cady, W. G., Piezoelectricity, Dover Publication

Course Outcomes:

At the end of this Course the student will be able to

- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Compare polycrystalline and single crystal piezoelectric materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain techniques of self sensing MEMS sensors. **L2**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME55f – SUPPLY CHAIN MANAGEMENT

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Explain the basics of supply chain management.
- Familiarize inventory management techniques and models to ensure EOQ batch size under risk management.
- Demonstrate various distribution strategies for shipment of products.
- Focus on evaluating of strategic alliance partners and understanding of RDBMS.

UNIT I **12 Hours**

Understanding the supply chain: What is SCM? Why SCM? The Complexity, Key issues in SCM Logistics network - Introduction, Data Collection, Transportation, Ware house Management, Strategic location of ware houses, Demand forecasting, Role of aggregate planning, MRP, ERP, Managing variability, Key features of Network configuration.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the strategic importance of SCM and how operations relate to other business functions. **L2**
- Summarize working knowledge of the concepts and methods of SCM **L2**
- Apply concepts for continuous improvement for practical problems **L3**

UNIT II **8 Hours**

Inventory management: Concepts of Materials Management, Economic lot size model, Effect of Demand uncertainly, Fixed order costs, Variable lead frames, Inventory under certainly & uncertainty, Risk Management

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain why companies keep inventory and costs of inventory for inventory decisions. **L2**
- Outline the key elements and relationship with customer service. **L2**
- Determine the appropriate reorder point in a continuous inventory system based on a target service level. **L3**
- Apply the order quantity estimate for a periodic inventory system. **L3**

UNIT III **8 Hours**

Distribution strategies: Introduction, Centralized vs Decentralized control, Direct shipment, Cross Docking, Push based vs Pull based supply chain.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss outsourcing as a strategic decision. **L3**
- Classify the distribution strategies, systems and processes **L2**
- Analyze issues and trends in the supply chain **L4**

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UNIT IV **8 hours**

Strategic alliances: Third party Logistics (3PL), Retailer – supplier relationship issues, requirements, success & failures, Distributor integration Types & issues.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the third party logistics **L2**
- Develop retailer supplier relationship issues **L2**
- Compare distribution integration types and issues **L2**

UNIT V **10 hours**

MIS & SCM: Relational Data Base Management (RDBMS), System Architecture, Communications, and Implementation of ERP, Decision support systems for SCM: Analytical tools, Presentation tools, Smooth production flow Current issues & directing challenges for future, e-Commerce strategies and world class supply chain management.

Learning Outcomes:

At the end of this unit, the student will be able to

- Interpret the basic modes of RDBMS for communication and ERP implementation. **L5**
- Identify support systems for supply chain management **L3**
- Explain the analytical and presentation tools **L2**
- Outline E-commerce strategies for world class SCM **L2**

Text Books:

1. Sunil Chopra, Peter Meindl, Supply Chain Management: Strategy, Planning, and Operation, 4/e, Pearson, 2010.
2. David N. Burt, Donald W. Dobler , World Class Supply Management: The Key to Supply Chain Management, 2/e, McGraw-Hill/Irwin, 2003

Reference Books:

1. John Joseph Coyle, Edward J. Bardi, C. John Langley, The Management of Business Logistics: A Supply Chain Perspective, South-Western/Thomson Learning, 2003.
2. Upendra Kachru, Logistics and Supply Chain Management, Excel Books, 2009.

Course Outcomes:

At the end of this Course the student will be able to

- Apply the concepts of supply chain management for demand forecasting. **L3**
- Make use of SCM and inventory management for procurement. **L3**
- Analyze the shipment activities and related issues. **L4**
- Build third party alliances. **L5**
- Adapt the RDBMS data for communications and analyzing future challenges and understand e-commerce strategies. **L6**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC55a- FUNDAMENTALS OF ELECTRONICS AND COMMUNICATION ENGINEERING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To study the basic principle, construction and operation of semiconductor devices.
- To learn the real time applications of semiconductor devices.
- To introduce binary number systems, logic gates and digital logic circuits.
- To get an idea about the basic principles of communication systems and their applications.
- To learn the measurement of physical parameters using Sensors and Transducers.

UNIT – I:

Introduction to Electronics Engineering: Overview, scope and objective of studying Electronics Engineering. Introduction to semiconductor devices: Bond structure of semiconductors, intrinsic and extrinsic semiconductors; Basic principle and operation of semiconductor devices – diode, bipolar junction transistor, field effect transistors; Introduction to VLSI.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic principle, construction and operation of semiconductor devices. **L2**
- Learn about the diode, bipolar junction transistor and field effect transistors. **L1**

UNIT – II:

Applications of semiconductor devices: Basic concepts of rectifiers, voltage regulators, amplifiers and oscillators; Basic concepts of operational amplifier and their applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn the real time applications of semiconductor devices.(L1) **L1**
- To understand the basic concepts of operational amplifier and their applications.(L2) **L2**

UNIT – III:

Introduction to digital systems: Binary number system, Boolean algebra, Logic gates, adders, one-bit memory, flip-flops (SR, JK), shift registers, Asynchronous counter.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the binary number systems, Boolean algebra and working of logic gates. **L2**
- Know the working and applications of digital logic circuits. **L1**

UNIT – IV:

Introduction to Communication Systems: Elements of a communication system – transmitter and receiver; Signal types in communication; FDM and TDM; Processing of signals for transmission – basic concepts of amplitude and frequency modulation; Examples of telecommunication systems – telephone, radio, television, mobile communication and satellite communication.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the basic elements of a communication system. **L2**
- Understand various examples of telecommunication systems. **L2**

UNIT – V:

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic working principle and applications of different sensors and transducers. **L2**
- Measure physical parameters using different types of sensors and transducers. **L3**

Text Books:

1. Millman J, Halkias C.C andJit S, "Electronic Devices and Circuits", Tata McGraw-Hill, 2nd 2007 Edition.
2. Mano M.M., "Digital Design", Prentice-Hall, 3rd Edition. 2002
3. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai& Co. 3rd edition Delhi, 2010.
4. Kennedy G. and Davis B., "Electronic Communication Systems", Tata McGraw-Hill, 4th 2008 Edition.

Reference Books:

1. Tomasi W., "Advanced Electronic Communication Systems", Pearson/Prentice-Hall, 6th 2004 Edition.
2. Boylstead R.L. andNashelsky L., "Electronic Devices and Circuit Theory", Pearson, 10th 2009 Edition.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic principle, construction and operation of semiconductor devices. **L2**
- Learn the real time applications of semiconductor devices. **L1**
- Comprehend the binary number systems, logic gates and digital logic circuits. **L1**
- Understand the basic principles of communication systems and their applications. **L2**
- Measure the physical parameters using Sensors and Transducers. **L3**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC55b- TRANSDUCERS AND SENSORS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To study about the characteristics of instrumentation system and transducers.
- To know the operation of different types of Temperature Transducers.
- To learn the operation of different types of Flow Transducers.
- To understand the working and operation of different types of Pressure Transducers.
- To gain the knowledge on working of Force and Sound Transducers.

UNIT – I:

Introduction: General Configuration and Functional Description of measuring instruments, Static and Dynamic Characteristics of Instrumentation System, Errors in Instrumentation System, Active and Passive Transducers and their Classification.

Motion Transducers: Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the characteristics of instrumentation system and transducers. **L1**
- Measure motion using different motion transducers. **L3**

UNIT – II:

Temperature Transducers: Standards and calibration, fluid expansion and metal expansion type transducers - bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics.

Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smart sensors, Piezo-electric sensors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the working principle of temperature transducers. **L2**
- Study about different types of bio sensors and smart sensors. **L1**

UNIT – III:

Flow Transducers: Bernoulli's principle and continuity, Orifice plate, Nozzle plate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Bernoulli's principle and continuity. **L2**
- Learn how to measure flow using different types of flow meters. **L1**

UNIT – IV:

Pressure Transducers: Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Work with different types of manometers. **L3**
- Use different types of pressure transducersto measure pressure. **L3**

UNIT – V:

Force and Sound Transducers: Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes. Sound level meter, sound characteristics, Microphone.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn how to measure force using force transducers. **L1**
- Understand the working and operation of sound transducers. **L2**

Text Books:

1. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", Dhanpat Rai& Co. 3rd edition Delhi, 2010.
2. Rangan C.S, Sarma G.R and Mani V S V,"Instrumentation Devices and Systems", TATA McGraw Hill publications, 2007.

Reference Books:

1. Doebelin. E.O, "Measurement Systems Application and Design",McGraw Hill International, New York, 2004.
2. Nakra B.CandChaudharyK.K , "Instrumentation Measurement and Analysis", Second Edition, Tata McGraw-Hill Publication Ltd.2006.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the characteristics of instrumentation system and transducers **L2**
- Know the operation of different types of Temperature Transducers. **L1**
- Compare the operation of different types of Flow Transducers. **L2**
- Correlate the working and operation of different types of Pressure Transducers. **L4**
- Gain the knowledge on working of Force and Sound Transducers. **L1**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC55c- PRINCIPLES OF COMMUNICATIONS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To understand the importance of modulation and Amplitude modulation.
- To know about the frequency modulation and phase modulation.
- To study different types of pulse analog modulation techniquesand multiple access techniques.
- To gain knowledge on pulse code modulation and different waveform coding techniques.
- To comprehend the wireless communication systems, their evolution and standards.

UNIT – I:

Analog communication-I: Elements of communication systems need for Modulation, Modulation Methods, Baseband and carrier communication Amplitude Modulation(AM),Generation of AM signals, Rectifier detector, Envelope detector, sideband and carrier power of AM, Double side band suppressed carrier(DSB-SC) modulation & its demodulation, Switching modulators, Ring modulator, Balanced modulator, Single sideband(SSB) transmission, VSB Modulation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic elements of communication systems. **L2**
- Compare the performance of analog modulation schemes. **L2**

UNIT – II:

Analog communication-II : Angle Modulation & Demodulation: Concept of instantaneous frequency Generalized concept of angle modulation, Bandwidth of angle modulated waves- Narrow band frequency modulation (NBFM); and Wide band FM (WBFM),Phase modulation, Pre-emphasis & De-emphasis, Illustrative Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare the performance of different frequency modulated schemes. **L2**
- Learn about the Pre-emphasis & De-emphasis circuits in frequency modulation. **L1**

UNIT – III:

Digital communications-I (Qualitative Approach only) :Pulse Analog Modulation Techniques : Pulse analog modulation techniques, Generation and detection of Pulse amplitude modulation, Pulse width modulation, Pulse position modulation

Multiple Access Techniques: Introduction to multiple access techniques, FDMA,TDMA, CDMA, SDMA: Advantages and applications

Learning Outcomes: At the end of this unit, the student will be able to

- Analyze the performance of different pulse modulation techniques. **L4**
- Understand the basic principles of Multiple Access Techniques. **L2**

UNIT – IV:

Digital communications-II (Qualitative Approach only) : Pulse Code Modulation, DPCM, Delta modulation, Adaptive delta modulation, Overview of ASK, PSK, QPSK, BPSK and M-PSK techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the performance of different types of digital modulation schemes. **L2**
- Explain different types of waveform coding techniques and their applications. **L1**

UNIT – V:

Wireless communications (Qualitative Approach only) : Introduction to wireless communication systems, Examples of wireless communication systems, comparison of 2G and 3G cellular networks, Introduction to wireless networks, Differences between wireless and fixed telephone networks, Introduction to Global system for mobile(GSM),GSM services and features.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand various types of wireless communication systems. **L1**
- Explain GSM services and features. **L2**

Text Books:

1. H Taub, D. Schilling and Gautam Sahe, "Principles of Communication Systems", TMH, 2007, 3rd Edition
2. George Kennedy and Bernard Davis, "Electronics & Communication System", 4th Edition, TMH 2009
3. Wayne Tomasi, "Electronic Communication System: Fundamentals Through Advanced",2nd editions,PHI,2001.

Reference Books:

1. Simon Haykin, "Principles of Communication Systems", John Wiley, 2nd Edition.
2. Sham Shanmugam," Digital and Analog communication Systems",Wiley-India edition,2006.
3. Theodore. S.Rapport, "Wireless Communications",Pearson Education,2nd Edition,2002.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the importance of modulation and Amplitude modulation. **L2**
- Summarize the frequency modulation and phase modulation methods. **L2**
- Explain about different types of pulse analog modulation techniquesand multiple access techniques. **L3**
- Acquire knowledge on pulse code modulation and different waveform coding techniques. **L1**
- Comprehend the wireless communication systems, their evolution and standards. **L1**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS55a- OOPS CONCEPTS THROUGH JAVA

Open Elective-1

L	T	P	C
3	0	0	3

Course Objectives:

- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

UNIT – I: INTRODUCTION **8hrs**

Introduction to Java: The key attributes of object oriented programming, simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics. **L2**
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. **L2**

UNIT – II: CLASSES **8hrs**

Classes: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use of geometric transformations on graphics objects and their application in composite form. **L3**
- Extract scene with different clipping methods and its transformation to graphics display device. **L3**

UNIT – III: INHERITANCE **8hrs**

Inheritance – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. **L4**
- Render projected objects to naturalize the scene in 2D view and use of illumination models . **L4**

UNIT – IV: INTERFACES **7 Hrs**

Interfaces – Creating, Implementing, Using, Extending, and Nesting of interfaces.

Packages – Defining, Finding, Member Access, Importing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of Multimedia basics, different graphics systems and applications of computer graphics. **L3**
- Discuss various multimedia data structures. **L3**

UNIT – V: EXCEPTION HANDLING

Exception handling: Hierarchy, Fundamentals, Multiple catch clauses, subclass exceptions, Nesting try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of Multimedia Authoring systems. **L5**
- Understand the how videos are placed. **L5**

Text Books:

1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.
2. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill.
3. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.

Reference Books:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Core Java", Nageswar Rao, Wiley Publishers.
3. "Thinking in Java", Bruce Eckel, Pearson Education.
4. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
5. "Head First Java", Kathy Sierra, Bert Bates, O'Reilly
6. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill.
7. "Java in Nutshell", David Flanagan, O'Reilly
8. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press.

Course Outcomes:

At the end of this Course the student will be able to

- Gain knowledge of client-side scripting, validation of forms and AJAX programming. **L3**
- Understand server-side scripting with PHP language. **L4**
- Understand what XML is and how to parse and use XML Data with Java. **L5**
- To introduce Server-side programming with Java Servlets and JSP.

III B.Tech I SEMESTER

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS55b- INTRODUCTION TO INTERNET OF THINGS

Open Elective-I

L	T	P	C
3	0	0	3

Course Objectives:

- Students will be explored to the interconnection and integration of the physical world and the cyber space. They are also able to design & develop IOT Devices.

UNIT – 1: INTRODUCTION

Introduction – Characteristics-Physical Design - Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.**Learning Outcomes:**

At the end of this unit, the student will be able to

- Able to understand the application areas of IOT · **L2**
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**

UNIT – II: M2M, IoT vs M2M

M2M, IoT vs M2M, SDN and NFV for IoT, IOT system Management with NETCONF-YANG.

. Learning Outcomes:

At the end of this unit, the student will be able to

- Able to understand the application areas of IOT · **L2**
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**

UNIT – III: IOT SYSTEM MANAGEMNT

IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development.

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to understand the application areas of IOT · **L2**
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**

UNIT – IV: SENSORS

Sensors- Types of sensor nodes, Internet communications, IP addresses, MAC Address, TCP and UDP Ports, Application layer protocols

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to understand the application areas of IOT · **L2**
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**

UNIT – V: IOT APPLICATIONS

IOT application for industry-Future factory concepts, Brownfield IoT, Smart objects, Smart applications, Study of existing IoT platforms/middleware, IoT- A, Hydra etc.

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to understand the application areas of IOT · **L2**
- Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**

Text Books:

1. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.

Reference Books:

1. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
2. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.
3. *Simon Monk, "Programming the Raspberry Pi: Getting Started with Python",* McGraw-Hill, *2013.*
4. Charalampos Doukas, "Building Internet of Things With the Arduino", Second Edition, 2012.
5. Dr. John Bates, "Thingalytics: Smart Big Data Analytics for the Internet of Things", Software AG Publisher, 2015.

Course Outcomes:

At the end of this Course the student will be able to

Introduction to computer graphics

Able to understand the application areas of IOT · **L2**

Able to realize the revolution of Internet in Mobile Devices, Cloud & Sensor Networks · **L3**

Able to understand building blocks of Internet of Things and characteristics **L4**

III B.Tech I SEMESTER

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS55c- INTRODUCTION TO OPERATING SYSTEMS

Open Elective-1

L	T	P	C
3	0	0	3

Course Objectives:

- To make the students understand the basic operating system concepts such as processes, threads, scheduling, synchronization, deadlocks, memory management, file and I/O subsystems and protection.
- To get acquaintance with the class of abstractions afford by general purpose operating systems that aid the development of user applications

UNIT – 1: OPERATING SYSTEMS OVERVIEW

Operating Systems Overview: Operating system functions, Operating system structure, operating systems Operations, protection and security.

Operating System Structure: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand what makes a computer system function and the primary PC components. **L2**
- Understand past and current trends in computer technology. **L3**

UNIT – II: THREADS

Threads: overview, Multicore Programming, Multithreading Models, Thread Libraries, Implicit threading, Threading Issues.

CPU Scheduling: Scheduling-Criteria, Scheduling Algorithms, Thread Scheduling.

. Learning Outcomes:

At the end of this unit, the student will be able to

- Understand past and current trends in computer technology. **L3**
- Use basic software applications. **L4**

UNIT – III: MEMORY MANAGEMENT

Memory Management: Swapping, contiguous memory allocation, segmentation, paging, structure of the page table.

Deadlocks: System Model, deadlock characterization, Methods of handling Deadlocks, Deadlock prevention, Detection and Avoidance, Recovery from deadlock.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use basic software applications. **L4**
- Add functionality to the exiting operating systems **L5**

UNIT – IV: MASS-STORAGE STRUCTURE

Mass-storage structure: Overview of Mass-storage structure, Disk structure, Disk attachment, Disk scheduling, Swap-space management, RAID structure, Stable-storage implementation.

Learning Outcomes:

Read

At the end of this unit, the student will be able to

- Add functionality to the exiting operating systems **L5**
- Design new operating systems **L6**

UNIT – V: I/O systems

I/O systems: I/O Hardware, Application I/O interface, Kernel I/O subsystem, Transforming I/O requests to Hardware operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Add functionality to the exiting operating systems **L5**
- Design new operating systems **L6**

Text Books:

1. Operating System Concepts, Abraham Silberschatz, Peter B. Galvin, Greg Gagne, Ninth Edition, 2012, Wiley.
2. Operating Systems: Internals and Design Principles, Stallings, Sixth Edition, 2009, Pearson Education.

Reference Books:

1. Modern Operating Systems, Andrew S Tanenbaum, Second Edition, PHI.
2. Operating Systems, S.Haldar, A.A.Aravind, Pearson Education.
3. Principles of Operating Systems, B.L.Stuart, Cengage learning, India Edition.
4. Operating Systems, A.S.Godbole, Second Edition, TMH.
5. An Introduction to Operating Systems, P.C.P. Bhatt, PHI.
6. Operating Systems, G.Nutt, N.Chaki and S.Neogy, Third Edition, Pearson Education.
7. Operating Systems, R.Elmasri, A,G.Carrick and D.Levine, Mc Graw Hill.

Course Outcomes:

At the end of this Course the student will be able to

- Understand what makes a computer system function and the primary PC components. **L2**
- Understand past and current trends in computer technology. **L3**
- Use basic software applications. **L4**
- Add functionality to the exiting operating systems **L5**
- Design new operating systems **L6**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS14a-MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Humanities Elective-I)(Common to CE&ME)

L	T	P	C
3	0	0	3

Course Objectives:

- To inculcate the basic knowledge of micro economics and financial accounting.
- To make the students learn how demand is estimated for different products, input- output relationship for optimizing production and cost.

UNIT – 1

Introduction to Managerial Economics:

Definition of Managerial Economics, Nature and Scope – Managerial Economics and its relation with other subjects- Basic economic tools in Managerial Economics.

Demand Analysis & Elasticity of Demand: Meaning- Demand distinctions- Demand determinants- Law of Demand and its exceptions, Types of Elasticity of demand - Measurement of price elasticity of demand, Significance of Elasticity of Demand.

Demand Forecasting: Meaning - Factors governing demand forecasting - Methods of demand forecasting - Forecasting demand for new products.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the nature and scope of Managerial Economics and its importance. **L1**
- Understand the concept of demand and its determinants. **L2**

UNIT – II

Theory of Production: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the production function, Input-Output relationship and different cost concepts. **L1**
- Apply the least-cost combination of inputs. **L2**

UNIT – III

Introduction to Markets: Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the price output relationship in different markets. **L1**
- Evaluate price-output relationship to optimize cost, revenue and profit. **L2**

11/10/21

UNIT – IV

Types of Industrial Organization: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

Capital Budgeting: Introduction to capital, Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the concept of capital budgeting and its importance in business. **L1**
- Contrast and compare different investment appraisal methods. **L2**

UNIT – V

Introduction to Financial Accounting: Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

Interpretation and analysis of Financial Statement: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the concept, convention and significance of accounting. **L1**
- Apply the fundamental knowledge of accounting while posting the journal entries. **L2**

Text Books:

1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011.
2. **Prof. C.Viswanatha Reddy:** 'Financial Accounting-1' Himalaya Publishing House, Newdelhi.

Reference Books:

1. **A R Aryasri** - Managerial Economics and Financial Analysis, TMH 2011.
2. **Suma damodaran**- Managerial Economics, **Oxford** 2011.
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.
4. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives. **L1**
- Be able to perform and evaluate payback period and capitalized cost on one or more economic alternatives. **L2**
- Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives. **L3**
- Evaluate the capital budgeting techniques. **L4**
- Students can analyze how to invest their capital and maximize returns. **L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS14b-ENTERPRENUARSHIP AND INNOVATION MANAGEMENT

(Humanities Elective-I)(Common to [illegible])

CE & ME

L	T	P	C
3	0	0	3

Course Objectives:

- To enable students understand the opportunities available to start a business.
- To impart knowledge about various sources of support (Financial and Non-financial) available to start an enterprise.

UNIT – 1: FUNDAMENTALS OF ENTREPRENEURSHIP

Fundamentals of Entrepreneurship – Evolution and Theories of Entrepreneurship – Characteristics of Entrepreneurs –Myths of Entrepreneurship – Kakinada Experiment -Elements of leadership –Role of Entrepreneurs in Indian economy – Social and Ethical Perspectives of Entrepreneurship - Corporate entrepreneurship – Social Entrepreneur, women Entrepreneurship
- Opportunities & challenges.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define entrepreneurship and the characteristics of an entrepreneur. **L1**
- Explain the significance of entrepreneurship in the economic development of a nation. **L2**

UNIT – II: IDEATION AND EVALUATION OF BUSINESS IDEAS

Opportunity identification – Ideations process - Sources of business ideas – Role of creativity – Sources of Innovation - Business Idea Evaluation - Product/ Service design – Design Thinking - Customer Value Proposition (CVP) – Business models.

Case study: Business cases of OYO, Paytm and Flipkart/ Smartmart.

Activity: Idea generation in groups and CVP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Select the right business ideas. **L1**
- Explain the business idea evaluation process **L2**

UNIT – III: Business Organizations and Venture Establishment

Forms of business organisations/ownership – Techno-economic feasibility assessment – Financial feasibility – Market feasibility – Preparation of Business plan – Business canvas & Lean canvas – Challenges & Pitfalls in selecting new venture.

Activity: Preparation of business plan (draft).

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall different forms of business organizations. **L1**
- Develop business canvas. **L2**

UNIT – IV: Introduction to Innovation

Creativity, Invention and innovation, Types of Innovation, Relevance of Technology for Innovation, The Indian innovations and opportunities.

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to develop new ideas to discover new ways of looking problems and opportunities. **L1**
- Apply technology to innovation. **L2**

11/10/21

UNIT – V: Promoting and managing innovation

Innovators and Imitators, Patents, Trademarks, Intellectual Property, Exploring, Executing, Leveraging and renewing innovation, Enhancing Innovation Potential & Formulating strategies for Innovation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Intellectual Property Licensing. **L1**
- Summarize the importance of IPR. **L2**

Text Books:

1. Robin Lowe and Sue Marriott, Enterprise: Entrepreneurship and Innovation Concepts, Contexts and Commercialization.
2. John Bessant and Joe Tidd, Innovation and Entrepreneurship.

Reference Books:

1. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
2. Peter F. Drucker, Innovation and Entrepreneurship.
3. EDII "Faculty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development" Institute of India, Ahmadabad, 1986.
4. Philips, Bonefiel and Sharma (2011), Social Entrepreneurship, Global vision publishing house, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- Choose entrepreneurship as an alternative career. **L1**
- Distinguish between corporate and social entrepreneurs. **L2**
- Examine and build customer value proposition. **L3**
- Analyze feasibility of business ideas. **L4**
- Compare various supports schemes provided by GOI. **L5**

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE56- SOIL MECHANICS LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.

LIST OF EXPERIMENTS

1. Atterberg's Limits.
2. Field density-core cutter and sand replacement method
3. Grain size analysis
4. Specific gravity of soils by Density Bottle method &Pycnometer method
5. Permeability of soil, constant and variable head test
6. Compaction test
7. CBR Test
8. Consolidation test
9. Unconfined compression test
10. Tri-axial Compression test(Demo)
11. Direct shear test.
12. Vane shear test

NOTE: At least EIGHT of the above experiments are to be conducted

Text Books:

1. Soil Testing Lab Manual by K.V.S. Appa Rao &V.C.C.Rao,University Science Press ,Laxmi Publication.
2. Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, NewDelhi.
3. Relevant ISCodes.

Course Outcomes:

At the end of this Course the student will be able to

- Identify various soils based on their characteristics.
- Evaluate permeability and seepage of soils.
- Determine plasticity characteristics of various soils.
- Design consolidation process by predicting settlement of soils.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE57- HIGHWAY ENGINEERING LAB

L	T	P	C
0	0	2	1

Course Objectives: The objectives of the course are to make the students learn about

To have knowledge on various highway materials like aggregate, bitumen, mechanical properties of the materials and their usage in the field.

Note: Minimum of eight experiments is to be executed

I. Tests on Aggregates

1. Aggregate Crushing Value Test
2. Los Angeles Abrasion Test
3. Aggregate Impact Value Test
4. Aggregate shape Test (Flakiness &Elongation)
5. Specific Gravity of Aggregate Test
6. Water Absorption of Aggregate Test
7. Soundness Test

II. Tests onBitumen

1. Penetration Test
2. Ductility Test
3. Softening Point Test
4. Specific Gravity Test
5. Viscosity Test
6. Flash and Fire Point Test

III. Demo on Bituminous Mixes

1. Marshall Stability Test

Course Outcomes:

By performing the various tests in this laboratory the student will be able to know the physical characteristics of aggregates and bitumen

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS16-ORGANIZATIONAL BEHAVIOR

(Common to CE & ME)

L	T	P	C
3	0	0	0

Course Objectives:

- To make the student understand about the organizational behavior
- To enable them to develop self motivation, leadership and management.

UNIT – 1:

Organizational Behavior - Introduction to OB - Meaning and definition, scope - Organizing Process – Making organizing effective - Understanding Individual, Behavior – Attitude - Perception - Learning - Personality Types.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Organizational Behavior. **L1**
- Evaluate personality types. **L2**

UNIT – II:

Individual Behavior – Diversity – Biographical Characteristics Ability – Implementing Diversity Management – Strategies – Attitudes & Job Satisfaction - Personality – Theories of Personality – Perception – Process of Perception – Perception & Individual Decision Making – Motivation from concepts to Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Organizational Behavior. **L1**
- Contrast and compare Individual Behavior and attitude. **L2**

UNIT – III:

Group Behavior – Foundations of Group Behaviour – Defining and Classifying Groups – Stages of Group Development – Group Properties – Roles – Norms – Status, Size and Cohesiveness – Group Decision Making – Understanding Work Teams – Types of Teams – Creating Effective Teams.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the concept of Group Dynamics. **L1**
- Contrast and compare Group behavior and group development. **L2**

UNIT – IV:

Leadership and Motivational Theories: Leadership Theories – Characteristic of effective leader – Finding and Creating Effective Leaders – Power & Polities. Introduction to motivation, Maslow's Hierarchy of Needs, Two- factor theory of Motivation, Mcdregers theory of motivational Model.

Learning Outcomes:

At the end of this unit, the student will be able to

- Contrast and compare Traits theory and Managerial Grid. **L1**
- Know the difference between Transactional and Transformational Leadership. **L2**

UNIT – V:

Foundation of Organizational Structure: Conflicts & Negotiations – Organization Structure – Organization Change & Stress Management – Self Management – Managing Careers.

Learning Outcomes:

11/10/21

At the end of this unit, the student will be able to

- Know the importance of organizational change and development. **L1**
- Apply change management in the organization. **L2**

Text Books:

1. Stephen P. Robbins, Timothy: Organizational Behaviour, Pearson 14th Edition, 2012.
2. Dr. Anjali Ghanekar, Organizational Behaviour Concepts & Cases, Everest, 19th Edition, 2013.

Reference Books:

1. Mirza S Saiyadain, Cases in Organizational Behavior , TMH,2011.
2. Gerard H.Seijts, Cases in Organizational Behavior, Sage,2008.
3. Nelson, Quick and Khandelwala, ORGB, 2/e, Cengage, 2012.
4. P.G. Aquinas: Organizational Behaviour Concepts, Realities, Application & Challenges, 2nd Edition, Excel Books 2012.

Course Outcomes:

At the end of this Course the student will be able to

- To bring about the through understanding of entrepreneurship and constraints for the growth of entrepreneurial culture. **L1**
- To demondtrate knowledge in entrepreneurship development. **L2**
- To understand the concept of entrepreneushiptaining and various entrepreneurship training institutes in India. **L3**
- To be able to demontrate progressive learning in the project report and ownership structures. **L4**
- To be able to demontrate progressive learning in the project report and ownership structures. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS12-ENGLISH LANGUAGESKILLS

(Common to CE & ME)

L	T	P	C
3	0	0	3

Course Objectives:

- Facilitate active listening to enable inferential learning through expert lectures and talks
- Provide training and opportunities to develop fluency in English through participation in formal group discussions and presentations using audio-visual aids

UNIT – I: **12 Hrs**

Listening: Listening to famous speeches for structure and style
Speaking: Oral presentations on general topics of interest.
Reading: Reading for meaning and pleasure – reading between the lines.
Writing: Appreciating and analyzing a poem –Paraphrasing, note-taking.
Grammar and Vocabulary: Tenses (Advanced Level) Correcting errors in punctuation -Word roots and affixes.
Learning Outcomes:
At the end of this unit, the student will be able to

- Understand the purpose of rhythm and rhyme and the use of figures of speech in making the presentation lively and attractive. **L1**
- Apply the knowledge of structure and style in a presentation, identify the audience and make note of key points. **L2**

UNIT – II: **12 Hrs**

Listening: Following the development of theme; answering questions on key concepts after listening to stories online.
Speaking: Narrating personal experiences and opinions.
Reading: Reading for summarizing and paraphrasing; recognizing the difference between facts and opinions.
Writing: Summarizing, precis writing, letter and note-making
Grammar and Vocabulary: Subject-verb agreement, noun-pronoun agreement, collocations.
Learning Outcomes:

- At the end of this unit, the student will be able to
- Make formal structured presentations on academic topics. **L1**
- Use correct English avoiding common errors in formal speech and writing. **L2**

UNIT – III: **12 Hrs**

Listening: Identifying views and opinions expressed by different speakers while listening to speeches.
Speaking: Small talks on general topics; agreeing and disagreeing, using claims and examples/ evidences for presenting views, opinions and position.
Reading: Identifying claims, evidences, views, opinions and stance/position.
Writing: Writing structured persuasive/argumentative essays on topics of general interest using suitable claims, examples and evidences.
Grammar and Vocabulary: The use of Active and passive Voice, vocabulary for academic texts.
Learning Outcomes:
At the end of this unit, the student will be able to

- Participate in group discussions using appropriate conventions and language. Strategies. **L1**
- Use appropriate vocabulary to express ideas and opinions. **L2**

11/10/21

UNIT – IV **12 Hrs**

Listening: Listening to identify important moments - Understanding inferences; processing of information using specific context clues from the audio.

Speaking: Group discussion; reaching consensus in group work (academic context).

Reading: Reading for inferential comprehension.

Writing: Applying for internship/ job - Writing one's CV/Resume and cover letter.

Grammar and Vocabulary: Phrasal verbs, phrasal prepositions and technical vocabulary.

Learning Outcomes:

At the end of this unit, the student will be able to

- Express thoughts and ideas with acceptable accuracy and fluency **L1**
- Draw inferences and conclusions using prior knowledge and verbal cues **L2**

UNIT – V **12 Hrs**

Listening: Understanding inferences - processing of explicit information presented in the text and implicit information inferable from the text or from previous/background knowledge.

Speaking: Formal team presentations on academic/ general topics.

Reading: Intensive and extensive reading.

Writing: Structure and contents of a Report – Abstract – Project report features.

Grammar and Vocabulary: Correcting common errors, improving vocabulary and avoiding cliches and jargons.

Learning Outcomes:

At the end of this unit, the student will be able to

- Develop advanced listening skills for in-depth understanding of academic texts. **L1**
- Collaborate with a partner to make effective presentations. **L2**

Text Books:

1. "Forging Ahead": A Course Book for B.Tech Students. Orient BlackSwan,2020.
2. Meenakshi Raman &Sangeeta Sharma, "Technical Communication" O U Press2009.

Reference Books:

1. Bailey, Stephen. "Academic writing: A handbook for international students "Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, "Speaking and Critical Thinking". Heinley ELT; 2nd Edition,2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. "Cambridge Academic English" (B2). CUP, 2012. (Student Book, Teacher Resource Book, CD & DVD).

Course Outcomes:

- At the end of this Course the student will be able to
- Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English. **L1**
- Apply grammatical structures to formulate sentences and correct word forms **L2**
- Analyze discourse markers to speak clearly on a specific topic in informal discussions. **L3**
- Evaluate reading/listening texts and to write summaries based on global comprehension of the setexts. **L4**
- Create a coherent paragraph interpreting a figure/graph/chart/table. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE61- FOUNDATION ENGINEERING

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- To know the necessity of soil exploration.
- To design the shallow foundations.
- To know and necessity of deep foundations
- To perform the stability analysis of slopes.
- To know the principles and design of earth retaining walls
- To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically knowledge of the subject is essential..

UNIT – I: SOIL EXPLORATION:

Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn about soil sampling (undisturbed and disturbed)
- To determine the bearing capacity of shallow foundations

UNIT – II: EARTH SLOPE STABILITY

Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn about the failure of slopes.
- To design of infinite and finite slopes using various methods.

UNIT – III: EARTH PRESSURE THEORIES:

Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Rebhann's and Culmann's graphical method

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand the role earth pressure on the stability of retaining systems.

UNIT – IV: SHALLOW FOUNDATIONS:

Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff's and Skempton`s Methods

ALLOWABLE BEARING PRESSURE:

Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn about various types of foundations

- To calculate the bearing capacity and settlement of foundations

UNIT – V:

PILE FOUNDATION: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups. **WELL FOUNDATIONS:** Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand the behavior of the piles under different loading conditions.
- To design the load carrying capacity of piles.
- To understand the behavior of well foundations.

Text Books:

1. Geotechnical Engineering by C.Venkataramaiah, New AgePubilications.
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers and Distributors, Delhi
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., New Delhi

Reference Books:

1. Das, B.M.,-(1999) Principles of Foundation Engineering–6th edition(Indian edition) Thomson Engineering
2. Foundation Engineering by Varghese,P.C., Prentice Hall of India., New Delhi.
3. Foundation Engineering by V.N.S.Murthy, CRC Press, New Delhi.
4. Bowles, J.E., (1988) Foundation Analysis and Design – 4 th Edition, McGraw-Hill Publishing company, Newyork.
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata McGraw-Hill Publishers New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- To enable the student to analyze shallow and deep foundations when subjected to various types of loadings
- To enable the student to analyze slopes, retaining walls and well foundations

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE62- DESIGN OF STEEL STRUCTURES

L	T	P	C
2	1	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To teach different types of Connections and relevant IS code provision.
- To impart with design procedures of beams and columns.
- To enable Design of truss elements
- To enable design of column bases
- To teach design and Plate and Gantry Girders with curtailment of flanges

UNIT – I:

Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads – load combinations - wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 -2007 – Design Strengths- deflection limits – serviceability – Section Classification - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members – Design Strength of members

Learning Outcomes:

At the end of this unit, the student will be able to

- Estimate strength of welds
- Design Welded and Bolted connections as per IS Codal provisions

UNIT – II:

Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns –column splice – column base – slab base.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand behavior of compression members
- Design and detail of compression members under different conditions adopting IS Code.

UNIT – III:

Design of Beams – Plastic section modulus - Shape factor – Bending and shear strength laterally / supported beams design –Introduction to lateral torsion buckling -Built up sections – large plates Web buckling Crippling and Deflection of beams, Design of Purlin.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand behavior of simple and compound beams
- Visualize importance of curtailment of flange plates
- Design and detail of steel beams under different conditions adopting IS Code.

UNIT – IV:

Design of eccentric connections with brackets, Beam end connections – Web angle – Unstiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand behavior of simple and compound beams
- Visualize importance of curtailment of flange plates
- Design and detail of steel beams under different conditions adopting IS Code.

UNIT – V:

Plate Girder: Design consideration – I S Code recommendations Design of plate girder Welded – Curtailment of flange plate's stiffeners – splicings and connections.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify different components of plate girder
- Design and detail of components of plate girder confirming to IS Code
- Understand the functioning of gantry girder for different types of loads

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

Note: The students should prepare the following plates.

Plate 1 Detailing of simple beams
Plate 2 Detailing of Compound beams including curtailment of flange plates.
Plate 3 Detailing of Column including lacing and battens.
Plate 4 Detailing of Column bases – slab base and gusseted base
Plate 5 Detailing of steel roof trusses including particulars at joints.
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.
Codes/Tables: IS-800 code books and Structural Steel Tables are to be permitted into the examination Hall.

I S Codes:

1) Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.
2) IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian standards.
3) Steel Tables.

Text Books:

1. Design of Steel Structures by K.S.SaiRam
2. Limit State Design of Steel Structures by S.K. Duggal
3. Design of Steel Structures by Bhavikatti. IK INT Publication House

Reference Books:

1. Structural Design and Drawing by N.KrishnaRaju, University Press,Hyderabad.
2. Structural Design in Steel by SarwarAlamRaz, New Age International Publishers, NewDelhi
3. Steel Structures by Subramanyam.N, Oxford University press, NewDelhi
4. Design of Steel Structures by Edwin Gaylord, Charles Gaylord,JamesStallmeyer,Tata Mc.Graw-Hill, NewDelhi.

Codes/Tables: IS Codes:

- IS -800 – 2007
- IS – 875 – PartIII
- Steel Tables.
- Railway Design Standards Code. and steel tables to be permitted into the examination hall.

Course Outcomes:

At the end of this Course the student will be able to

- Explain relevant IS codes
- Analysis and design of flexural members and detailing
- Design compression members of different types with connection detailing
- Design Plate Girder and Gantry Girder with connection detailing
- Develop drawings pertaining to different components of steel structures

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE63- ENVIRONMENTAL ENGINEERING

L	T	P	C
2	1	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To make the students conversant with sources and its demand of water To understand the basic characteristics of water and its determination To expose the students to understand the design of water supply lines
- To provide adequate knowledge about the water treatment processes and its design To have adequate knowledge on safe disposal methods

UNIT – I:

Introduction: Necessity of protected water supply –Flow chart of public water supply system - Role of Environmental Engineer.

Water Demand and Water Quality: Population forecasts, design period – water demand, types of water demands – factors affecting – fluctuations – fire demand – Characteristics of water – Physical, Chemical & Biological and their testing – drinking water standards - Waterborne diseases - Comparison from quality and quantity and other considerations.

Water collection structures at source: intakes – infiltration galleries.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand importance of water quality
- Explain water quality standards

UNIT – II:

Water Treatment (Sedimentation, Filtration and Disinfection): Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation flocculation clarifier design – coagulants – feeding arrangements– Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices

Learning Outcomes:

At the end of this unit, the student will be able to

- Design waste water treatment systems
- Categorize different water treatment procedures

UNIT – III:

Water Distribution Network Analysis : Distribution systems – Requirements, Layout of Water distribution systems – Design procedures- Hardy Cross and equivalent pipe methods - service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house.

Learning Outcomes:

At the end of this unit, the student will be able to

- Plan water supply systems in terms of transmission and distribution

UNIT – IV:

Waste Water Collection : House plumbing– inverted siphon – catch basins – flushing tanks– ejectors - Conservancy and water carriage systems – sewage and storm water estimation - fluctuations – types of sewers – Hydraulics of sewers and storm drains– design of sewers–shapes and materials.

Waste Water Characteristics: Characteristics of sewage – cycles of decay –decomposition of sewage. - B.O.D. – C.O.D. equations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish characteristics of domestic and storm water
- Assess quality of waste water parameters

UNIT – V:

Waste Water Treatment : Layout and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – trickling filters – ultimate disposal of sewage – Construction and design of Oxidation ponds – sewage farming – dilution. Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff -Tanks working principles and design – soakpits.

Learning Outcomes:

At the end of this unit, the student will be able to

- Plan Sewage treatment and disposal methodologies
- Design waste water treatment systems leading to cleaning of rivers

Text Books:

1. Water supply and sanitary Engineering by G.S. Birdi, DhanpatRai& SonsPublishers.
2. Water supply and sanitary Engineering byS.A.Garg,
3. Elements of environmental engineering by K.N. Duggal, S. ChandPublishers.
4. Manual on Water supply and Treatment – CPHEEO,1999.
5. Punmia B.C, Ashok Jain & Arun Jain, Water Supply Engineering, Laxmi Publications,Pvt.
6. Ltd., New Delhi,2004.

Reference Books:

1. Water and Waste Water Technology by Mark J Hammar and Mark J. HammarJr.
2. Water and Waste Water Technology bySteel
3. Water and Waste Water Engineering by Fair Geyer andOkun
4. Waste water treatment- concepts and design approach by G.L. Karia and R.A.Christian, Prentice Hall of India
5. Waste water Engineering by Metcalf andEddy.
6. Unit operations in Environmental Engineering by R. Elangovan and M.K. Saseetharan, New age International
7. Environmental Engineering by georad.Kiely TMHPubilications.
8. IntroductiontoEnvironmentalEngineeringbyMackenzie,DevisandDavid.A.Cornwell, TMH Publications, NewDelhi.
9. Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, AshokJain &Arun Jain, Laxmi Publications Pvt.Ltd, NewDelhi.

Course Outcomes:

At the end of this Course the student will be able to

- Understand about quality of water and purification process
- Design waste water treatment systems
- Select appropriate technique for treatment of waste water.

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE64a- ADVANCED REINFORCED CONCRETE CONSTRUCTION

(Professional Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Course is designed to shape the concrete and use the steel bars for external loads on different building elements.
- To understand the codal recommendations for methods of design
- To analyze and design of various reinforced concrete structures like water tanks.
- Analysis and design of intz tank and its staging
- Raft foundation, corbels, underground and on ground circular water tanks, intz tank, bunkers and silos
- To analyze and design of Raft Foundations.
- To analyze and design of Pile Foundations

UNIT – I:

Elevated circular water tank (Working stress method) Introduction ; Design of elevated circular water tank

Learning Outcomes:

At the end of this unit, the student will be able to

- Have a good understanding of design of circular water tanks

UNIT – II:

Design of Intze tank (Working stress method) Calculation of dimensions; Design of top dome; Design of top ring beam ; Design of cylindrical all ; Design of bottom ring beam.

Learning Outcomes:

At the end of this unit, the student will be able to

- have a good understanding of design of intze water tanks and staging .

UNIT – III:

Design of R.C.C combined (Rectangular and Trapezoidal) and strap footings.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design RCC combined and strap footings

UNIT – IV:

Raft Foundations (Limit state method) Soil design; Design of slab; Design of beams

Learning Outcomes:

At the end of this unit, the student will be able to

- After completion of this unit student will
- analyse and design of Raft Foundations

UNIT – V:

Pile Foundations (Limit state method) Introduction; Loads on pile groups ; Soil design of a pile; Structural design of a pile

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyse and design of pile Foundations

Text Books:

- Reinforced concrete , Vol.1 & 2 by H. J. Shah, Charotar publishing house Pvt. Ltd, 2011.

Reference Books:

- RCC Designs by BC Punmia et.al. , 10th Edition, Laxmi Publications (P) Ltd. 2006.

Course Outcomes:

At the end of this Course the student will be able to

- Students can handle the isolated design of individual elements independently.
- Indian Standards of approach can be practiced by the student.
- Students can handle the analysis and design of rectangular and circular tanks.
- Students can handle the Raft foundation
- Students can handle the Pile Foundations

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE64b- GROUND IMPROVEMENT TECHNIQUES

(Professional Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- The knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils.

UNIT – I:

DEWATERING: Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis.

GROUTING: Objectives of grouting- grouts and their properties- grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand methods of dewatering
- Study different types of dewatering and working criteria
- Understand methods of grouting
- Assess efficiency of grouting adopting different tests

UNIT – II: DENSIFICATION METHODS IN GRANULAR SOILS

In – situ densification methods in granular Soils – Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact atdepth.

DENSIFICATION METHODS IN COHESIVE SOILS:–

In – situ densification methods in Cohesive soils – preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand methods of in-situ densification
- Study different types of drains for soil densification

UNIT – III:

STABILISATION: Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride, sodium silicate and gypsum.

Learning Outcomes:

At the end of this unit, the student will be able to

- Study different methods of stabilization of soils
- Study utilization of industrial wastes to stabilize soils

UNIT – IV:

REINFORCED EARTH: Principles – Components of reinforced earth – factors governing design of reinforced earth walls – design principles of reinforced earth walls.

GEOSYNTHETICS : Geotextiles- Types, Functions and applications – geogrids and geomembranes – functions and applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand principles of reinforced earth in ground improvement
- Study procedures for verification of stability of slopes.
- Utilization of advanced materials for ground improvement
- Compare different types of synthetic based soil stabilization material and understand performance

UNIT – V:

EXPANSIVE SOILS: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand nature of expansive soils
- Study foundation techniques in expansive soils

Text Books:

- Perceive the knowledge of various methods of ground improvement and their suitability to different field situations.
- Design a reinforced earth embankment and check its stability.
- Understand the functions of Geo-synthetics and their applications in Civil Engineering practice.
- Understand the concepts and applications of grouting

Reference Books:

1. Haussmann M.R. (1990), Engineering Principles of Ground Modification, McGraw- Hill InternationalEdition.
2. Dr.P.Purushotham Raj. Ground Improvement Techniques, Laxmi Publications, New Delhi / University science press, NewDelhi
3. NiharRanajanPatra. Ground Improvement Techniques, Vikas Publications, NewDelhi

Course Outcomes:

At the end of this Course the student will be able to

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional,Boca Taton, Florida,USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley andSons,
   New York, USA.
3. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy,USA

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE64c- TRANSPORTATION ENGINEERING

(Professional Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Introduce different transportation systems and their importance and their role in development
- Understand standards and norms of National and International organizations which are framed for efficient functioning of existing transport systems
- Impart Knowledge regarding the functioning of various components like rails, sleepers, Tracks, Geometric curves, Runways, Taxiways Aprons Wear houses, Jetties etc
- Design elements like horizontal curves, vertical curves, super elevation etc
- Analyze how signal systems ,visual aids and Markings etc help in safe working of transportation systems.

UNIT – I: Railway Engineering:

Introduction – Permanent Way Components – Cross Section Of Permanent Way – Functions And Requirements Of Rails, Sleepers And Ballast – Types Of Gauges – Creep Of Rails – Theories Related To Creep – Coning Of Wheels – Adzing Of Sleepers – RailFastenings.

Learning Outcomes:

At the end of this unit, the student will be able to

- Obtain Knowledge regarding different components of an railway track and its materials
- Can differentiate various types of gauge networks

UNIT – II: Geometric Design of Railway Track

Gradients – Grade Compensation – Cant And Negative Super Elevation – Cant Deficiency – Degree Of Curves – Safe Speed On Railway Track – Points And Crossings – Layout And Functioning Of Left Hand Turn Out And Right Hand Turn Outs – Station Yards – Signaling And Interlocking.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design railway network with proper alignment
- Will be able to overcome problems like super elevation, CANT, speeds on curves
- Can be possible to design points and crossings

UNIT – III: Airport Engineering

Airport Site Selection – Factors Affecting Site Selection And Surveys- Runway Orientation – Wind Rose Diagram – Basic Runway Length – Correction For Runway Length – Terminal Area – Layout And Functions – Concepts Of Terminal Building – Simple Building , Linear Concept, Pier Concept And Satellite Concept – Typical Layouts .

Learning Outcomes:

At the end of this unit, the student will be able to

- How a runway orientation affected by wind rose diagram
- Understand different terms present in an Airport
- Understand wind intensities and directions for designing runway

UNIT – IV: Geometric Design of Runways and Taxiways

Aircraft Characteristics – Influence of Characteristics on Airport Planning and Design – Geometric Design Elements of Runway – Standards and Specifications. As Per – Functions of Taxiways – Taxiway Geometric Design – Geometric Elements and Standard Specifications – Runway and Taxiway Lighting.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design runway in a aerodrome
- Understand functions of taxiway and design taxi way

UNIT – V: Ports, Docks and Harbours

Requirements of Ports And Harbors – Types of Ports – Classification of Harbors – Docks And Types of Docks – Dry Docks, Wharves And Jetties – Breakwaters: Layouts of Different Types of Harbors and Docks – Dredging Operations – Navigation Aids.

Learning Outcomes:

At the end of this unit, the student will be able to

- Differentiate between ports and harbours
- Differentiate types of break water structures to control water current
- Learn Different types of dredging operations

Text Books:

1. A Text Book Of Railway Engineering-S.C.Saxena And S.Arora, Dhanpatrai AndSons, New Delhi.
2. Transportation Engineering, Volume – II (Railways,Airports,Docks and Harbours,Bridges and Tunnels) by C.Venkataramaiah, Universities Press,Hyderabad.
3. Airport Planning And Design- S.K. Khanna And M.G Arora, NemchandBros.

Reference Books:

1. Satish Chandra AndAgarwal, M.M. (2007) "Railway Engineering" Oxford Higher Education, University Press NewDelhi.
2. Highway, Railway, Airport AndHarbour Engineering – K.P. Subramanian, Scitech Pubilishers.

Course Outcomes:

At the end of this Course the student will be able to

1. Gain knowledge regarding various specifications and standards set by organisations and official bodies.
2. Differentiate the working of various transport systems and their working in different scenarios
3. Understanding the functions of various components in Rail, Air, Water transport systems and their importance.
4. Capable of carrying out surveys needed to be done while constructing Railways Airports and seaports
5. Have a in depth knowledge on curve sections super elevations and many other design elements
6. Explain the working of various design elements used in different Transport systems
7. Calculate entities like maximum permissible loads on rails ,degree of curves, permissible speeds on various gauges etc
8. Prepare master plans for Airports, harbour site considering natural phenomenon and different harbour railway airport elements

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS11-COMPETITIVE & SPOKEN ENGLISH

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To train students to use language effectively in everyday conversations and to participate in group discussions.
- To enable them to learn and practice competitive English and ready for competitive examinations.

UNIT – 1: Grammar

Sentences-Construction-Types-Affirmative-Interrogative-Nouns-Pronouns-Verbs-Models-Tenses-Adverb-Adjective-Speech-Voice-Articles-Prepositions-Conjunctions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Students will improve their speaking ability in English both in terms of fluency and comprehensibility by enlarging their vocabulary. **L1**
- Students will attain and enhance competence in the four modes of literacy: listening, speaking, reading and writing **L2**

UNIT – II: Vocabulary

Content of the Unit – II

Competitive Vocabulary List-Word Building Tips- Antonyms-Synonyms-One word Substitutes-Idioms and Phrases-Phrasal Verbs-Reading Comprehension-importance- tips- Cracking unknown passage.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the factors that influence use of grammar and vocabulary in speech and writing **L1**
- Comprehend the meaning of paragraphs and unknown passages **L2**

UNIT – III: Speaking Skills

Dynamics of Speaking-Communication Skills -Public Speaking- Significance to Professionals- establishing credibility & Confidence- Preparation of Speech-Audience-Analysis -Topic generation Techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- Display competence in oral, written and visual communication **L1**
- Showan understanding of opportunities in the field of communication **L2**

UNIT – IV: Stage Dynamics

Organization of Speech- Platform Manners- Body language- Psychology of Persuasion- Speeches for Special Occasions-exercises-Recording and feedback sessions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze your audience and design speeches to reflect your analysis. **L1**
- Evaluate speeches based on a variety of verbal and non-verbal criteria. **L2**

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UNIT – V:Accent Neutralization

Realization of past tense and plural forms- Stress Rules– Intonation- Connected speech- weak forms-assimilation-elision- Linking and Intrusion-juncture-contractions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to identify which are stressed and unstressed words. **L1**
- Reproduce in speech, appropriate pattern of intonation and rhythm. **L2**

Reference Books:

1. Hari Mohan Prasad, ***Objective English for Competitive Examination***, Tata McGraw Hill, New Delhi, 2014.
2. V SASIKUMAR and PV DHAMIJA *: **SPOKEN ENGLISH A Self- Learning Guide to Conversation Practice***, 2nd Edition, TATA McGRAW-HILL'S SERIES.
3. M.Sambaiah, ***Technical English***, Wiley publishers India. New Delhi. 2014.
4. JK GANGAL, A PRCACTICAL COURSE IN EFFECTIVE ENGLISHSPEAKING SKILLS, PHI LEARNING Private Ltd. New Delhi. 2012
5. KRISHNA MOHAN and N.P. SINGH,***SPEAKING ENGLISH EFFECTIVELY***, 2nd Edition, Trinity Press, 2015.
6. Wren and Martin,***High School English Grammar and Composition***, S. Chand Publication, New Delhi, 2014.
7. Neetu Singh, ***English for General Competitions from Plinth To Paramount*** *(Volume-I&II),*Paramount Reader Publications, 2014.
8. Dale Carnegie,***The Quick And Easy Way To Effective Speaking***, Vermilion Publications, 1990.
9. E Suresh Kumar. ***Effective Publish Speaking***, Orient Longman, 2016.

Course Outcomes:

At the end of this Course the student will be able to

- Becoming active participants in the learning process and acquiring proficiency in spoken English of the students. **L1**
- Speaking with clarity and confidence thereby enhancing employability skills of the students. **L2**
- Participate in critical conversations and prepare, organize and deliver in public contexts **L3**
- Improving their speaking ability in English both in terms of fluency and comprehensibility **L4**
- Equipped with competitive proficiency in English for various competitive examinations at state, national and international level. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS23-INTEGRAL TRANSFORMS AND ITS APPLICATIONS

(Open Elective -II)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the student

- With the concepts and several methods of integral transforms and its applications.
- The concepts of fractional calculus and its applications.

UNIT – 1: Basic concepts of integral transforms:: Fourier transforms: **9 Hrs**

Introduction, basic properties, applications to solutions of Ordinary Differential Equations (ODE), Partial Differential Equations (PDE) and Integral Equations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve ordinary differential equations and partial differential equations. **L3**
- Solve Integral equations. **L3**

UNIT – II: Laplace transforms:

Introduction, existence criteria, Convolution, differentiation, integration, inverse transform, Tauberian Theorems, Watson's Lemma, solutions to ODE, PDE including Initial Value Problems (IVP) and Boundary Value Problems (BVP).

Applications of joint Fourier-Laplace transform, definite integrals, summation of infinite series, transfer functions, impulse response function of linear systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve initial and boundary value problems using Laplace transform technique. **L3**
- Apply the techniques of joint Fourier-Laplace transform techniques. **L4**

UNIT – III: Hankel Transforms & Hilbert Transforms

Hankel Transforms: Introduction, properties and applications to PDE Mellin transforms: Introduction, properties, applications; Generalized Mellin transforms.

Hilbert Transforms: Introduction, definition, basic properties, Hilbert transforms in complex plane, applications; asymptotic expansions of 1-sided Hilbert transforms.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve PDE by using the concepts of Hankel transforms. **L4**
- Learn the concepts of Hilbert transforms. **L3**

UNIT – IV: Stieltjes Transform, Legendre transforms and Radon transforms

Stieltjes Transform:

Definition, properties, applications, inversion theorems, properties of generalized Stieltjestrans form.

Legendre transforms:

Introduction, definition, properties, applications.

Radon transforms:

Introduction, properties, derivatives, convolution theorem, applications, inverse radon transform.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyzes the Stieltje's and Legender's transforms. **L4**
- Analyzes random transforms and focuses on thier applications. **L3**

UNIT – V: Fractional Calculus and its applications & Integral transforms in fractional equations

Fractional Calculus and its applications: Introduction, fractional derivatives, integrals, Laplace transform of fractional integrals and derivatives.

Integral transforms in fractional equations: fractional ODE, integral equations, IVP for fractional Differential Equations (DE), fractional PDE, green's function for fractional DE.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the basic concepts of fractional calculus. **L2**
- Applies the concepts of integral transforms in fractional calculus. **L4**

Text Books:

1. Advanced Topics in Applied Mathematics for Engg. & physical Science: Sudhakar Nair
2. Introduction to Applied Mathematics, Gilbert Strang

Reference Books:

1. Fractional Calculus Theory and Applications of Differentiation and Integration to Arbitrary Order: J. Spanier and K. B. Oldham
2. Handbook of Mathematical Functions: M. Abramowitz & I. Stegun

Course Outcomes:

At the end of this Course the student will be able to

- Use the basic concepts of integral transforms, Stieltjes Transform, Legendre transforms and Radon transforms etc., in real life problems. **L1**
- Use the concepts of Laplace transforms in solving the initial value and boundary value problems. **L2**
- Applies the concepts of Hankel Transforms & Hilbert Transforms while addressing the various problems related to engineering sciences. **L3**
- Analyze the problems in engineering and technology using various techniques of integral transforms and applications. **L4**
- Uses the ideas of fractional calculus and its applications in solve the real world problems. **L5**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS24-NUMERICAL ANALYSIS

(Open Elective –II)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the student

- With the concepts and several methods of Numerical methods.
- To explore the solutions of ordinary differential equations, partial differential equations and integral equations.

UNIT – 1: Solution of Algebraic and Transcendental equations & Solution to System of Nonlinear Equations and Spline Functions **9 Hrs**

Solution of Algebraic and Transcendental equations:

Ramanujan's method – Secant method – Muller's method – Graeffe's root-squaring method – Lin-Bairstow's method – Quotient-Difference method

Solution to System of Nonlinear Equations and Spline Functions:

Method of Iteration- Newton-Raphson method. Linear splines - Quadratic splines – Cubic splines : Minimizing property of Cubic splines – Error in the Cubic Spline ad its derivatives – Surface fitting by cubic splines. – Cubic B-Splines: Representation of B- Splines – Least squares solution – Applications of B-Splines.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve the algebraic and transcendental equations **L2**
- Solve the system of nonlinear equations and spline functions. **L4**

UNIT – II: Numerical Linear Algebra:

Triangular matrices – LU decomposition of a matrix – vector and matrix norms. – Solutions of linear systems – Direct methods: Gauss elimination – necessary for pivoting – Gauss-Jordan method – modification of the Gauss method to compute the inverse – number of arithmetic operations – LU decomposition method – computational procedure for LU decomposition method – Lu decomposition from Gauss elimination – solution of tridiagonal systems – III conditioned linear systems – Method for III- conditioned systems. – Solution of linear systems –Iterative methods. – Matrix Eigen value problems – Eigen values of a symmetric tridiagonal matrix – Householder's method – QR method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of numerical linear algebra. **L1**
- Apply the concepts of numerical linear algebra. **L3**

UNIT – III: Numerical solution of ordinary differential equations:

Solution by Taylor's series, Picard's method,Euluer's method , Runge-Kutta methods, Predictor-Corrector methods: Adams-Moulton method – Milne's method. – Cubic Spline method – Simultaneous and higher order equations. – Boundary value problems: Finite difference method – Cubic Spline method – Galerkin's method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve first order initial value problems. **L3**
- Solve ssimultaneous and higher order equations and boundary value problems. **L4**

UNIT – IV: Numerical solution of Partial differential equations:

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve Laplace's equation using finite difference technique. **L3**
- Solve Heat equation and wave equation. **L4**

UNIT – V: Numerical solution of Integral equations:

Numerical methods for Fredholm equations: Method of degenerate Kernels – method of successive approximations – Quadrature methods – use of Chebyshev series – cubic Spline method – singular Kernels – method of invariant imbedding.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply numerical methods for solving Fredholm equations. **L3**
- Analyzes cubic Spline method, singular Kernels – method of invariant imbedding etc. **L4**

Text Books:

1. S. S. Sastry, Introductory Methods of Numerical Analysis(Fifth Edition 2012), PHI Learning Private Limited, New Delhi.

Reference Books:

1. M.K.Jain,S.R.K.Iyengar, R.K.Jain, Numerical Methods for Scientific and Engineering Computation (sixth edition),Nee Age International(P) Limited, Publishers, New Delhi.
2. K.E. Atkinson, An Introduction to Numerical Analysis, Wiley, 1989.S.D. Conte and C. De Boor, Elementary Numerical Analysis 302226 An Algorithmic Approach, McGraw-Hill, 1981.
3. K. Eriksson, D. Estep, P. Hansbo and C. Johnson, Computational Differential Equations, Cambridge Univ. Press, Cambridge, 1996.
4. G.H. Golub and J.M. Ortega, Scientific Computing and Differential Equations: An Introduction to Numerical Methods, Academic Press, 1992.
5. J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd ed., Texts in Applied Mathematics, Vol. 12, Springer Verlag, New York, 1993.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the need of numerical methods in solving engineering problems of various fields. **L1**
- Learn various numerical techniques to solve initial and boundary value problems. **L2**
- Apply various methods in solving initial and boundary value problems **L3**
- Emphasizes the numerical solutions of Integral equations. **L4**
- Analyze the problems in engineering and technology using various techniques of Numerical methods. **L5**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS25-OPTIMIZATION TECHNIQUES

(Open Elective -II)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the student

- With the basic concepts and several methods of optimization.
- With the concepts of geometric programming & constrained minimization problems.

UNIT – 1: Linear programming I : Simplex Method **9 Hrs**

Introduction, Applications of Linear Programming, Standard form of a Linear Programming Problem, Geometry of Linear Programming Problems, Basic Definitions in Linear Programming. Simplex Method, Simplex Algorithm and Two phase Simplex Method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve the problems related to linear programming. **L3**
- Lear the simplex method and two phase simplex method. **L3**

UNIT – II: Linear programming II : Duality in Linear Programming

Symmetric Primal-Dual Relations, General Primal-Dual Relations, Duality Theorem, Dual Simplex Method, Transportation Problem and assignment problem.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the dual relations and duality theorem **L2**
- Solve transportation problem and assignment problem. **L4**

UNIT – III: Non-linear programming: Unconstrained optimization techniques & Direct Search Methods

Non-linear programming: Unconstrained optimization techniques: Introduction: Classification of Unconstrained minimization methods

Direct Search Methods: Random Search Methods: Random jumping Method, Random Walk method. Grid Search Method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify Unconstrained minimization methods and direct search methods. **L2**
- Apply the unconstrained minimization methods and direct search methods **L3**

UNIT – IV: Non-linear programming: Constrained optimization techniques

Introduction , Characteristics of a constrained problem, Random Search Methods, complex method, Sequential linear programming, Basic approach in methods of Feasible directions, Zoutendijk's method of feasible directions: direction finding problem, determination of step length, Termination criteria.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Constrained optimization techniques. **L2**
- Solve nonlinear programming problems. **L3**

UNIT – V: Geometric Programming & Constrained minimization Problems

Geometric Programming:

Unconstrained Minimization Problems: solution of unconstrained geometric programming using differential calculus and arithmetic-geometric inequality.

Constrained minimization Problems :

Solution of a constrained geometric programming problem, primal-dual programming in case of less-than inequalities, geometric programming with mixed inequality constraints.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve unconstrained geometric programming using differential calculus and arithmetic-geometric inequality. **L3**
- Solve Solution of a constrained geometric programming problem, primal-dual programming. **L4**

Text Books:

1. Singiresu S Rao., Engineering Optimization: Theory and Practices, New Age Int. (P) Ltd. Publishers, New Delhi.

Reference Books:

1. Chong, E.K.P.and Zak, S. H.. An Introduction to Optimization, John Wiley & Sons, N.Y.
2. Peressimi A.L., Sullivan F.E., Vhl, J.J..Mathematics of Non-linear Programming, Springer – Verlag.

Course Outcomes:

At the end of this Course the student will be able to

- Remembers the concepts of linear programming problems. **L1**
- Understand various techniques of linear programming problems. **L2**
- Solve constrained and unconstrained linear programming problems. **L3**
- Analyzes geometric programming using differential calculus and arithmetic-geometric inequality. **L4**
- Analyze optimization problems that occur in real world in engineering and technology using various elegant optimization techniques. **L5**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

19ABS33-FUNCTIONAL NANOMATERIALS FOR ENGINEERS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To learn and understand the fundamental concepts of functional/smart nanomaterials.
- To understand the classification and important applications of functional materials
- To learn and understand the materials utilized for energy applications
- To learn and understand the principle and applications of nanosensors
- To understand the concept of self-assembling molecular layers and its applications

UNIT – I: INTRODUCTION TO FUNCTIONAL /SMART NANOMATERIALS **9 Hrs**

Introduction: Nanomaterials and their importance (in brief), Functional/ Smart Nanomaterials, – (Hydrogels, polymer brushes, Carbon nanotubes, Cellulose),Functionalization techniques, Properties of Smart materials (Sensing materials, Actuation materials, Control devices, Self-detection, self-diagnostics, Self-corrective, self-controlled, self-healing, Shock Absorbers, Damage arrest)-components of smart systems (Sensor :- Data Acquisition, Data Transmission; Command and control unit, Actuator:- Data Instructions, Action Devices)

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic properties and fictionalization of smart nanomaterials **L1**
- Explain the need of functional/smart nanomaterials for advanced technology **L2**
- Identify engineering applications of sensors **L3**
- Analyze the sensing, control and detection mechanism in smart nanomaterials **L4**
- Illustrate the components of smart systems **L2**

UNIT – II: CLASSIFICATION AND APPLICATIONS **9 Hrs**

Classification of smart materials (piezoelectric, electrostrictive, Magnetostrictive, Thermoresponsive, Electrochromic and Smart gels), Shape Memory Alloys and their working principle, Quantum Tunneling Composites and their working principle, Applications of smart materials in Aircrafts, Medicine, Robotics, Smart fabrics, Sporting goods and smart glass, Merits and demerits of smart materials.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify smart materials based on electrical, magnetic and thermal characteristics **L1**
- Understand the basic concepts and working principle of memory alloys **L2**
- Identifies the Engineering applications of smart materials **L2**
- Apply the concepts to Aircrafts, Medicine and Robotic fields **L3**
- Explain the working principle of Quantum Tunneling Composites **L2**
- Identify the Merits and demerits of smart materials in engineering field **L2**

UNIT – III: NANOSENSORS

Introduction, Sensor definition, Working principle of nanosensors, Types of nanosensors (Physical nanosensors – Pressure, Force, Mass, Displacement, Optical nanosensors – Proximity, Ambient light, Chemical nanosensors- Chemical composition, Molecular concentration). Applications of nanosensors (Medicine, Aerospace, Communication, Structural Engineering).

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the working principle and concept of nanosensors **L1**
- Classify the nanosensors based on their working principle and application **L2**

- Summarize various types of nanosensors **L2**
- Explain the applications of nanosensors in various fields **L2**
- Apply the concept of nanosensors in Medicine, Aerospace, Communication, Structural Engineering fields **L3**

UNIT – IV: SELF-ASSEMBLING MOLECULAR LAYERS **9Hrs**

Introduction, principles of self-assembly, monolayers, Characteristics of Self assembled monolayers (SAMs), Molecular SAMs, Types of SAMs, Factors influencing Monolayer order, methods of preparation (Langmuir- Boldgett film : Mechanism, Experimental arrangement, Assembly, Advantages and disadvantages of LB films) patterning of SAMs (Locally attract, Locally remove, Modify tail group). Applications (Self-cleaning and moisture repellent).

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of self-assembling **L1**
- Understand the significance of molecular layers **L2**
- Explain the concept of Langmuir- Boldgett film preparation **L2**
- Explain the important factors influencing Monolayer order **L2**
- Classify the materials based on patterning of SAMs **L2**
- Apply the concept of Self-cleaning and moisture repellent **L3**

UNIT – V: NANOMATERIALS FOR ENERGY APPLICATIONS

Introduction, **Solar Cells** (Silicon Solar Cells, Thin film Solar Cells, Organic Solar Cells - Dye Sensitized Solar Cells, Polymer solar cells) Working Principle, Efficiency estimation and advantages, **Hydrogen Fuel Cells** – Working Principle, Structure, Assembly of fuel cell, **Water splitting** – H_2 Production, Photocatalytic process.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of solar cell **L1**
- Classify the solar cells based on manufacturing material **L2**
- Explain the construction and working principle of solar cell **L2**
- Interpret the efficiency and advantages in various solar cells **L2**
- Explain the construction and working principle of hydrogen cells **L2**
- Identify applications of water splitting for H_2 production **L2**
- Explain the photocatalytic process **L2**

Text Books:

1. YaserDahman, Nanotechnology and Functional Materials for Engineers-, Elsevier, 2012
2. E. Zschech,C. Whelan, T. Mikolajick, Materials for Information Technology: Devices, Interconnects and Packaging Springer-Verlag London Limited 2005.

Reference Books:

1. Gauenzi,P.,Smart Structures, Wiley, 2009.
2. MahmoodAliofkhazraei, Handbook of functional nanomaterials, Vol (1&2), Nova Publishers, 2014.

Course Outcomes:

At the end of this Course the student will be able to

- Identify the various functional/smart nanomaterials materials **L1**
- Classify the smart nanomaterials based their applications and properties **L2**
- Apply the various functional nanomaterials in various applications **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

19ABS34-MATERIALS CHARACTERIZATION TECHNIQUES

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To learn and understand an exposure to evaluation of special characteristics of materials.
- To understand the principle and important applications of characterization techniques
- To learn and understand the materials structural characteristics
- To learn and understand the materials Mechanical & Thermal characteristics

UNIT – I: STRUCTURE ANALYSIS BY POWDER X-RAY DIFFRACTION **9 Hrs**

Introduction, Bragg's law of diffraction, Intensity of Diffracted beams –factors affecting Diffraction Intensities - structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherrer and WH Methods, Small angle X-ray scattering (SAXS) (in brief).

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the diffraction phenomenon in crystals **L1**
- Identify the factors affecting diffraction pattern intensities **L2**
- Explain the polycrystalline nature of the material **L3**
- Analyze the crystal structure and crystallite size by various methods **L4**
- Illustrate the Small angle X-ray scattering (SAXS) **L2**

UNIT – II: MICROSCOPY TECHNIQUE -1 –SCANNING ELECTRON MICROSCOPY(SEM) 9 Hrs

Introduction, Principle, Construction and working principle of Scanning Electron Microscope, Specimen preparation, Different types of modes used (Secondary Electron and Backscatter Electron), Advantages, limitations and applications of SEM.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic concepts and working principle of Scanning Electron Microscope **L1**
- Classify the different types of Scanning Electron Microscope modes used **L2**
- Identifies the specimen preparation for Scanning Electron Microscope **L2**
- Analyze the morphology of the sample by using Scanning Electron Microscope **L4**
- Understand the advantages and limitations of Scanning Electron Microscope **L2**

UNIT – III: MICROSCOPY TECHNIQUE -2 - TRANSMISSION ELECTRON MICROSCOPY (TEM) **9Hrs**

Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy, Difference between SEM and TEM, Advantages and Limitations of Transmission Electron Microscopy.

Learning Outcomes:

- Explain the basic principle and working principle of Transmission Electron Microscope
- Classify the different types of Transmission Electron Microscope modes used **L1**
- Identifies the specimen preparation for Transmission Electron Microscope **L2**
- Analyze the morphology and crystal structure of the sample by using Transmission Electron Microscope **L2**
- Understand the advantages and limitations of Transmission Electron Microscope **L2**
- Explain the basic principle and working principle of Transmission Electron Microscope **L3**

UNIT – IV:SPECTROSCOPY TECHNIQUES **9Hrs**

Principle, Experimental arrangement, Analysis and Advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy (ii) Raman Spectroscopy, (iii) Fourier Transform infrared (FTIR) spectroscopy, (iv) X-ray photoelectron spectroscopy (XPS).

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the principle and experimental arrangement of spectrometers **L1**
- Understand the analysis and advantages of the spectroscopic techniques **L2**
- Explain the concept of UV-Visible spectroscopy **L2**
- Explain the principle and experimental arrangement of Raman Spectroscopy **L2**
- Explain the principle and experimental arrangement of Fourier Transform infrared (FTIR) spectroscopy **L2**
- Explain the principle and experimental arrangement of X-ray photoelectron spectroscopy (XPS) **L2**

UNIT – V: ELECTRICAL & MAGNETIC CHARACTERIZATION TECHNIQUES

Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method, Vibrating sample Magnetometer (VSM) and SQUID (Superconducting Quantum Interference Device)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the various types of electrical properties analysis techniques **L1**
- Classify the solar cells based on manufacturing material **L2**
- Explain the effect of magnetic field on the electrical properties **L2**
- Analyze the magnetization by using induction method **L2**
- Explain the construction and working principle of VSM **L2**
- Explain the construction and working principle of SQUID **L2**

Text Books:

1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2008
2. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan, John Wiley & Sons Ltd., 2008.

Reference Books:

1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville Banwell and Elaine M. McCash, Tata McGraw-Hill, 2008.
2. Elements of X-ray diffraction – Bernard Dennis Cullity & Stuart R Stocks, Prentice Hall ,2001 – Science.

Course Outcomes:

At the end of this Course the student will be able to

- Identify the various characterization techniques **L1**
- Classify the characterization techniques based on their applications and properties **L2**
- Apply the various characterization techniques for materials characterization. **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS44-Green Chemistry and Catalysis for sustainable Environment

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

Learn an interdisciplinary approach to the scientific and societal issues arising from industrial chemical production, including the facets of chemistry and environmental health sciences that can be integrated to promote green chemistry and the redesign of chemicals, industrial processes and products

Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

UNIT – 1: Principles and concepts of green chemistry **9 Hrs**

Introduction, Green chemistry Principles, sustainable development and green chemistry, atom economy, atom economic reactions: Rearrangement and addition reactions and un-economic reactions: Substitution, elimination and Wittig reactions, Reducing Toxicity. Waste - problems and Prevention: Design for degradation, Polymer recycling

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the Green chemistry Principles for day to day life as well as synthesis L3
- Describe the sustainable development and green chemistry L2
- Explain economic and un-economic reactions L2
- Demonstrate Polymer recycling L2

UNIT – II: : Catalysis and green chemistry **10Hrs**

Introduction to catalysis, Heterogeneous catalysts: Basics of Heterogeneous Catalysis, Zeolites and the Bulk Chemical Industry, Heterogeneous Catalysis in the Fine Chemical and Pharmaceutical Industries, Catalytic Converters, Homogeneous catalysis: Transition Metal ion Catalysis, Organo-catalysis, Greener Lewis Acids, Asymmetric Catalysis, Phase transfer catalysis: Hazard Reduction, Oxidation Using Hydrogen Peroxide, Bio-catalysis and photo-catalysis with examples

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain Heterogeneous catalyst and its applications in Chemical and Pharmaceutical Industries L2
- Differentiate Homogeneous and Heterogeneous catalysis L2
- Identify the importance of Bio and Photo Catalysis L3
- Discuss Transition metal and Phase transfer Catalysis L3

UNIT – III: Organic solvents: environmentally benign solutions **7 Hrs**

Organic solvents and volatile organic compounds, solvent free systems, supercritical fluids: Super critical carbon dioxide, super critical water and water as a reaction solvent: water based coatings, Ionic liquids as catalysts and solvents

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate Organic solvents and importance of solvent free systems L3
- Discuss Super critical carbondioxide L2
- Explain Super critical water and water as a reaction solvent L2
- Interpret Ionic Liquids as Catalyst and Solvent L2

UNIT – IV: Emerging greener technologies and alternative energy sources **8 Hrs**

Biomass as renewable resource, solar power, other forms of renewable energy, introduction and applications of Fuel Cells, Chemicals from Renewable feedstocks: Chemicals from Fatty Acids, Polymers from Renewable Resources. The Syngas Economy, The Bio-refinery, Design for energy efficiency: Photochemical Reactions and Examples, advantages and Challenges.

Microwave-assisted Reactions-examples and applications, sono-chemical reactions- examples and applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe importance of Biomass and Solar Power L2
- Illustrate Sonochemistry and Green Chemistry L2
- Apply Green Chemistry for Sustainable Development L3
- Discuss the importance of Renewable resources L3

UNIT – V: Green processes for green nanoscience **8 Hrs**

Introduction and traditional methods in the nanomaterials synthesis, Translating green chemistry principles for practicing nanoscience. Green Synthesis of nanophase inorganic materials and metal oxide nanoparticles: microwave-assisted synthesis, green synthesis of metal and metal oxide nanoparticles, green chemistry applications of inorganic nanomaterials

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss green Chemistry Principles for practicing Green nano synthesis L3
- Illustrate Microwave Assisted Synthesis L2
- Differentiate Hydrothermal and Reflux synthesis L2
- Demonstrate Green Chemistry applications of Inorganic nanomaterials L2

Text Books:

1. M. Lancaster, Green Chemistry an introductory text, Royal Society of Chemistry, 2002.
2. Paul T. Anastas and John C. Warner, Green Chemistry Theory and Practice, 4th Edition, Oxford University Press, USA, 1997.

Reference Books:

1. Sanjay K. Sharma and AckmezMudhoo, Green Chemistry for Environmental Sustainability, First Edition, , CRC Press, 2010.
2. AlvisePerosa and Maurizio Selva, Hand Book of Green chemistry Volume 8: Green Nanoscience, wiley-VCH, 2013

Course Outcomes:

At the end of this Course the student will be able to

- Apply the Green chemistry Principles for day to day life as well as synthesis for sustainable development. L3
- Differentiate Homogeneous and Heterogeneous catalysis L2
- Demonstrate Organic solvents and importance of solvent free systems L2
- Describe importance of Biomass and Solar Power for green environment. L2
- Discuss green Chemistry Principles for practicing Green nano synthesis using Microwave Assisted technique. L3

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS45-Chemistry of Nanomaterials and applications

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- And also characterize the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering

UNIT – 1: Introduction to nanoscience **8 Hrs**

Introduction, importance of nanomaterials, nanoscience in nature, classification of nanostructured materials, properties, scope of nanoscience and nanotechnology& applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify the nanostructure materials **L2**
- Describe scope of nanoscience and technology **L2**
- Explain different synthetic methods of nanomaterials **L2**
- Identify the synthetic methods of nanomaterial which is suitable for preparation of particular material **L3**

UNIT – II: : Synthesis of nanomaterials **10 Hrs**

Bottom-Up approach:- Sol-gel synthesis, micro emulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis.

Top-Down approach:- Arc discharge Plasma arc method, aerosol synthesis, ion sputtering, laser pyrolysis, laser ablation, chemical vapour deposition method, electro deposition method, and high energy ball milling.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the top down approach **L2**
- Explain aerosol synthesis and plasma arc technique **L2**
- Differentiate chemical vapour deposition method and electrodeposition method **L2**
- Discuss about high energy ball milling **L3**

UNIT – III: Characterization nanomaterials **7 Hrs**

Techniques for characterization: Dynamic light scattering for particle size determination, Diffraction technique, electron microscopy techniques for the characterization of nanomaterials, BET method for surface area analysis

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss different technique for characterization of nanomaterial **L3**
- Explain electron microscopy techniques for characterization of nanomaterial **L3**
- Describe BET method for surface area analysis **L2**
- Apply different spectroscopic techniques for characterization **L3**

UNIT – IV: Structural studies of nanomaterials **8 Hrs**

Properties of nanomaterials: fullerenes, carbon nanotubes, core-shell nanoparticles. Nano-crystalline materials, magnetic nanoparticles and important properties in relation to nano-magnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain synthesis and properties and applications of nanaomaterials **L2**
- Discuss about fullerenes and carbon nanotubes **L3**
- Differentiate nanomagnetic materials and thermoelectric materials **L2**
- Describe liquid crystals **L2**

UNIT – V: Applications of Nanomaterials **7 Hrs**

Engineering, medicine, aerospace applications of nanomaterials

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate applications of nanaomaterials **L2**
- Discuss the magnetic applications of nanomaterials **L3**
- List the applications of non-linear optical materials **L1**
- Describe the applications fullerenes, carbon nanotubes **L2**

Text Books:

1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, Univ. Press, 2012

Reference Books:

1. Ludovico Cademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Concepts of Nanochemistry; Wiley-VCH, 2011.
2. Guozhong Cao, Nanostructures & Nanomaterials; Synthesis, Properties & Applications: Imperial College Press, 2007
3. C. N. R. Rao, Achim Muller, K.Cheetham, Nanomaterials Chemistry, , Wiley-VCH, 2007

Course Outcomes:

At the end of this Course the student will be able to

- Understand the state of art synthesis of nano materials **L1**
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry. **L2**
- Analyze nanoscale structure in metals, polymers and ceramics **L3**
- Analyze structure-property relationship in coarser scale structures **L3**
- Understand structures of carbon nano tubes **L1**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ABS46-Environmental Management and Audit

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To make the student understand evolution of LCA, stages in product LCA, procedure and applications for LCA.
- To understand the EMS core elements, benefits, certification, ISO 14000 series, evolution, principles, structure.
- To impart knowledge on environmental monitoring, modelling, technology assessment, risk assessment.
- Understand necessity of environmental design, principles, benefits, strategies.
- To understand types of audit, general audit methodology, audit process and apply the various domestic, industrial activities.

UNIT – 1: Life Cycle Assessment (LCA): **8 Hrs**

Evolution, stages, a code of good conduct for LCA, procedure for LCA-goal and scope, analyzing the inventory, assessing the environmental impact, evaluating environmental profiles, applications in government & private Sector

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate code of good conduct for LCA **L2**
- Discuss scope, analyzing the inventory and assessing the environmental impact **L3**
- List evolution and stages of LCA **L1**
- Describe the applications in government & private Sector **L2**

UNIT – II: Environmental Management System Standards: **8 Hrs**

Environmental Management Systems – Core Elements, benefits, certification and documentation, EMS Standards – ISO 14000 series – evolution, principles, structure, supporting systems, specification standards, implementation and benefits of Implementing

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain Environmental Management Systems **L3**
- Describe EMS Standards – ISO 14000 series **L2**
- Apply Environmental Management Systems for certification and documentation **L3**

UNIT – III: Environmental Monitoring, Modeling& Risk Assessment **8 Hrs**

Forecasting & Growth modeling, sensitivity Analysis, Applications of remote sensing and GIS, Environmental technology Assessment. Environmental risk assessment in industry, ecosystem approach to risk assessment, Eco-Mapping, Environmental Education

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate Applications of remote sensing and GIS in Environmental assessment **L2**
- Discuss environmental risk assessment in industry **L3**
- List ecosystem approach to risk assessment, Eco-Mapping, Environmental Education **L1**

UNIT – IV: Environmental Design & Economics **10 Hrs**

Principles, Benefits, Motivation, ED for manufactured products- Considerations in product life stages, Tools for products, Eco-labelling, ED for Building – Principles and Strategies for green building construction, ED for development and planning.

Economics and Environment -environmental cost, benefits, taxes, accounting, environmental Valuation – categorization and valuation techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe principles, benefits and motivation of environmental Design for manufactured products **L2**
- Explain principles and Strategies for green building construction **L2**
- Differentiate ED for Building cost, benefits and taxes **L2**
- Discuss about categorization and valuation techniques w.r.t economics and environment **L3**

UNIT – V: Environmental Auditing **8 Hrs**

Objectives, Scope, types, Basic structure and steps of EA, Elements of Audit process – What, Who, Why, How, Waste audits, EA in industrial projects, Liability audit and site assessment.

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate Basic structure and steps of environmental auditing **L2**
- Discuss environmental auditing in industrial projects in terms of liability audit and site assessment **L3**
- List Scope and types environmental auditing **L1**

Text Books:

1. Environmental Management, Vijay Kulkarni & T. V. Ramachandra, Capital Publishing Company, New Delhi, 2006.
2. Concepts of Environmental Management for Sustainable Development, M.C. Dash, Wiley Publications, 2019.

Reference Books:

1. Ajith Sankar, Environmental Management, OXFORD publications, 2015
2. Ni Bin Chang, Systems Analysis for Sustainable Engineering: Theory and Applications, Tata McGraw-Hill Publications, 2006.
3. Gary Skinner, Ken Crafer, Environmental Management, , Cambridge, IGCSE, 2017

Course Outcomes:

At the end of this Course the student will be able to

- Classify the stages in LCA with goal and procedures **L2**
- Describe the structure of EMS, Explain benefits of EMS, Differentiate core elements of EMS, Discuss about certification of ISO 14000 series. **L2**
- Discuss Forecasting & Growth modeling and Ecosystem Approach to Risk Assessment and Environmental Education. **L3**
- Explain Principles and Strategies for green building construction. **L2**
- Illustrate Objectives, Scope of Environmental auditing, elements of Audit process, liability audit and site assessment. **L2**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE65a- ENERGY CONSERVATION & MANAGEMENT

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation Techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient Technologies.

UNIT – I: **09 Hrs**

Basic Principles of Energy Audit and management Energy audit – Definitions – Concept– Types of audit – Energy index – Cost index – Pie charts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various types of Energy Audit **L1**
- To know about various types of Energy conservation schemes and Energy Manager functions **L2**

UNIT – II: **09 Hrs**

Lighting Modification of existing systems – Replacement of existing systems – Priorities: Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Lighting systems and types of lamps. **L1**
- To evaluate illumination level Illumination of inclined surface to beam and Design of Energy efficient lighting systems. **L2**

UNIT – III: **09 Hrs**

Power Factor and energy instruments Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Methods of Power Factor improvement **L1**
- To know about various Energy Instruments **L3**

UNIT – IV: **09 Hrs**

Space Heating and Ventilation Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about analysis of Heating and HVAC **L1**
- To know about Energy conservation methods **L2**

UNIT – V: **09 Hrs**

Economic Aspects and Analysis Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts).Computation of Economic Aspects Calculation of simple payback method – Net present worth method – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic concept of Analysis of Economics and different methods **L1**
- To know about Computation of Economic Aspects Calculation **L2**

Text Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Energy efficient electric motors by John.C.Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995.

Reference Books:

1. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
2. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1stedition, 1998.
3. Energy management hand book by W.C.Turner, John wiley and sons.
4. Energy management and conservation –k v Sharma and pvenkata seshaiah-I K International Publishing House pvt.ltd, 2011.
5. http://www.energymanagertraining.com/download/Gazette_of_IndiaP art IISecI-37_25-08-2010.pdf

Course Outcomes:

At the end of this Course the student will be able to

- Explain energy efficiency, conservation and various technologies. **L1**
- Design energy efficient lighting systems. **L2**
- Calculate power factor of systems and propose suitable compensation techniques. **L3**
- Explain energy conservation in HVAC systems. **L4**
- **L5**



B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE65b- PLC AND ITS APPLICATIONS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The student will be able to:

- Understand the basic functions and types of PLCs
- Get exposure of Easy Veep software, its applications
- Classification of PLCs and applications
- Programming using PLCs
- Troubleshooting aspects using PLCs

UNIT – I: Introduction

Basic functions of PLCs, Mechanical relays versus PLC, Different types of PLC's – Allen- Bradley – Micrologix: ML1000, ML1100, SLC500, Compact Logix, Mitsubishi FX series, HMI's, Processor and I/O cards

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about basic functions of PLCs & classification of PLCs **L1**
- To distinguish between PLCs and Mechanical relays **L2**
- To know about Processor and I/O cards

UNIT – II: **10 Hrs**

Introduction to Easy Veep software, Link between mechanical, electrical and programming documentation, Logic diagrams, Flip-Flop Logic, M8000, M8001 internal bits interpretation, Binary code, data table, manipulation and search engine in Mitsubishi environment Communication between PC and PLC, Communication between PC and HMI, PLC and HMI Serial Local network, Introduction to SLC500

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about Easy Veep software & about Logic diagrams **L1**
- To understand about Search engine & interfacing of PC and PLCs **L2**

UNIT – III: PLC software and applications **10 Hrs**

Boolean algebra – understanding binary code, ADD and SUB functions, UP and Down Counters, Introduction to k1Y0, MOV function, CPR and ZCP functions, SHWT and SHRD instructions, Introduction to Absolutely Drum Instruction.

Allen Bradley PLC: Introduction to Rockwell Software, Hardware focus, Hardware considerations (Field wiring, Master Control Relay, VFD), Basic programming and applications, Cascade control – subroutine, Different programs.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic features of PLCs & various instructions of PLC **L1**
- To know about various PLC versions & understand about Cascade control and subroutines **L2**

UNIT – IV: Programming instructions **10 Hrs**

Instructions and binary interpretation, Bit Instruction, Timers and counters, Comparison instructions, Programming Instructions – Math instructions, Move and Logical Instructions, Discussions of programming, communications for PLC-Robotic arm, Exercise of setup and monitoring

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Programming instructions & understand Math instructions in PLCs **L1**
- To know about Logical instructions & understand about Communications with PLC using set up and monitoring **L2**

UNIT – V: Analog and Digital parameters **10 Hrs**

Analog and Digital parameters by using SLC5/03-VFD-Panel Mate series 1700, Practical Troubleshooting, troubleshooting technique, Control system stability and tuning basics. Applications: Process to rewind, test, and integrate with extrusion process for wiring and fibre optic industries, Food industry – yeast, flour distribution and control. Process Medical equipment Industry – Gas analyzer, Leak tester (using CO2), plastic wrapping machines etc.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about analog and digital parameters in certain PLCs & apply PLCs for control system stability aspects **L1**
- To know about troubleshooting techniques & identify few applications of PLCs in Science and Technology fields **L2**

Text Books:

1. Automating manufacturing systems with PLCs by Hugh Jack, 2010.
2. PLC Hand Book (Automation direct Siemens)

Reference Books:

1. Programmable Logic Controllers by R. Bliesener, F Ebel, Festo. Didactic publishers,2002.
2. Programmable Logic Controllers by W. Bolton, 4th Edition, Newnes, 2006.
3. Introduction to PLCs by Jay F. Hooper, 2nd Edition, Carolina Academic Press, 2006.

Course Outcomes:

At the end of this Course the student will be able to

- Understand different types of PLCs **L1**
- Understand the usage of Easy Veep software **L2**
- Understand the hardware details of Allen Bradley PLC **L3**
- Programming of PLCs **L4**
- Know about few applications of PLCs in different fields of Science and Technology **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE65c- SYSTEM RELIABILITY CONCEPTS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- The Basic concepts, rules for combining probabilities of events, failure density and distribution functions.
- Evaluation of network Reliability / Unreliability and types of redundancies.
- Evaluation of network Reliability / Unreliability using conditional probability method.
- Expected value and standard deviation of Exponential distribution and Measures of reliability.
- Evaluation of Limiting State Probabilities of one, two component repairable models.

UNIT – I: Basic Probability Theory **09 Hrs**

Basic concepts – Rules for combining Probabilities of events – Failure Density and Distribution functions – Bernoulli's trials – Binomial distribution – Expected value and standard deviation for binomial distribution – Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic rules for probabilities of events **L1**
- Get detailed information about Probability of failure density and distribution Functions and obtain the expected value and standard deviation for binomial distribution. **L2**

UNIT – II: Network Modeling and Reliability Evaluation **09 Hrs**

Basic concepts – Evaluation of network Reliability / Unreliability – Series systems, Parallel systems, Series - Parallel systems, partially redundant systems – Types of redundancies - Evaluation of network Reliability / Unreliability using conditional probability method – Paths based and Cutset based approach – complete event tree and reduced event tree methods - Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- How to find the Probability of success and failures of network using different approaches for series-parallel configurations. **L1**
- To find reliability / unreliability of complex systems using different methods **L2**

UNIT – III: Time Dependent Probability **09 Hrs**

Basic concepts – Reliability functions f(t), Q(t), R(t), h(t) – Relationship between these functions – Bath tub curve – Exponential failure density and distribution functions - Expected value and standard deviation of Exponential distribution – Measures of reliability – MTTF, MTTR, MTBF – Evaluation of network reliability / Unreliability of simple Series, Parallel, Series-Parallel systems - Partially redundant systems - Evaluation of reliability measure – MTTF for series and parallel systems – Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of time domain functions and relationship between them. and obtain the expected value and standard deviation for exponential distribution. **L1**
- To obtain probabilistic measures for fully redundant and partially redundant configurations **L2**

UNIT – IV: Discrete Markov Chains & Continuous Markov Processes **09 Hrs**

Markov Chains: Basic concepts – Stochastic transitional Probability matrix – time dependent probability evaluation – Limiting State Probability evaluation – Absorbing states.

Markov Processes: Modeling concepts – State space diagrams – time dependent reliability evaluation of single component repairable model – Evaluation of Limiting State Probabilities of one, two component repairable models – Frequency and duration concepts – Frequency balance approach - Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of Stochastic Transitional Probability Matrix, Limiting State Probability **L1**
- Understand the concept of Frequency balance approach. And To distinguish between Markov chains and Markov processes **L2**

UNIT – V: Multi Component & Approximate System Reliability Evaluation **09 Hrs**

Recursive relation for evaluation of equivalent transitional rates– cumulative probability and cumulative frequency and 'n' component repairable model – Series systems, Parallel systems, Basic probability indices – Series, Parallel systems – Complex Systems– Cutset approach – Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of recursive relation for evaluation of equivalent transitional rates. **L1**
- To know about computation of basic probability indices for series, parallel configurations **L2**

Text Books:

1. Reliability Evaluation of Engineering Systems by Roy Billinton and Ronald N. Allan, Reprinted in India B. S. Publications, 2007.
2. Reliability Engineering by E. Balagurusamy, Tata McGraw Hill, 2003.

Reference Books:

1. Introduction to Reliability Engineering by E. E. Lewis by Wiley Publications.
2. Reliability and Maintainability Engineering by Charles E. Ebeling, Tata McGraw Hill, 2000.
3. Reliability and Safety Engineering by Ajit Kumar Verma, SrividyaAjit and Durga Rao Karanki, Springer, Second Edition, 2016. System Reliability Theory Marvin Rausand and ArnljotHoyland, Wiley Publictions.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the concepts for combining Probabilities of events, Bernoulli's trial, and Binomial distribution. **L1**
- Network Reliability/Unreliability using conditional probability, path and cutest based approach, complete event tree and reduced event tree methods. **L2**
- Understanding Reliability functions and to develop relationship between these functions, expected value and standard deviation of Exponential distribution and measures of reliabilities. **L3**
- Analyze the time dependent reliability evaluation of single component repairable model, frequency and duration concepts, Frequency balance approach. **L4**
- `Recursive relation for evaluation of equivalent transitional rates, cumulative probability and cumulative frequency and 'n' component repairable model. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65a- AUTOMOBILE ELECTRONICS, SENSORS AND DRIVES

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Explain the use of electronics in the automobile.
- Explain the importance of various types of sensors and actuators in automotive electronics.
- Demonstrate the various control elements in Engine Management system.
- Familiarize with Vehicle management systems.
- Identify various electronic and the instrumentation systems used in automobile.

UNIT – 1: Introduction to microcomputer: **10 Hrs**

Microcomputer: Buses, memory, timing, CPU registers; Microprocessor architecture: Initialization, operation codes, program counter, branch and jump instructions, subroutine. Analog to digital converters and Digital to analog converters, sampling, polling and interrupts, digital filters, lookup table.

Learning Outcomes:

At the end of this unit, the student will be able to

- Draw the architecture of microprocessor. **L3**
- Explain the importance of subroutines, branch and jump instructions in Microprocessor. **L3**
- Compare Analog to Digital Converters and Digital to Analog Converters. **L4**
- Identify the various components of Microcomputer. **L1**

UNIT – II: Sensors and actuators **10 Hrs**

Speed sensors, Pressure sensors: Manifold Absolute Pressure sensor, knock sensor, Temperature sensors: Coolant and Exhaust gas temperature, Exhaust Oxygen level sensor, Position sensors: Throttle position sensor, accelerator pedal position sensor and crankshaft position sensor, Air mass flow sensor. Solenoids, stepper motors and relays.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall the working principles of various types of sensors used in automotive electronics. **L1**
- Identify the practical applications of sensors and actuators. **L2**
- Apply the concept of sensors and actuators in real world applications **L3**

UNIT – III: Electronic engine management system **10Hrs**

Electronic engine control: Input, output and control strategies, electronic fuel control system, fuel control modes: open loop and closed loop control at various modes, EGR control, Electronic ignition systems – Spark advance correction schemes, fuel injection timing control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare open loop and closed loop control systems. **L4**
- Identify the various elements in Engine Management System. **L2**
- Recall the concepts of electronic ignition system. **L1**

UNIT – IV: Electronic vehicle management system **8 Hrs**

Mechanical Engineering Department,
JNTUA College of Engineering,
PULIVENDULA - 516 390.

Cruise control system, Antilock braking system, electronic suspension system, electronic steering control, traction control system, Transmission control, Safety: Airbags, collision avoiding system, low tire pressure warning system.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of cruise control system. **L2**
- Outline working of the safety systems. **L1**
- Demonstrate the control of electronic steering and traction. **L2**

UNIT – V: Automotive instrumentation system: **8 Hrs**

Input and output signal conversion, multiplexing, fuel quantity measurement, coolant temperature and oil pressure measurement, display devices- LED, LCD, VFD and CRT, Onboard diagnostics(OBD), OBD-II, off board diagnostics.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the method of measurement of fuel quality. **L2**
- Compare onboard diagnostics and off board diagnostics. **L4**
- Discuss various types of display devices. **L2**

Text Books:

1. Understanding Automotive Electronics, William B Ribbens, Newne Butterworth-Heinermann, 6th edition 2003.
2. Crouse W H, Automobile Elctrical Equipment, McGraw Hill Book Co.Inc, Newyork 2005.

Reference Books:

1. Bechhold "Understanding Automotive Electronics", SAE, 1998.
2. Robert Bosch "Automotive Hand Book", SAE (5th Edition), 2000.
3. Tom Denton,"Automobile Electrical and Electronic Systems" 3rd edition- Edward Arnold, London - 2004.
4. Eric Chowanietz - 'Automotive Electronics' - SAE International USA – 1995.

Course Outcomes:

At the end of this Course the student will be able to

- Obtain an overview of automotive components, like sensors, actuators, communication protocols and safety systems employed in today's automotive industry. **L1**
- Interface automotive sensors and actuators with microcontrollers. **L3**
- Know, the various display devices that are used in automobiles. **L2**
- Identify the elements in the engine management and vehicle management system. **L2**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65b- PROGRAMMING OF ROBOT AND ITS CONTROL

(Open Elective - II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Learn the fundamental concepts of industrial robotic technology.
- Apply the basic mathematics to calculate kinematic and dynamic forces in robot manipulator.
- Understand the robot controlling and programming methods.
- Describe concept of robot vision system.

UNIT – 1: Fundamentals of Robots: **10 Hrs**

Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots.

Learning Outcomes:

At the end of this unit, the student will be able to

- Outline the advantages, disadvantages and applications of robot. **L2**
- Compare the types of robot manipulators based on applications. **L2**

UNIT – II: Robot Actuators And Feedback Components: **10 Hrs**

Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare the types of actuators used in robot manipulator. **L2**
- List out the various types of robots and feedback components. **L2**

UNIT – III: Robot Programming **10Hrs**

Methods of programming - requirements and features of programming languages, software packages, problems with programming languages. VAL, RAIL, AML, C, C++.

Learning Outcomes:

At the end of this unit, the student will be able to

- List out the various methods of robot programming **L2**
- Explain the requirements and features of programming **L2**

UNIT – IV: Control of Manipulators: **8 Hrs**

Open- and close-loop control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic concepts of robot controlling systems. **L2**
- Outline PD and PID control schemes. **L2**
- Use the force control strategies to determine the forces in robot. **L3**
- Explain the force control and torque control techniques. **L2**

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UNIT – V: Robot Vision: **8 Hrs**

Introduction, architecture of robotic vision system, image processing, image acquisition camera, image enhancement, image segmentation, imaging transformation, Camera transformation and calibrations, industrial applications of robot vision.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the components of robot vision system. **L3**
- Explain the concept of image enhancement, segmentation and transformation. **L2**
- List the various components of robot vision system. **L1**
- Illustrate the industrial applications of robot vision system. **L2**

Text Books:

1. Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey , Industrial Robotics — Mc Graw Hill, 1986.
2. R K Mittal and I J Nagrath, Robotics and control, Illustrated Edition, Tata McGraw Hill India 2003..

Reference Books:

1. Saeed B. Niku, Introduction to Robotics – Analysis, System, Applications, 2nd Edition, John Wiley & Sons, 2010.
2. H. Asada and J.J.E. Slotine, Robot Analysis and Control, 1st Edition Wiley- Interscience, 1986.
3. Robert J. Schillin, Fundamentals of Robotics: Analysis and control, Prentice-Hall Of India Pvt. Limited, 1996.
4. Mohsen shahinpoor, A robot Engineering text book, Harper & Row Publishers,1987.
5. John.J.Craig Addison, Introduction to Robotics: Mechanics and Control, Wesley, 1999.
6. K.S. FU, R.C. Gonzalez and C.S.G Lee, Robotics: Control, sensing, vision, and intelligence . Mc Graw Hill, 1987.
7. Richard D. Klafter, Thomas Robotic Engineering an integrated approach, PHI publications 1988.

Course Outcomes:

At the end of this Course the student will be able to

- Explain fundamentals of Robots. **L2**
- Apply kinematics and differential motions and velocities. **L3**
- Demonstrate control of manipulators. **L2**
- Understand robot vision. **L2**
- Develop robot cell design and programming. **L3**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65c- SENSORS FOR INTELLIGENT MANUFACTURING

(Open Elective - II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize the sensors used in intelligent manufacturing.
- Illustrate sensors used in precision manufacturing and CNC machine tools.
- Explain sensors for monitoring of manufacturing systems.
- Outline advanced sensors used in intelligent manufacturing.

UNIT – 1: Introduction 12 Hrs

Principles, classifications and characteristics of sensors – Electrical, magnetic, optical, acoustic, pneumatic, magnetic, electro-optical and vision sensors, role of sensors in intelligent manufacturing.

Learning Outcomes:

At the end of this unit, the student will be able to

- List out various types of sensors used in manufacturing. **L1**
- Explain the characteristics of different sensors. **L3**
- Explain optical, magnetic, pneumatic and acoustic sensors. **L3**
- Describe the role of sensors in intelligent manufacturing. **L4**

UNIT – II: Sensors and control in CIM and FMS: 10 Hrs

Design of CIM, decision support system for CIM, analysis of CIM, development of CIM strategy with sensors and control. FMS-Robot control with machine vision sensors-Architecture of robotic vision system, image processing, image acquisition, enhancement, segmentation, transformation, industrial application of robot vision, multi Sensor controlled robots, measurement of robot density, robot programming.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify various types of inbellisort manufacturing systems. **L2**
- List the various types of sensors in CIM. **L2**
- Explain machine sensors. **L3**
- Describe architecture of robotic design systems. **L4**

UNIT – III: Sensors in Precision Manufacturing: 8Hrs

Testing of manufacturing components, principles and applications of digital Encoders, opto-electronic colour sensors, control applications in robotics. Sensors for CNC machine tools– linear, position and velocity sensors. Automatic identification techniques for shop floor control.

Learning Outcomes:

At the end of this unit, the student will be able to

- List out different types of sensors in precision manufacturing. **L1**
- Describe the principle behind opto-electronic color sensors **L2**
- Select sensors for CNC machine tools. **L3**
- Explain automatic identification techniques for shop floor control. **L3**

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UNIT – IV: Control of Manipulators: **8 Hrs**

Sensors for Monitoring of Manufacturing Systems: Principles – sensors for monitoring temperature, force, vibration and noise. Sensors to detect machinery faults. Selection of sensors and monitoring techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify various types of machine failures in manufacturing systems. **L2**
- Select sensors for monitoring of force, vibration and noise. **L3**
- Explain monitoring techniques for machinery faults. **L3**
- Name sensors used for temperature. **L3**

UNIT – V: Smart / Intelligent sensors: **8 Hrs**

Integrated sensors, micro sensors, nano sensors. Manufacturing of semi conductor sensors. Fibre optic sensors – Fibre optic parameters, configurations, photoelectric sensor for long distance, sensor alignment techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- List out advance sensors in intelligent manufacturing. **L1**
- Explain about semiconductor and integrated sensors. **L3**
- Describe micro and nano sensors. **L3**
- Discuss principles of fibre optic sensors. **L3**

Text Books:

1. Sabrie Soloman, Sensors and Control systems in Manufacturing, McGraw-Hill, 2/e, 2010.
2. H.K Tonshoff and I.Inasaki, Sensor Applications Vol 1: Sensors in Manufacturing, Wiley-VCH Publications, 2001.

Reference Books:

1. Sabrie soloman, Sensors Handbook, McGraw Hill, 2/e, 20210
2. Mikell P.Groover, Mitchell Weiss, Roger N.Nagel, Nicholas G.Odrey, Industrial Robotics, Tata McGraw-Hill, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Classify various sensors used in intelligent manufacturing. **L2**
- Describe sensors used in computer integrated manufacturing and machine sensors. **L3**
- Discuss sensors used in precision manufacturing. **L3**
- Identify reasons behind machinery faults. **L3**
- Discuss advanced sensors in intelligent manufacturing. **L3**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65d- NON-CONVENTIONAL SOURCES OF ENERGY

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize with concept of various forms of renewable energy.
- Understand division aspects and utilization of renewable energy sources for both domestics and industrial applications.
- Expose the students in an environmental and cost economics of using renewable energy sources compared to fossil fuels.

UNIT – 1: Principles Of Solar Radiation: **10 Hrs**

Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Learning Outcomes:

At the end of this unit, the student will be able to

- explain the basic concepts of solar radiation and solar collectors **L2**
- develop sun path diagrams **L3**
- Explain environmental impact of solar power. **L2**
- Discuss the instruments for measuring solar radiation and sun shine. **L6**

UNIT – II: Solar Energy Collection: **10 Hrs**

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage and Applications :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify solar energy collectors. **L1**
- Describe orientation and thermal analysis of solar energy collectors. **L2**
- Explain photovoltaic energy conversion. **L2**
- Illustrate the various solar energy applications. **L2**

UNIT – III: Wind Energy & Bio-Mass **10Hrs**

Wind Energy : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

BIO-MASS: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C.Engine operation and economic aspects.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare vertical axis and horizontal axis windmills. **L3**
- Illustrate the performance characteristics of vertical axis and horizontal axis windmills. **L2**
- Discuss the principles of Bio-conversion. **L6**
- Explain combustion characterizes of bio-gas. **L2**

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UNIT – IV: Geothermal Energy & Ocean Energy **8 Hrs**

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. Tidal and wave energy: Potential and conversion techniques, mini-hydel power plants, and their economics.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of geothermal and ocean energy. **L2**
- Discuss OTEC and principles utilization. **L6**
- Explain mini-hydel power plants and their economics. **L2**

UNIT – V: Direct Energy Conversion **10 Hrs**

Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, MHD accelerator, MHD Engine, power generation systems, electron gas dynamic conversion, economic aspects. Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the working principle of MHD engine. **L2**
- Explain constructional details of various thermo-electric generators. **L2**
- Identify the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**

Text Books:

1. Renewable energy resources, Tiwari and Ghosal, Narosa.
2. Non-Conventional Energy Sources, G.D. Rai.

Reference Books:

1. Renewable Energy Sources, Twidell& Weir.
2. Solar Energy, Sukhatme
3. Solar Power Engineering, B.S.Magal Frank Kreith & J.F.Kreith.
4. Non-Conventional Energy, Ashok V Desai, Wiley Eastern
5. Principles of Solar Energy, Frank Krieth & John F Kreider.
6. Non-Conventional Energy Systems, K Mittal , Wheeler.

Course Outcomes:

At the end of this Course the student will be able to

- Outline the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**
- Explain the basic concepts of solar radiation and solar collectors. **L2**
- Discus OTEC and principles utilization. **L6**
- Describe orientation and thermal analysis of solar energy collectors. **L2**

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B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65e- NEMS & MEMS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize the basics of MEMS and NEMS
- Focus on the available tools and procedures to analyze and design micro/nano-scale engineering systems
- Demonstrate main issues stemming from operating in micro and nano length scale.
- Train MEMS and NEMS devices and their applications
- Impart fabrication and modeling aspects of MEMS and NEMS devices
- Enable a systematic design approach to engineering projects

UNIT – I: INTRODUCTION: **10 Hrs**

New trends in Engineering and Science: Micro and Nano scale systems, Overview of Nano and Micro Electromechanical Systems, Micro electromechanical systems devices and structures, Nanotechnology and (N+1) Problem, Physical and Technological limitation of miniaturization;Nanoscale Structures / Nanoparticles: Adhesion, Nanotubes, Nanowires, Quantum Dots, Multilayered structures, Nanocluster Composites Crystals: Lattices, Nanocrystals and nanoparticles.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts, nanostructures and nanotechnology. **L2**
- Identify the principles of processing, manufacturing and characterization of nanomaterials and nanoscale systems. **L3**
- Apply electronic microscopy, and nano indentation techniques to characterize nano materials and nanostructures. **L3**

UNIT – II: MODELING OF MEMS AND NEMS: **10 Hrs**

Introduction to modeling, analysis and simulation, Scaling laws for length and time and its effect on modeling, Grain size effect on materials properties (mechanical, electrical, magnetic, etc.), basic electro-magnetic with application to MEMS and NEMS, Modeling developments of micro-and nano actuators using electromagnetic fields, Lumped-parameter mathematical models of MEMS, Energy conversion in NEMS and MEMS.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the operation of micro devices, micro systems and their applications. **L1**
- Model MEMS devices and structures. **L3**
- Develop micro devices, micro systems using the MEMS fabrication process. **L3**

UNIT – III: MANUFACTURING TECHNIQUES AND PROCESSES: **10Hrs**

Cleanroom and Fab Procedures, Vacuum: Vacuum Systems, Pumps and Gauges; Materials for MEMS: Silicon, silicon compounds, polymers, metals; Microfabrication Technologies: Beam Machining – Ion-Beam, E-Beam and LASER processing techniques; Lithographic Patterning – Bulk μMachining, Surface μMachining, SU-8 Lithography & Surface forming, LIGA Process: X-Ray Lithography &UV LIGA; Precision Machining – Precision Milling and turning, μEDM, Micromolding & Embossing, Precision Bonding, Thin Films: Processes, Evaporation, Dry and Wet Etching, Sputtering Deposition; Characterization: Optical Techniques/Microscope, SEM, Optical and Electrical, Properties, Auger and Thin Film Analysis, AFM.

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Learning Outcomes:

At the end of this unit, the student will be able to

- Outline computer-aided design, fabrication, analysis and characterization of nano-structured materials, micro- and nano-scale devices. **L2**
- Develop micro/nanosystems for photonics and optical applications. **L2**
- Explain manufacturing processes based on diffusion, deposition and patterning of surfaces. **L4**

UNIT – IV: MICRO SENSORS AND MICRO ACTUATORS: 8 Hrs

MEMS Sensors: Piezoresistive pressure sensor, Acoustic wave sensors, Resonant Microsensor, Peizoelectric Rate gyroscope, Capacitive Accelerometer; etc. Nanosensors & Nano biosensors; Design of Actuators: Actuation using thermal forces, Actuation using shape memory Alloys, Actuation using piezoelectric crystals, Actuation using Electrostatic forces (Parallel plate, Torsion bar, Comb drive actuators), Micromechanical Motors and pumps; Nanomotor, Molecular Motor, etc.

Learning Outcomes:

At the end of this unit, the student will be able to

- Outline basic approaches for various actuator design. **L2**
- Distinguish between various MEMS sensors. **L4**
- Explain the operation principles of advanced micro- and nanosystems. **L4**

UNIT – V: CONTROL OF MICROELECTROMECHANICAL SYSTEMS 10 Hrs

Introduction to Microelectromechanical Systems Control, Control of Microelectromechanical Systems, Intelligent Control of MEMS; Synthesis, Analysis, Fabrication, and Computer-Aided Design of MEMS, Case studies: Design and Fabrication Analysis of Translational Microtransducers, Single-Phase and three phase Reluctance Micromotors, Modeling, Analysis, and Control of Micromirror Actuators; Application of Nanomotor in Bio-medical applications, Nano robots, Electronics based on CNT - Molecular Electronics.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify micro electro mechanical system control for a given application. **L3**
- Synthesis intelligent control of MEMS/NEMS. **L4**
- Evaluate MEMS/NEMS for various applications. **L4**

Text Books:

1. Marc Madou, Fundamentals of Micro fabrication, CRC press 1997.
2. Stephen D. Senturia, Micro system Design, Kluwer Academic Publishers,2001
3. J. A. Pelesko and D. H. Bernstein, Modeling of MEMS and NEMS, Chapman & Hall/CRC, 2003.
4. Sergey Edward Lyshevski, Lyshevski Edward Lyshevski, MEMS and NEMS: Systems, Devices and Structures, CRC Press, 2005.

Reference Books:

1. Tai Ran Hsu, MEMS and Microsystems Design and Manufacture, Tata Mcraw Hill, 2002.
2. Chang Liu, Foundations of MEMS, Pearson education India limited, 2006
3. Mahalik N P, MEMS, Tata McGraw-Hill Education, 2008.
4. Gianfranco Cerofolini, Nanoscience and Technology: Nanoscale Devices, Springer, 2009.

Course Outcomes:

At the end of this Course the student will be able to

- Identify processing and characterization of nanomaterials. **L3**
- Plan operation of micro devices, micro systems and their applications. **L3**
- Describe the implementation of MEMS into products. **L4**
- Explain the operation principles of advanced micro- and nanosystems. **L4**
- Apprise the technology implemented in advanced micro- and nanosystem. **L5**
- Design the micro devices, micro systems using the MEMS fabrication process. **L5**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME65f – OPTIMIZATION TECHNIQUES THROUGH MATLAB

(Open Elective - II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

UNIT – 1: Introduction to MAT LAB: **10 Hrs**

Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

Learning Outcomes:

At the end of this unit, the student will be able to

- Write simple codes in MATLAB. **L3**
- Plot the data using MATLAB. **L3**
- Implement optimization models in MATLAB. **L3**

UNIT – II: Introduction to Optimization: **10 Hrs**

Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

Learning Outcomes:

At the end of this unit, the student will be able to

- Build optimization problem. **L1**
- Solve various optimization problems **L3**
- Compare convex and concave programming **L4**

UNIT – III: Single Variable Optimization: **10Hrs**

Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand various methods involving single variable optimization. **L2**
- Develop codes in MATLAB for different methods. **L3**
- Identify methods for solving a single variable optimization problem. **L3**

UNIT – IV: Multi Variable Optimization: **8 Hrs**

Conjugate gradient method, Newton's method, Powell's method, Flectcher- Reeves method, Hooke and Jeeves method, interior penalty function with MATLAB code.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply various methods involving multi variable optimization. **L2**
- Develop codes in MATLAB for solving various multi variable optimization problems. **L3**
- Choose methods for solving a multi variable optimization problem. **L3**

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UNIT – V: Evolutionary Algorithms: **8 Hrs**

Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply different types of genetic algorithms. **L3**
- Model optimization problems using genetic algorithms in MATLAB. **L3**
- Compare different genetic algorithms for performance. **L5**

Text Books:

1. Rao V.Dukkipati, MATLAB: An Introduction with Applications, Anshan, 2010.
2. Achille Messac, Optimization in practice with MATLAB, Cambridge University Press, 2015.
3. Jasbir S Arora, Introduction to optimum design, 2/e. Elsevier, 2004.

Reference Books:

1. Cesar Perez Lopez, MATLAB Optimization Techniques, Academic press, Springer publications, 2014.
2. Steven C.Chapra, Applied Numerical Methods with MATLAB for Engineers and scientists, 4/e, McGraw-Hill Education, 2018.

Course Outcomes:

At the end of this Course the student will be able to

- Use optimization terminology and concepts, and understand how to classify an optimization problem. **L4**
- Apply optimization methods to engineering problems. **L3**
- Implement optimization algorithms. **L3**
- Compare different genetic algorithms. **L5**
- Solve multivariable optimization problems. **L4**

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B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC65a-INTRODUCTION TO MICROCONTROLLER AND APPLICATIONS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To understand the basic concepts and architecture of 8051.
- To learn various instructions and addressing modes used in 8051
- To be able to write programs in assembly language for 8051
- To be able to program 8051 Timers and implement serial communication for a given application.
- To learn interfacing of memory, I/O devices and the usage of Interrupts.

UNIT – I:

Architecture of 8051: Introduction, Block diagram of 8051 Microcontroller, Functions of each block, Pin details of 8051, ALU,ROM, RAM, Memory Organization of 8051, Special function registers, Program Counter, PSW register, Stack, I/O Ports, Timer, Interrupt, Serial Port, Oscillator and Clock, Clock Cycle, Machine Cycle, Instruction cycle, Reset, Power on Reset.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the architecture of 8051 microcontroller. **L2**
- Learn the functions of each block of 8051 microcontroller. **L1**

UNIT – II:

Instruction Set of 8051: Instruction set of 8051, Classification of 8051 Instructions, Data transfer instructions, Arithmetic Instructions, Logical instructions, Branching instructions, Bit Manipulation Instructions

Assembler and Addressing Modes: Assembling and running an 8051 program, Structure of Assembly Language, Assembler directives, Different addressing modes of 8051.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know different instructions available in the Instruction set of 8051. **L1**
- Learn and use different types of addressing modes of 8051 microcontroller. **L1**

UNIT – III:

Programs: Arithmetic operations, Biggest Number / Smallest Number, Ascending order / Descending order, BCD to HEX Conversion, HEX to BCD Conversion, Odd Parity Generator Even Parity Generator, Time delay routines

I/O: Bit addresses for I/O and RAM, I/O programming, I/O bit manipulation programming.

Learning Outcomes:

At the end of this unit, the student will be able to

- Write assembly language program in 8051 for simple operations. **L6**
- Gain knowledge about different mappings used in 8051 microcontroller. **L1**

UNIT – IV:

Timer: Programming 8051 Timers, Timer registers, Different modes of Timer, Programming timer in different modes, Counter programming, Different modes of Counter, Sample programs.

Serial Communication: Basics of Serial communication, UART, RS 232 Protocol, 8051 interface to RS 232, 8051 UART Programming, SPI and I^2C implementation on 8051.

Learning Outcomes:

At the end of this unit, the student will be able to

- Write programs to use the 8051 Timers for a given application. **L6**
- Use different types of serial communication devices based on the application. **L3**

UNIT – V:

Interrupt: 8051 Interrupts, Programming Timer Interrupts, Programming external hardware interrupts, Programming the serial communication interrupt, Interrupt priority in 8051.**IC 8255:** IC 8255, Block Diagram, Modes of 8255, Interfacing with 8051.

Interfacing Techniques: Interfacing external memory to 8051, Sensor interfacing, ADC interfacing, DAC interfacing, Keyboard interfacing, Seven segment LED Display Interfacing, Stepper Motor interfacing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Interface memory and I/O devices for specific applications. **L4**
- Learn and apply Interrupts based on the application and usage. **L3**

Text Books:

1. Muhammed Ali Mazidi, Janice Gillispie Mazidi and Rolin D McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd Edition, Pearson Education, 2008.
2. Ajit pal, "Microcontrollers, Principles and Applications", – PHI Ltd., - 2011.

Reference Books:

1. Ajay V Deshmukh, "Microcontrollers: Theory and Applications", TATA McGraw Hill publications, 2007.
2. Krishna Kanth, "Microprocessors and Microcontrollers", PHI Publications, 2010

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts and architecture of 8051. **L2**
- Know the usage of various instructions and addressing modes in 8051 **L1**
- Write programs in assembly language for 8051 **L6**
- Program 8051 Timers and implement serial communication for a given application. **L6**
- Interface memory, I/O devices and use Interrupts. **L4**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC65b-PRINCIPLES OF DIGITAL SIGNAL PROCESSING

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To understand the frequency domain analysis of discrete time signals.
- To learn the properties of discrete fourier series and fourier transforms.
- To design & analyze IIR digital filters from analog filters.
- To know various structures used in implementation of FIR digital filters.
- To grasp the importance and applications of Multirate Digital signal processing.

UNIT – I:

Introduction to Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time systems, stability of LTI systems, LTI system Properties. Solution of Linear constant coefficient difference equations , frequency domain representation of discrete time signals and systems. Review of Z-transforms.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze and process signals in the discrete domain. **L4**
- Determine time domain representations and frequency domain analysis of discrete-time signals and systems. **L3**

UNIT – II:

Discrete Fourier Series and Fourier Transforms: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the pproperties of discrete fourier series. **L2**
- Describe DFT using FFT algorithms. **L1**

UNIT – III:

Design of IIR Digital Filters and Realizations: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design IIR digital filters from analog filters. **L6**
- Construct IIR digital filters with different realization techniques. **L6**

UNIT – IV:

Design of FIR Digital Filters and Realizations: Characteristics of FIR Digital Filters, frequency response. Design of FIR digital filters using window techniques and frequency sampling technique, comparison of IIR & FIR filters, basic structures of FIR systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design FIR digital filters using window techniques. **L6**
- Construct the basic structures of FIR systems. **L6**

UNIT – V:

DSP Applications: Introduction to programmable DSPs, Multirate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor; Adaptive filters: Introduction, Basic principles of Forward Linear Predictive filter and applications such as system identification, echo cancellation, equalization of channels, and beam forming using block diagram representation study only.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply Interpolation and Decimation with help of sampling and filtering. **L3**
- Understand the principle and applications of Forward Linear Predictive filter. **L2**

Text Books:

1. John G. Proakis and Dimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithmsand Applications", Pearson Education, 2007.
2. A.V.Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing",PHI.
3. B.Venkataramani and M. Bhaskar, "Digital Signal Processors – Architecture, Programming and Applications", TATA McGraw Hill, 2002.

Reference Books:

1. Andreas Antoniou, "Digital Signal Processing", TATA McGraw Hill, 2006
2. MH Hayes, "Digital Signal Processing", Schaum's Outline series, TATA Mc-Graw Hill, 2007.
3. Robert J. Schilling and Sandra L. Harris, "Fundamentals of Digital Signal Processing using Matlab", Thomson, 2007.

Course Outcomes:

At the end of this Course the student will be able to

- Articulate the frequency domain analysis of discrete time signals. **L3**
- Understand the properties of discrete fourier series and fourier transforms. **L2**
- Design & analyze IIR digital filters from analog filters. **L6**
- Design various structures used in implementation of FIR digital filters. **L6**
- Summarize the importance and applications of Multirate Digital signal processing. **L2**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC65c-INTRODUCTION TO IMAGE PROCESSING

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn the fundamentals of Image Processing and learn the different types of image transforms.
- To study different types of filtering techniques for image enhancement.
- To understand various types of image segmentation and thresholding techniques.
- To gain knowledge on wavelets and multi resolution image processing techniques.
- To comprehend various types of image compression and colour image processing methods.

UNIT – I:

Digital Image Fundamentals: Fundamental steps of digital image processing, Components of Digital Image processing, image sampling and quantization, basic relationships between pixels – neighborhood, adjacency, connectivity, distance measures. Applications of Digital Image Processing.

Image Transforms: Fourier Transform and its properties in one dimensional and Two dimensional, Discrete Fourier Transform, Discrete Cosine Transform, Discrete Sine transform, Walsh transform, Hadamard transform, Slant transform, KL Transforms and its properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the fundamentals of digital image processing. **L2**
- Analyze the image transforms in one and two dimensions. **L4**

UNIT – II:

Image Enhancements and Filtering: Gray level transformations, Histogram processing, histogram equalization, Enhancement of Frequency domain, Homomorphic filtering, Filtering in the frequency domain. Image Restoration: A Model of the Image Degradation \ Restoration Process, Noise Models, Inverse filtering, Minimum Mean Square Error (Weiner) Filtering, Constrained least squares filtering.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the filters in spatial and frequency domains. **L4**
- Understand the image restoration model and various types of noises in image restoration. **L2**

UNIT – III:

Image Segmentation: Detection of Discontinuities: Point detection, Line detection, Edge detection, Edge linking and boundary detection, Thresholding, Region based segmentation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the concept of image segmentation. **L1**
- Analyze various types of thresholding techniques. **L4**

UNIT – IV:

Wavelets and Multi-resolution image processing: Back ground, Image Pyramids, Sub band coding, The Haar Transform.Multi resolution Expansions: Series Expansions, Scaling Functions, Wavelet Functions, Wavelet Transform in One dimension: The wavelet series expansions, The Discrete wavelet transform, The Continuous Wavelet Transform, The Fast wavelet Transform, Wavelet transform in two dimensions, Wavelet Packets.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the wavelets in one dimension and two dimensions. **L2**
- Explain the multi-resolution expansions and fast wavelet transform. **L1**

UNIT – V:

Image Compression: Redundancy, coding, inter-pixel and psycho-visual; Loss less compression – Huffmann coding, predictive coding; Lossy Image compression- predictive and transform coding; Image compression standards.

Color Image Processing: Color Fundamentals, Color models–RGB, CMY, HSI; Pseudo color Image Processing, Basics of Full color Image Processing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for image compression and its types. **L2**
- Learn the color image processing and various types of color models. **L1**

Text Books:

1. R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Second Edition, Pearson Education, 2008.
2. Anil Kumar Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 2nd edition 2004.

Reference Books:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image processing", Tata McGraw Hill.
3. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the fundamentals of Image Processing and apply different types of image transforms. **L2**
- Correlate different types of filtering techniques for image enhancement. **L4**
- Understand various types of image segmentation and thresholding techniques. **L2**
- Gain knowledge on wavelets and multi resolution image processing techniques. **L1**
- Summarize different types of image compression and colour image processing methods. **L2**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS65a- INTRODUCTION TO MACHINE LEARNING

Open Elective-II

L	T	P	C
3	0	0	3

Course Objectives:

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

UNIT – I: INTRODUCTION **8hrs**

Introduction: An illustrative learning task, and a few approaches to it. What is known from algorithms? Theory, Experiment. Biology. Psychology. Overview of Machine learning, related areas and applications. Linear Regression, Multiple Regression, Logistic Regression, logistic functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT – II: DECISION TREE LEARNING **8hrs**

Decision Tree Learning: - Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and Over fitting. Neural Network Learning: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT – III: SAMPLE COMPLEXITY AND OVER FITTING **8hrs**

Sample Complexity and Over fitting: Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Support Vector Machines: functional and geometric margins.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT – IV: INSTANCE-BASED TECHNIQUES **7 Hrs**

Instance-based Techniques: Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. Clustering and Unsupervised Learning: K-means clustering, Gaussian mixture density estimation, model selection

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**

- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT – V: Genetic Algorithms

Genetic Algorithms: Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity. Dimensionality reduction: feature selection, principal component analysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Tom Michel, Machine Learning, McGraw Hill, 1997
2. Trevor Has tie, Robert Tibshirani & Jerome Friedman. The Elements of Statically Learning, Springer Verlag, 2001.

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001 3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

Course Outcomes:

At the end of this Course the student will be able to

- Student should be able to understand the basic concepts such as decision trees and neural networks.Ability to formulate machine learning techniques to respective problems **L2**
- Apply machine learning algorithms to solve problems of moderate complexity. **L3**

B.Tech III.Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS65b- INTRODUCTION TO COMPUTER NETWORKS

Open Elective-II

L	T	P	C
3	0	0	3

Course Objectives:

This course is designed to:

- Introduce the basic concepts of Computer Networks.
- Familiarize with the layered approach and different layers of computer networks.
- Familiarize with the design issues of different layers.
- Explain the working of different protocols of a computer network..

UNIT – I: INTRODUCTION **8hrs**

Introduction: Uses of computer networks, network hardware, Protocol Hierarchies, Design Issues for the layers, Connection oriented vs Connectionless Service. **The physical layer:** The theoretical basis for data communication, Guided transmission media, wireless transmission, communication satellites.

Learning Outcomes:

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT – II: THE DATA LINK LAYER **8hrs**

The data link layer: Data link layer design issues, error detection and correction, elementary data link protocols, sliding window protocols

The medium access control: The channel allocation problem, multiple access protocols, Ethernet.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT – III: THE NETWORK LAYER **8hrs**

The network layer: Network layer design issues, Flooding, Distance Vector Routing, Link state Routing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT – IV: IP VERSION 4 PROTOCOL **7 Hrs**

The IP version 4 Protocol, IP Addresses, IP version 6, Internet control protocols, OSPF, BGP, Internet multicasting.

The transport layer: Elements of transport protocols, congestion control, The internet transport protocols: UDP and TCP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**

- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT – V: THE APPLICATION LAYER

The application layer: DNS- The Domain Name System, Electronic Mail, WWW Architectural Overview, Static Web pages, Dynamic web pages and web applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Andrew S.Tanenbaum, David j.wetherall, Computer Networks, 5th Edition, PEARSON.

Reference Books:

1. Forouzan, Datacommunications and Networking, 5th Edition, McGraw Hill Publication.

Course Outcomes:

Students will be able to:

- Recognize the method of using layered approach for design of computer networks. **L2**
- Explain the functionality of each layer of a computer network. **L3**
- Apply the knowledge of layered approach for the design of computer network software **L4**
- Analyze the performance of protocols of a computer network. **L4**
- Recommend the protocols for different applications. **L5**
- Propose new protocols for a computer networks. **L6**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS65c- WEB DESIGN AND MANAGEMENT

Open Elective-II

L	T	P	C
3	0	0	3

Course Objectives:

- To Learn the basic concepts in HTML, CSS, JavaScript
- To Understand the responsive design and development
- To learn the web project management and maintenance process
- To Design a Website with HTML, JS, CSS / CMS - Word press

UNIT – I: WEB DESIGN - HTML MARKUP FOR STRUCTURE **8hrs**

Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5.

Learning Outcomes:

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT – II: CSS AND JAVASCRIPT **8hrs**

CSS - Formatting text - Colours and Background - Padding, Borders and Margins – Floating and positioning - Page Layout with CSS - Transition, Transforms and Animation – JavaScript - Using Java Script.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT – III: RESPONSIVE WEB DESIGN **8hrs**

Sass for Responsive Web Design - Marking Content with HTML5 - Mobile-First or DesktopFirst - CSS Grids; CSS Frameworks, UI Kits, and Flexbox for RWD - Designing small UIs by Large Finger - Images and Videos in Responsive Web Design - Meaningful Typography for Responsive Web Design.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT – IV: WEB PROJECT MANAGEMENT **7 Hrs**

Project Life Cycle - Project Definition - Discovery and Requirements - Project Schedule and Budgeting - Running the project - Technical Documentation - Development, Communicaton, Documentation - QA and testing -Deployment - Support and operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT – V: PROJECT CASE STUDY

Using HTML, CSS, JS or using Opensource CMS like Word press, design and develop a Website having Aesthetics, Advanced and Minimal UI Transitions based on the project - Host and manage the project live in any public hosting.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Jennifer Niederst Robbins, "Learning Web Design", O'REILLY 4th Edition
2. Ricardo Zea, "Mastering Responsive Web Design", PACKT Publishing, 2015
3. Justin Emond, Chris Steins, "Pro Web Project Management", Apress,2011

Reference Books:

1. Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley and Sons, edition 2014
2. Jon Duckett, Jack Moore, "JavaScript & JQuery: Interactive Front-End Web Development", John Wiley and Sons, edition 2014
3. Uttam K. Roy "Web Technologies" Oxford University Press, 13th impression, 2017 4. Word press - http://www.wpbeginner.com/category/wp-tutorials/

Course Outcomes:

At the end of this Course the student will be able to

- Recognize the method of using layered approach for design . **L2**
- Explain the functionality of each layer of a computer network. **L3**
- Apply the knowledge of layered approach for the design of computer network software **L4**
- Analyze the performance of protocols of a computer network. **L4**
- Recommend the protocols for different applications. **L5**
- Propose new protocols for a computer networks. **L6**

B.Tech IV Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS15a-MANAGEMENT SCIENCE

(Humanities Elective-II)(Common to CE & ME)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the role of entrepreneurship in economic development.
- Identify the general characteristics of entrepreneurs.

UNIT – I

INTRODUCTION TO MANAGEMENT

Concepts of Management - Nature, importance and Functions of Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

DESIGNING ORGANIZATIONAL STRUCTURES

Basic concepts related to Organization - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of management and organization. **L1**
- Apply the concepts & principles of management in real life industry. **L2**

UNIT – II

OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control: *c* chart, *p* chart, (simple Problems) Deming's contribution to quality.

MATERIALS MANAGEMENT: EOQ, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the core concepts of Management Science and Operations Management. **L1**
- Evaluate Materials departments & Determine EOQ. **L2**

UNIT – III

HUMAN RESOURCES MANAGEMENT (HRM):

Concepts of HRM, Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concepts of HRM in Recruitment, Selection, Training & Development. **L1**
- Apply Managerial and operative Functions. **L2**

11/6/21

UNIT – IV

STRATEGIC MANAGEMENT:

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

PROJECT MANAGEMENT (PERT/CPM):

Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise. **L1**
- Evaluate PERT and CPM Techniques. **L2**

UNIT – V

CONTEMPORARY MANAGEMENT PRACTICES:

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze CRM, MRP, TQM. **L1**
- Understand modern management techniques. **L2**

Text Books:

1. **Management Science**, Aryasri: TMH, 2004.
2. **Management**, Stoner, Freeman, Gilbert, 6th Ed, Pearson Education, New Delhi, 2004.

Reference Books:

1. **Marketing Mangement**, Kotler Philip & Keller Kevin Lane: 12/e, PHI,2005.
2. **Essentials of Management** ,Koontz & Weihrich:, 6/e, TMH, 2005.
3. **Management—Principles and Guidelines**, Thomas N.Duening & John M.Biztantra, 2003.
4. **Production and Operations Management**, Kanishka Bedi, , Oxford University Press, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- Equipping engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations. **L1**
- Exploring and developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate. **L2**
- Cultivating the technical skills as well as the behavioral challenges of running organizations and complex systems. **L3**
- Emphasizing quantitative analytic skills and an entrepreneurial spirit **L4**
- Have an introductory understanding of global entrepreneurship concepts. **L5**

B.Tech IV Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS15b-BUSINESS ENVIRONMENT

(Humanities Elective-II)(Common to [illegible])

CE & ME

L	T	P	C
3	0	0	3

Course Objectives:

- To make the student understand about the business environment.
- To enable them in knowing the importance of fiscal and monitory policy.

UNIT – I: BUSINESS ENVIRONMENT

Meaning – Various environments affecting business – Social Economic; Political and Legal; Culture; Competitive Demographic; Technological and International environments.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Business environment. **L1**
- Explain various types of business environment. **L2**

UNIT – II: FISCAL & MONETARY POLICY

FISCAL POLICY - Public Revenues - Public Expenditure - Public debt - Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - **MONETARY POLICY** - Demand and Supply of Money – RBI - Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of public revenue and public Expenditure **L1**
- Explain the functions of RBI and its role. **L2**

UNIT – III: TRADE POLICY

INDIA'S TRADE POLICY - Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - **BALANCE OF PAYMENTS** – Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the role of Indian international trade. **L1**
- Analyze causes for Disequilibrium and correction measure. **L2**

UNIT – IV: WORLD TRADE ORGANIZATION

WORLD TRADE ORGANIZATION - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Dispute Settlement Mechanism. **L1**
- Compare and contrast the Dumping and Anti-dumping Measures. **L2**

UNIT – V: MARKETS

MONEY MARKETS AND CAPITAL MARKETS - Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.

Learning Outcomes:

1/10/21

At the end of this unit, the student will be able to

- Apply the knowledge in future investments. **L1**
- Understand the role of SEBI in investor protection. **L2**

Text Books:

1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall of India.
2. K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition.HPH2016.

Reference Books:

1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases,Prentice Hall of India, New Delhi, India.
3. Chari. S. N (2009), International Business, Wiley India.
4. E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- Apply the knowledge of Money markets in future investment. **L1**
- Analyze India's Trade Policy. **L2**
- Evaluate fiscal and monitory policy. **L3**
- Develop a personal synthesis and approach for identifying business opportunities. **L4**
- `Understand various types of business environment. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS13-ENGLISH LANGUAGE SKILLS LAB

(Common to CE & ME)

L	T	P	C
0	0	3	1.5

Course Objectives:

- Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL and GMAT etc.
- students will be trained to use language effectively to face interviews, group discussions, public speaking

UNIT – I: **12Hrs**

1. Phonetics for listening comprehension of various accents -2
2. Formal Presentations using PPT slides without Graphic Elements.
3. Paraphrasing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different accents spoken by native speakers of English **L1**
- Make formal structured presentations on general topics using PPT slides without graphical elements **L2**

UNIT – II: **12Hrs**

1. Debate – 2 (Following Argument).
2. Listening to short speeches/ short stories for note-making and summarizing.
3. E-mail Writing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Participate in formal discussions and speak clearly on a specific topic using suitable discourse markers. **L1**
- Make formal structured presentations on academic topics using ppt slides with relevant graphical elements. **L2**

UNIT – III **12Hrs**

1. Listening for Discussions.
2. Group Discussions.
3. Writing Persuasive/argumentative essays on general topics.

Learning Outcomes:

At the end of this unit, the student will be able to

- Participate in group discussions using appropriate conventions and language strategies. **L1**
- Produce logically coherent persuasive/argumentative essays. **L2**

UNIT – IV **12Hrs**

1. Reviewing film/book.
2. Group Discussions – reaching consensus in Group Work.
3. Resume Writing – Cover Letter – Applying for Internship.

Learning Outcomes:

At the end of this unit, the student will be able to

- Express thoughts and ideas with acceptable accuracy and fluency with a view to reach consensus in group discussions **L1**
- Prepare a CV and write a cover letter to seek internship/job **L2**

UNIT – V **12Hrs**

1. Writing Project Reports.
2. Editing Short Texts.
3. Answering FAQs in Interviews.

Learning Outcomes:

At the end of this unit, the student will be able to

- Collaborate with a partner to make effective presentations. **L1**
- Understand the structure and produce an effective project report. **L2**

Suggested Software

- Walden Infotech English Language Communication Skills.
- iTell- Orell Digital Language Lab.
- Digital Teacher.
- LES(Learn English Select) by British council.
- TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS).
- DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.
- Lingua TOEFL CBT Insider, by Dreamtech.
- English Pronunciation in Use (Elementary, Intermediate, Advanced)CUP.
- Cambridge Advanced Learners' English Dictionary withCD.

Reference Books:

1. Meenakshi Raman &Sangeeta Sharma, "Technical Communication" O U Press2009.
2. Barron's Books on TOEFL/GRE/GMAT/CAT/IELTS /DELTA/Cambridge University Press.2012
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications,2011.
4. "Practice Psychometric Tests": How to familiarize yourself with genuine recruitment tests, 2012.
5. David A McMurrey & Joanne Buckely "Handbook for Technical Writing" CENGAGE Learning2008.
6. "A Textbook of English Phonetics for Indian Students", 2nd Edition, T.Balasubramanyam. (Macmillan),2012.
7. "A Handbook for English Laboratories", E. Suresh Kumar, P. Sreehari, Foundation Books, 2011.
8. Sambaiah.M. ***Technical English***, Wiley publishers India. New Delhi. 2014.

Course Outcomes:

At the end of this Course the student will be able to

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills. **L1**
- Apply communication skills through various language learning activities. **L2**
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension. **L3**
- Evaluate and exhibit acceptable etiquette essential in social and professional settings **L4**
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English. **L5**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE66- ENVIRONMENTAL ENGINEERING – LAB

L	T	P	C
0	0	2	1

Course Objectives: The objectives of the course are to make the students learn about
The laboratory provides knowledge of estimating various parameters like pH, Chlorides, Sulphates, Nitratesin water. For effective water treatment, determination of optimum dosage and chloride demand are also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD ofeffluent.

LIST OF EXPERIMENTS:

1. Determination of pH and Turbidity.
2. Determination of Conductivity.
3. Determination and Estimation of total solids, total volatile solids and total fixed solids.
4. Determination and Estimation of Total dissolved solids and Total suspended solids.
5. Determination of Alkalinity/Acidity.
6. Determination of Chlorides.
7. Determination of iron.
8. Determination of Nitrogen.
9. Determination of total Phosphorous.
10. Determination of Optimum coagulant dose – Jartest.
11. Determination of Chlorine demand.
12. Determination of Dissolved Oxygen.
13. Determination of B.O.D
14. Determination of C.O.D
15. Presumptive coliformtest.

NOTE: At least 8 of the above experiments are to be conducted.

LIST OF EQUIPMENT:

1. PH meter,
2. Turbidity meter,
3. Conductivity meter,
4. Hot air oven,
5. Mufflefurnace,
6. Dissolved Oxygen meter,
7. U – V visible spectrophotometer,
8. Reflux Apparatus,
9. Jar Test Apparatus,
10. BOD incubator.
11. COD Extraction apparatus

Text Books:

1. Chemistry for Environmental Engineering by Sawyer and Mc.Carty
2. Standard Methods for Analysis of water and Waste Water –APHA
3. Environmental Engineering Lab Manual by Dr.G.Kotaiah and Dr.N.KumaraSwamy, Charotar Publishers, Anand.

Course Outcomes:

At the end of this Course the student will be able to

- Estimate various parameters of water
- Assess quality of waste water parameters

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AHS17-RESEARCH METHODOLOGY

(Common to CE & ME)

L	T	P	C
3	0	0	0

Course Objectives:

- Students should understand a general definition of research design.
- Students should be able to identify the overall process of designing a research study from its inception to its report.

UNIT – 1:

Meaning of Research — Objectives of Research — Types of Research — Research Approaches — Guidelines for Selecting and Defining a Research Problem — research Design — Concepts related to Research Design — Basic Principles of Experimental Design.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of research and its process. **L1**
- Explain various types of research. **L2**

UNIT – II:

Sampling Design — steps in Sampling Design —Characteristics of a Good Sample Design — Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement — Tests of Sound Measurement — Scaling and Scale Construction Techniques — Time Seri. Analysis — Interpolation and Extrapolation. Data Collection Methods — Primary Data — Secondary data — Questionnaire Survey and Interviews.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of sampling and sampling design. **L1**
- Explain various techniques in measurement and scaling. **L2**

UNIT – III:

Correlation and Regression Analysis — Method of Least Squares — Regression on Correlation — Correlation on Determination — Types of Correlations and Their Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the association of two variables. **L1**
- Understand the importance of correlation and regression. **L2**

UNIT – IV:

Statistical Inference: Tests of Hypothesis — Hypothesis Testing Procedure — Sampling Theory — Sampling Distribution — Chi-square Test — Multi-variate Analysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the statistical inference. **L1**
- Understand the hypothesis testing procedure. **L2**

UNIT – V:

Report Writing and Professional Ethics: Interpretation of Data — Report Writing — Layout of a Research Paper — Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars — Professional Ethics in Research.

Learning Outcomes:

11/10/24

At the end of this unit, the student will be able to

- Learn about report writing. **L1**
- Understand how to write research paper. **L2**

Text Books:

1. C.R.Kothari, "Research Methodology: Methods and Techniques",2nd edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, "Research Methodology":Ranjit Kumar, Sage Publications.

Reference Books:

1. P.Narayana Reddy and G.V.R.K.Acharyulu, "Research Methodology and Statistical Tools", 1st Edition, Excel Books, New Delhi.
2. Donald R. "Business Research Methods", Cooper & Pamela S Schindler, 9th edition.
3. S C Gupta, "Fundamentals of Statistics", 7th edition Himalaya Publications.
4. Dr. P.Satyanarayana, "a Companion to Literary Research", 1st edition 2020, HSRA publications.

Course Outcomes:

At the end of this Course the student will be able to

- Develop understanding on various kinds of research, objectives of doing research, research process, research designs and sampling. **L1**
- Identify and discuss the complex issues inherent in selecting a research problem, selecting an appropriate research design, and implementing a research project. **L2**
- Have basic knowledge on qualitative research techniques. **L3**
- Identify and discuss the concepts and procedures of sampling, data collection, analysis and reporting. **L4**
- Have basic awareness of data analysis-and hypothesis testing procedures. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE71- ESTIMATION COSTING &VALUATION

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To impart basic knowledge on different types of estimation
- To enrich with specifications and tender procedures.
- To give insights on various types of contract agreements.
- To inculcate data preparation for abstract estimation
- To teach procedure for valuation of buildings.

UNIT – I:

INTRODUCTION:

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

STANDARD SPECIFICATIONS:

Standard specifications for different items of building construction

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand methods of Estimation
- Prepare detailed and general specifications for a project

UNIT – II:

ESTIMATION OF BUILDINGS:

Detailed Estimates of Buildings--detailed estimates of residential buildings single storied and multi-storied buildings-earthwork-foundations-Super structure-Fittings including sanitary and electrical fittings-paintings.

Learning Outcomes:

At the end of this unit, the student will be able to

- Carryout estimation of quantities for structural components
- Estimate cost while using different types of sanitary and electrical fittings

UNIT – III:

EARTHWORK ESTIMATION: Earthwork for roads and canals.

REINFORCEMENT ESTIMATION: Reinforcement bar bending and bar requirement schedules.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the reinforcement requirement estimation
- Calculate the earthwork for roads and canals

UNIT – IV:

CONTRACTS AND TENDERS:

Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand tender schedule and tender notices
- Draft tender documents for projects

- Prepare documents for different types of contracts
- Identify arbitration and legal issues and mitigation methods

UNIT – V:

RATE ANALYSIS:

Working out data for various items of work over head and contigent charges.

VALUATION: Principles of valuation-Value and Cost-value engineering-value analysis-phases in value engineering-information-function-escalation-evaluation-recommendation-implementation-Audit.

Learning Outcomes:

At the end of this unit, the student will be able to

- Carry out valuation of buildings.
- Explain Auditing procedures and implementation
- Understand procedures for entries in measurement books and its importance
- Prepare abstract estimates based on SSR.

Text Books:

1. Estimating and Costing by B.N. Dutta, UBS publishers,2000.
2. Contracts and estimations by B.S.Patil, Universities.Press,Hyderabad.
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmipublications.

Reference Books:

1. Estimating and Costing by G.S. Birdie, DhanpatRai Publishing Company (P)Ltd
2. A Text book of Estimating and Costing by D.D.Kohli, S.ChandPubilishers.

Course Outcomes:

At the end of this Course the student will be able to

- Understand basics on methods and types of estimation.
- Formulate specifications and tender documents.
- Prepare contract agreements
- Determine rate analysis of different items.
- Valuation of buildings

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE72- CONSTRUCTION TECHNOLOGY & PROJECT MANAGEMENT

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Understand about fundamentals of construction management and techniques to be used to perform and complete the construction works In time
- Describe the basic concepts and skills required for construction project management
- Apply the techniques of project planning and management in construction projects.
- Plan and Schedule a civil engineering project by using techniques like CPM, PERT.
- Understand about fundamentals of construction management and techniques to be used to perform and complete the construction works In time

UNIT – I: FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY

Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Construction Documents – Construction Records – Quality – Safety – Codes and Regulations. PREPARATORY WORK AND IMPLEMENTATION Site layout – Infrastructure Development – Construction Methods – Construction Materials – Deployment of Construction Equipment – Prefabrication in Construction – False work and Temporary Works.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the different construction stages
- Learn various activities in project implementation
- Knowledge on prefabrication in construction

UNIT – II: EARTH WORK

Classification of Soils – Project Site – Development – Setting Out - Mechanized Excavation – Groundwater Control – Trenchless (No-dig) Technology – Grading – Dredging. Rock Excavation– Basic Mechanics of Breakage – Blasting Theory – Durability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn dewatering techniques
- Knowledge on drilling and blasting and its suitability

UNIT – III: PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS

Introduction – Project planning – Scheduling – Controlling – Role of decision in project management – Techniques for analyzing alternatives Operation research – Methods of planning and programming problems – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts – Development of PERT network problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand and application of Network techniques in construction
- Application of Management tools like Bar Chart, Gant Chart, CPM and PERT

UNIT – IV: ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK

Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial situations in network – Numbering the events – Cycles Problems – Planning for network construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn Elements of CPM and Pert network
- Analyze Steps in developing a network

UNIT – V: PERT AND CPM: TIME COMPUTATIONS & NETWORK ANALYSIS

Introduction – Uncertainties : Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems -Earliest expected time – Formulation for TE - Latest allowable occurrence time – Formulation for TL - Combined tabular computations for TE and TL problem. Introduction - Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems – CPM : process – CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for TE and TL - Start and finish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the resource allocation and scheduling
- Analyse how delay in activities effect the total estimated time of project

Text Books:

1. Construction project management by JhaPearson pubilications,NewDelhi.
2. Construction Technology by SubirK.Sarkar and SubhajitSaraswati – Oxford Higher Education- Univ.Press,Delhi.
3. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications NewDelhi.

Reference Books:

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003
2. Total Project management, the Indian context- by: P.K.JOY- Mac Millan Publishers India Limited.

Course Outcomes:

At the end of this Course the student will be able to

- Understand different construction techniques and practices.
- List out the requirements for substructure and superstructure in any construction project.
- Learn Network Techniques in construction management – Bar chart, Gant chart, CPM, PERT-
- Comprehending in Resource planning – planning for manpower, materials, equipment.

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE73- ADVANCED STRUCTURALDESIGN

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To make the student more conversant with the design principals of multistoried buildings, roof system, foundation and other important structures.

UNIT – I:

Design of a flat slab(Interior panel only)

Learning Outcomes:

At the end of this unit, the student will be able to

- To know the components of interior slab panel
- To understand the design procedure and detailing of reinforcement of interior panel of

UNIT – II:

Design of concrete bunkers of circular shape – (excluding staging) – Introduction tosilos

Learning Outcomes:

At the end of this unit, the student will be able to

- To know and understand the components of bunker
- To have a clear view of the design procedure and detailing of reinforcement of bunker

UNIT – III:

Design of concrete chimney

Learning Outcomes:

At the end of this unit, the student will be able to

- To have a comprehensive understanding of various forces acting on the chimney.
- To design the concrete chimney.

UNIT – IV:

Design of circular and rectangular water tank resting on the ground

Learning Outcomes:

At the end of this unit, the student will be able to

- To have a good understanding of design of water tanks resting on the ground.

UNIT – V:

Design of cantilever and counter forte retaining wall with horizontal backfill

Learning Outcomes:

At the end of this unit, the student will be able to

- To know the applications of cantilever and counter forte retaining walls.
- To perform the stability analysis of the retaining walls
- To design and detailing of the cantilever and counter forte retaining walls

FINAL EXAMINATION PATTERN:

The question paper shall contain 2 questions of either or type covering all the syllabus where each question carries 35 marks out of 35 marks, 20 marks shall be for the design and 15 marks are for the drawing.

Text Books:

1. Structural Design and drawing (RCC and steel) by KrishnamRaju, Universites .Press NewDelhi.
2. R.C.C Structures byDr. B. C. Punmia,Ashok Kumar Jain,Arun Kumar Jain, Laxmi Publications, NewDelhi
3. Advanced RCC by Varghese , PHI Publications, NewDelhi.
4. Design of RCC structures by M.L.Gambhir P.H.I. Publications, NewDelhi.

Reference Books:

1. R.C.C Designs by Sushilkumar , standard publishinghouse.
2. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications

Course Outcomes:

At the end of this Course the student will be able to

- Design and detail the flatslabs
- Design and detail bunkers and silos
- Design and detail concrete chimney
- Design and detail water tanks resting on the ground
- Design and detail cantilever and counterforte retaining walls

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE74a- BRIDGE ENGINEERING

(Professional Elective – III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- It deals with different types of loads on the bridges as per the I.R.C code provisions.
- It deals with the design procedures of bridges such as deck slab bridge, T – Beam Bridge, Plate Girder Bridge and Box culvert etc., based on the I.R.C provisions.
- It gives a good knowledge on different components like bridge bearing, piers and abutments of the bridges.
- It gives good knowledge on design of bridge bearings based on the I.R.C provisions
- It makes the student to design a bridge independently as per the I.R.C provisions

UNIT – I:

INTRODUCTION: Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.

BRIDGE BEARINGS : General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastomeric pad Bearing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different types of I.R.C loads on the bridges.
- Understand the different types of bridge bearings and their suitability.

UNIT – II:

DECK SLAB BRIDGE: Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.

BOX CULVERT: General aspects. Design loads, Design of Box culvert subjected to IRC class AA tracked vehicle only.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the effective width method of analysis of bridge decks
- Know the design of the deck slab bridges
- Understand the different forces acting on the box culverts and its design.

UNIT – III:

BEAM & SLAB BRIDGE (T-BEAM BRIDGE) General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the pigeauds method of analysis of deck slabs of T beam bridges
- Design the T beam bridges

UNIT – IV:

PLATE GIRDER BRIDGE: Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the forces acting on the plate girder bridge
- Understand the design of plate girder bridge

UNIT – V:

PIERS & ABUTMENTS: General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

Learning Outcomes:

After completing this Unit, students will be able to

- Know the forces acting on the piers and abutments and their stability analysis.
- Know the different types of wings walls

Text Books:

1. Bridge Engineering by PonnuSwamy, TATA Mcgraw Hill Company, NewDelhi.
2. Design of Bridges by N.KrishnamRaju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
3. Relevant – IRC & Railway bridgeCodes

Reference Books:

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, NewDelhi.
2. Design of Bridges Structure byD.J.Victor
3. Design of Steel structures byRamachandra.
4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, NewDelhi.
5. Design of Bridges Structure by T.R.Jagadish&M.A.Jayaram Prentice Hall of India Pvt., Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- Understand different types of bridges and loads coming over the bridge as per the I.R.C codal provisions.
- Understand the design procedures of the bridges as per the I.R.C recommendations
- Understand the different forces acting on the piers and abutments and their stability analysis

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE74b- EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

(professional Elective - III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To provide a coherent development to the students for the courses in sector of earthquake engineering
- To present the foundations of many basic engineering concepts related earthquake Engineering
- To give an experience in the implementation of engineering concepts which are applied in field of earthquake engineering
- To involve the application of scientific and technological principles of planning, analysis, design of buildings according to earthquake design philosophy.

UNIT – I:

Introduction to Structural Dynamics : – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Impulse Response function- Concept of response spectrum.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply Knowledge of mathematics, science and engineering by developing the equation of motion for vibratory systems and solving for the free and forced response.
- Calculate the earthquake design forces using appropriate methods as per IS 1893-2002(Part-I).

UNIT – II:

Multi-Degree of Freedom (MDOF) Systems: - Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

Learning Outcomes:

At the end of this unit, the student will be able to

- To formulate analytical model of MDOF systems subjected to earthquake loading for a given time history and analyze using response spectrum methods.
- Design the structure using IS 13920 code provisions

UNIT – III:

Earthquake Engineering : - Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Strong motion data - Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column andjoints

Learning Outcomes:

At the end of this unit, the student will be able to

- To explain the basic concepts in seismology and correlate to earthquake engineering.
- Plan a good structural configuration for seismic resistance and Apply the concept of Ductility and Base isolation in designing earthquake resistant structures.

UNIT – IV:

Earthquake Analysis : - Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi- storyed buildings – Use of response spectra.-Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

Learning Outcomes:

At the end of this unit, the student will be able to

- To apply the code procedures for seismic analysis, design and detailing of RC building frames.

UNIT – V:

Aseismic Planning : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

Shear walls : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

Learning Outcomes:

At the end of this unit, the student will be able to

- To explain and suggest a suitable seismic resistant measure for masonry load bearing structures.
- Intercept dynamic analysis result for design analysis and research purposes.
- Design and detailing of shear walls

Text Books:

1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch,Delhi.
2. Dynamics of Structures – Clough &Penzien, McGraw Hill – InternationalEdition
3. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, NewDelhi

Reference Books:

1. Structural Dynamics by Mario Paaz , AcademicPubilishers.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, NewDelhi
3. Earthquake Tips by C.V.R.Murty, I.I.T.Kanpur.
4. Earthquake Hazardous Mitijation by R.Ayothiraman and HemanthHazarika, I.K. International Publishing House Pvt.Ltd., NewDelhi.

Course Outcomes:

At the end of this Course the student will be able to

- The students will gain an experience in the implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering.
- The students will get a diverse knowledge of earthquake engineering practices applied to real life problems
- The students will learn to understand the theoretical and practical aspects of earthquake engineering along with the planning and design aspects

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE74c- AIR POLLUTION AND CONTROL

(professional Elective - III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To teach the basics of air pollution
- To impart the behavior of air due to metrological influence
- To throw light on air quality management
- To teach the design of air pollution control methods

UNIT – I:

INTRODUCTION : Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

EFFECTS OF AIR POLLUTION : Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holesetc.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the basics of air pollutants.
- Estimate the impact of air pollution

UNIT – II:

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

PLUME BEHAVIOUR : Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rosediagrams.

Learning Outcomes:

At the end of this unit, the student will be able to

- Study properties of atmosphere
- Learn plume behavior in different environmental conditions
- Analyse and compute the parameters of air pollutants
- Evaluate procedures for control of pollution

UNIT – III:

POLLUTANT DISPERSION MODELS : Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

CONTROL OF PARTICULATES : Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control, Equipment"s – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the design principles of particulate control.
- Learn and design pollutant dispersion models

UNIT – IV:

CONTROL OF GASEOUS POLLUTANTS : General Methods of Control of Nox and Sox emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the design principles of gaseous control.
- Develop environmental friendly fuels and study their properties.

UNIT – V:

AIR QUALITY MANAGEMENT : Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards.

Learning Outcomes:

At the end of this unit, the student will be able to

- Study the air quality management.
- Visualize emissions and their permissible standards

Text Books:

1. Air Quality by Thodgodish, Levis Publishers, Special India Edition, NewDelhi
2. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw HillCompany.
3. Air pollution by Wark and Warner.- Harper & Row, NewYork.

Reference Books:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel, B.S.Publications.
2. Air Pollution and Control by K.V.S.G.Murali Krishna, Kousal& Co. Publications, New Delhi.
3. Enivronmental meteorology by S.Padmanabhammurthy ,I.K.Internationals PvtLtd, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- Evaluating the ambient air quality based on the analysis of air pollutants
- Design particulate and gaseous control measures for an industry
- Judge the plume behavior in a prevailing environmental condition
- Estimate carbon credits for various day to day activities

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE76a- ADVANCED FOUNDATION ENGINEERING

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To impart how Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation.
- To teach special methods of computation of settlements and the corrections to be applied to settlements and to understand the advanced concepts of design of pile foundations.
- To throw light shallow and deep foundation designs.
- To teach the difference between isolated and combined footings, the determination of bearing capacity and proportioning of footings.

UNIT – I:

SHALLOWFOUNDATIONS:

General Requirements Of Foundations. Types Of Shallow Foundations And The Factors Governing The Selection Of A Type Of Shallow Foundation. Bearing Capacity Of Shallow Foundations By Terzaghi"s Theory And Meyerhof"s Theory (Derivation Of Expressions And Solution To Problems Based On These Theories). Local Shear And General Shear Failure And Their Identification. Bearing Capacity Of Isolated Footing Subjected To Eccentric And Inclined Loads. Bearing Capacity Of Isolated Footing Resting On Stratified Soils-Button"s Theory And Siva Reddy Analysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation

UNIT – II:

Earth Retaining Structures :Retaining walls: Uses, types, stability and design principles of retaining walls, backfill drainage, settlement and tilting.

Earth dams- Stability analysis: Classification, seepage control in embankments and foundations, seepage analysis, stability analysis: upstream and down stream for steady seepage, rapid draw down, end of construction, method of slices and Bishop's method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain need and importance of earth retaining structures
- Design of earth retaining structures according to stability concepts.

UNIT – III: DEEPFOUNDATIONS

Pile foundations-types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests. Well foundations – elements of well foundation. Forces acting a on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of well foundation (only forces acting and principles of design). Problems associated with wellsinking.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain conditions for adopting pile foundations and well foundations
- Design well foundations

UNIT – IV:

SHEET PILE WALLS:

Cantilever sheet piles and anchored bulkheads, Earth Pressure diagram, Determination of depth of embedment in sands and clays-Timbering of Trenches – Earth Pressure Diagrams – Forces in struts.

DESIGN OF UNDER REAMED PILES FOUNDATIONS:

Under reamed piles-principle of functioning of under reamed pile-Analysis and structural design of under reamed pile.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analysis of under reamed piles and their action on soils.

UNIT – V:

FOUNDATIONS IN PROBLEMATIC SOILS :

Foundations in black cotton soils- basic foundation problems associated with black cotton soils. Lime column techniques – Principles and execution. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the problems associated with black cotton soils for foundation
- Understand the principles and execution of lime column techniques

Text Books:

1. Analysis and Design of Foundations and Retaining Structures- Shamsher Prakash, GopalRanjan and SwamiSaran.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, PearsonPubilications
3. 3.Geotechnical Engg. – C.Venkatramaiah. New age International Pvt . Ltd, (2002).

Reference Books:

1. Analysis and Design of Foundations –E.W.Bowles.
2. Foundation engineering by Brije.M.Das, Cengagepubilications,NewDelhi.
3. Foundations Design and Construction –Tomlinson.

Course Outcomes:

At the end of this Course the student will be able to

- Compute the safe bearing capacity of footings subjected to vertical and inclined loads.
- Understand the advanced methods of settlement computations and proportion foundation footings.
- Judging the methods of computing the pull-out capacity and negative skin friction of piles and compute the settlements of pile groups in clays.
- Evaluate the problems posed by expansive soils and the different foundation practices devised.

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE76b- PRESTRESSED CONCRETE

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Analyze PSC beams with straight, concentric, eccentric, bent and parabolic tendons and design beams of rectangular and I sections for flexure.
- Design shear reinforcements, structural elements for shear, torsion and anchorage as per the provisions of BIS.
- Interpret the transmission mechanism of pre-stressing force by bond and compute deflection of beams under loads

UNIT – I:

INTRODUCTION:

Historic development – General principles of prestressingpretensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

METIIODS OF PRESTRESSING:-

Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – UdallSystem.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand pre tensioning and post tensioning
- Identify different type of prestressing systems.

UNIT – II:

ANALYSIS & DESIGN OF SECTIONS FOR FLEXURE;-

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

DESIGN OF SECTION FOR SHEAR :

Shear and Principal Stresses – Design for Shear in beams.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze beams for flexure and shear
- Understand prestressing with different types of tendons on beams of varying shape
- Know the end block characteristics and its significance

UNIT – III:

LOSSES OF PRESTRESS:-

Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel, slip in anchorage ,bending of member and wobble frictionallosses

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify different types of losses in prescreening
- Estimate losses of pre stress

UNIT – IV:

COMPOSITE SECTION:

Introduction Different Types- Propped and Un-propped- stress distribution- – Analysis of stress – Differential shrinkage – General designs considerations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify different types of composite beams
- Analyze PSC composite beams.

UNIT – V:

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:

Importance of control of deflections – factors influencing deflections – short term deflections of un cracked member's prediction of long term deflections.

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish between short term and long term deflections in PSC beams
- Estimate the short and long term deflections of PSC beam.

Text Books:

1. Prestressed Concrete by N. Krishna Raju; - Tata Mc.GrawHillPublications.
2. Prestressed Concrete by Ramamrutham,DhanpatraiPublications
3. Prestressed Concrete design Praveen Nagrajan, Pearson publications, 2013editions.

Reference Books:

1. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns
2. Pre stressed concrete: A Fundamental Approach byE.G.Nawy 5^{th} edition

Codes/Tables:

Codes: BIS code on prestressed concrete, IS 1343 to be permitted into the examination Hall

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE76c- DESIGN AND DRAWING OF IRRIGATION STRUCTURES

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Sloping glacis weir.
- Tank sluice with tower head
- Surplus weir.
- Trapezoidal notch fall.
- Canal regulator.

Design and drawing of the following irrigation structures.

1. Sloping glacisweir
2. Surplusweir.
3. Tank sluice with towerhead
4. Trapezoidal Notch fall
5. Canalregulator.

Final Examination pattern: Any two questions of the above Five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

At the end of this unit, the student will be able to

Text Books:

1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wileyeastern Ltd.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard BookHouse.

Course Outcomes:

At the end of this Course the student will be able to

- Design and draw the plan and cross section of Sloping glacis weir.
- Design and draw the plan and cross section of Tank sluice with tower head
- Design and draw the plan and cross section of Surplus weir.
- Design and draw the plan and cross section of Trapezoidal notch fall.
- Design and draw the plan and cross section of Canal regulator

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE75a-ARCHITECTURE AND TOWN PLANNING

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To know the western architecture and Indian architecture and also to gain knowledge on the principles of architectural design and historical background of town planning.

A) ARCHITECTURE:

UNIT – I:

At the end of this unit, the student will be able to

History of Architecture:

a) Western Architecture: Egyptian, Greek, Roman Architectures; influences- Comparative Analysis Orders

b) Indian Architecture: Vedic age - Indus Valley civilization - Buddhist period; stambas, Slenstas. Roranas, Chaityans, Viharas with one example for each Hindu temples - Evaluation of Dravidian and Indo Aryan Styles - Principle factors. Temple of Aibole, Mahabalipuram, Madurai, Deograph, Bhuvaneshwar, Mount Abu.

c) Indo - Sarsanic Architecture; Mosque - Place- FortTomb

Learning Outcomes:

Understand the different architectures of Indian and western countries

Understand the various principle factors of architecture

UNIT – II:

Architectural Design:

a) Principle of designing : Composition of plan Relationship between plan and elevation elements, form, surface Mass, Texture, Color,Tone.

b) Principle of Compositions: Unity, contrast, proportion, scale, Bab Rhuthm, character. Principles of Planning a Residence; Site Orientation prospect, Grouping, circulation, privacy, services and otherfactors

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the design pricnciples and compositions of architecture

UNIT – III:

Introduction of Post-classic Architecture and contribution of eminent architects to modern period.Brief summary of post - classic architecture - Indian and Western Architectural contribution of Edward Lutyens, Le Corbusier), Frank Lloyd Wrigt, Walter Groping, Vender Rohe, Caarihan, Nervi, Oscar Niemyer, Edward Durell stone

Learning Outcomes:

At the end of this unit, the student will be able to

- Obtain the knowledge of contribution of different architects in architecture

B) TOWNPLANNING:

UNIT – IV:

Historical Back Ground: Town planning in India - town plans of Magad - town plans of ancient Indian towns; Mourya, Pataliputravijayanagara, Delhi.Town planning in the West-town plans of Acropolis, Rome, Paris, London

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need of town planning
- Knowledge on planning of different towns in India and other countries

UNIT – V:

Components of Planning;

a) Zoning
b) Roads and road Traffic.
c) Housing-Slums, Parks, Playgrounds.
d) Public Utility Services.
e) Surveys and maps for planning.
f) Neighbourhood Planning

Planning New town, planning standards, National and regional Planning, town planning and legislation.Garden cities and satellite town

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the different components of town planning
- Knowledge on national standards in country and town planning

Text Books:

Reference Books:

A) ARCHITECTURE

1. Indian Architecture – Vol:- I and II by Percy Brown, Taraporevala Publications, Bombay.
2. Planning and 'Design of Building -Section of Architecture byY.S.Sane.
3. Modern Architecture and Design by Nikolans,Pevshar.
4. Modern Ideal Hol11nes for India byR.S.Deshpande.

B) TOWNPLANNING

1. Town and Country .Planning - A.J.Brown andH.M.Sherrard.
2. Town Design .-FederikGibbard, Architectural press,London.
3. National Building Code ofIndia.
4. Town Planning in India - Town and Country Planning Organisation, New Delhi1962.
5. Regional Planning - Misra R.P., Mysore University.
6. Urban and Regional Planning; Principles and case studies by K.S.Rama Gouda, Mysore University Publications.
7. Town and Country Planning - P. Abercrombe, Oxford University press.

Course Outcomes:

At the end of this Course the student will be able to

- Learn the importance of architecture and its principles in designing
- The different architectures till date and the contribution of different architects
- The necessity of town planning and different components of planning

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE75b-EXPERIMENTAL STRESS ANALYSIS

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To bring awareness on experimental method of finding the response of the structure to different types of load
- Demonstrates principles of experimental approach
- Teaches regarding the working principles of various strain gauges
- Throws knowledge on strain rosettes and principles of non destructive testing of concrete
- Gives an insight into the principles of photo elasticity

UNIT – I:

PRINCIPLES OF EXPERIMENTAL APPROACH: - Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods –Simplification of problems

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate the merits and principles of experimental approach
- Give an insight into the uses and advantages of experimental stress analysis

UNIT – II:

STRAIN MEASUREMENT USING STRAIN GAUGES:-

Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems-Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor – Materials of adhesion base.

Learning Outcomes:

At the end of this unit, the student will be able to

- Introduce various strain gauge systems and their properties
- Give information regarding the gauge factor and materials of adhesion bases

UNIT – III:

STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:- Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge. Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.

Learning Outcomes:

At the end of this unit, the student will be able to

- Introduces various strain rosettes and corrections for strain gauges
- Gives an insight into the destructive and non destructive testing of concrete

UNIT – IV:

THEORY OF PHOTOELASTICITY: - Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster"s Stress Optic law.

Learning Outcomes:

At the end of this unit, the student will be able to

- Introduces stress optic laws.
- Gives the arrangements and working principles of polariscope

UNIT – V:

TWO DIMENSIONAL PHOTOELASTICITY: - Introduction – Iso-chromatic Fringe patternsIsoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials

Learning Outcomes:

At the end of this unit, the student will be able to

- Introduces the understanding of different fringe patterns.
- Introduces model analysis and properties of photo elastic materials.

Text Books:

1. J.W.Dally and W.F.Riley, "Experimental stress analysis College House Enterprises"
2. Dr.Sadhu Singh, "Experimental stress analysis", khanna Publishers

Reference Books:

1. U.C.Jindal, "Experimental Stress analysis", Pearson Publications.
2. L.S.Srinath, "Experimental Stress Analysis", MC.Graw Hill Company Publishers.

Course Outcomes:

At the end of this Course the student will be able to

- The student will be able to understand different methods of experimental stress analysis
- The student will be able to understand the use of strain gauges for measurement of strain
- The student will be exposed to different Non destructive methods of concrete
- The student will be able to understand the theory of photo elasticity and its applications in analysis of structures

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE75c-FINITE ELEMENT ANALYSIS

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize basic principles of finite element analysis procedure.
- Explain theory and characteristics of finite elements that represent engineering structures.
- Apply finite element solutions to structural, thermal, dynamic problem
- Learn to model complex geometry problems and solution techniques

UNIT – I:

INTRODUCTION: Concepts of FEM – Steps involved – merits & demerits – energy principles – Discretization – Rayleigh –Ritz method of functional approximation.

PRINCIPLES OF ELASTICITY: Equilibrium equations – strain displacement relationships in matrix form – Constitutive relationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetric loading.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of nodes and elements.(L2)
- Understand the general steps of finite element methods.(l2)
- Understand the role and significance of shape functions in finite element formulations (l2)

UNIT – II:

ONE DIMENSIONAL & TWO DIMENSIONAL ELEMENTS: Stiffness matrix for bar element – shape functions for one dimensional elements – one dimensional problems .Two Dimensional Elements - Different types of elements for plane stress and plane strain analysis – Displacement models – generalized coordinates – shape functions – convergent and compatibility requirements – Geometric invariance – Natural coordinate system – area and volume coordinates

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the formulation of one dimensional and two – dimensional elements (L2)
- Apply the formulation techniques to solveone dimensional two – dimensional problems (L2)
- Formulate and solve axisymmetric problems.(L6)

UNIT – III:

GENERATION OF ELEMENT : Generation of element stiffness and nodal load matrices for 3-node triangular element and four noded rectangular elements.

Learning Outcomes:

At the end of this unit, the student will be able to

Apply the formulation techniques to solve problems using triangle and quadrilateral elements. (L3)

UNIT – IV:

ISOPARAMETRIC FORMULATION : Concepts of, isoparametric elements for 2D analysis – formulation of CST element, 4 –Noded and 8-noded iso-parametric quadrilateral elements – Lagrangian and Serendipity elements. **AXI-SYMMETRIC ANALYSIS:** Basic principles-Formulation of 4-noded iso-parametric axi-symmetric element

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concepts of isoparametric elements(L1)
- Formulate and solve axisymmetric problems.(L6)

UNIT – V:

SOLUTION TECHNIQUES: Numerical Integration, Static condensation, assembly of elements and solution techniques for static loads

Learning Outcomes:

At the end of this unit, the student will be able to

Text Books:

1. Finite Element Analysis for Engineering and Technology, Tirupathi R Chandraputla, Universities Press Pvt Ltd, Hyderabad.2003.
2. Finite Element analysis – Theory & Programming by C.S.Krishna Murthy- Tata Mc.Graw Hill Publishers

Reference Books:

1. Finite element analysis and procedures in engineering by H.V.Lakshminaryana, 3rd edition, universities press,Hyderabad
2. Finite element analysis in Engineering Design by S.Rajasekharan, S.Chand Publications, NewDelhi
3. Finite element analysis by S.S. Bhavakatti-New age internationalpublishers

Course Outcomes:

At the end of this Course the student will be able to

- Demonstrate the differential equilibrium equations and theirrelationship
- Apply numerical methods tofem
- Demonstrate the displacement models and loadvectors
- Compute the stiffness matrix for isoperimetricelements
- Analyze plane stress and plane strainproblems

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE75a- ELECTRICAL ENGINEERING MATERIALS

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Classification of materials.
- Properties of materials and its applications.
- Domestic wiring and earthling
- Concept of polarization and dipolar polarization
- Classification of materials.

UNIT – I: Conducting Materials **10 Hrs**

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials–classification of electrical materials–concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials–electrical / mechanical / thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys–applications.

Learning Outcomes:

At the end of this unit, the student will be able to

1. Understand the classification of conducting materials. **L1**
2. Analyze the properties of different conducting materials **L2**

UNIT – II: Dielectric and High Resistivity Materials **10 Hrs**

Introduction–solid, liquid and gaseous di electrics, leakage current, permittivity, dielectric constant, dielectric loss –loss angle –loss constant, Breakdown voltage and di electric strength of –solid, liquid and gaseous dielectrics, effect of break down–electrical and thermal effects, Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal /mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the classification of di electric and high resistivity materials. **L1**
- Analyze the properties of di electric and high resistivity materials **L2**

UNIT – III: Solid Insulating Materials **10 Hrs**

Introduction–characteristics of a good electrical insulating materials–classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials-Asbestos, Bakelite, rubber, plastics, thermoplastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand about various characteristics of solid insulating materials **L1**
- Understand the classification of solid insulating materials. **L2**

UNIT – IV: Liquid & Gas Insulating Materials **10 Hrs**

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids– Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators– classification based on dielectric strength – dielectric loss, chemical stability properties and their applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the classification of liquid insulating materials. **L1**
- Analyze the properties of liquid insulating materials **L2**

UNIT – V: Domestic Wiring **10 Hrs**

Wiring materials and accessories–Types of wiring–Types of Switches-Specification of Wiring–Staircase wiring- Fluorescent lamp wiring-God own wiring–Basics of earthling–single phase wiring layout for residential building.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand about wiring materials and accessories **L1**
- Understand about earthing and wiring layout of domestic buildings **L2**

Text Books:

1. Electrical Engineering Materials by G.K. Mithal, Khanna publishers, 2nd edition,1991.
2. Acourse in Electrical Engineering Materials by R.K. Rajput, Laxmi publications,2009.

Reference Books:

1. An Introduction to Electrical Engineering Materials by C.S.Indulkar and S.Thiruvengadam, SChand&Company,2008.
2. Electrical engineering Materials by Technical Teachers Training Institute, Madras, McGraw Hill Education,1st Edition,2004.
3. A course in Electrical Engineering Materials Physics Properties & Applications by S P.Seth, Dhanapat Rai & Sons Publications,2018.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the classification of materials, domestic wiring materials and earthing. **L1**
- Analyze the properties of different electrical materials **L2**
- Apply where the materials are applicable based on properties of materials **L3**
- Design and develop Residential wiring, go down wiring and earthing. **L4**
- `Understand the characteristics of materials **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE75b- DIGITAL SIGNAL PROCESSORS AND APPLICATIONS

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Provide the basic knowledge of different DSP Processors.
- Interfacing Memory and I/O Peripherals to different Programmable DSP Devices
- Operation of the ADC and programming modes
- Introduction to Field Programmable Gate Arrays
- Provide the basic knowledge of different DSP Processors.

UNIT – I: **10 Hrs**

Introduction to the TMSLF2407 DSP Controller: Brief Introduction to Peripherals - Types of Physical Memory - Software Tools

C2XX DSP CPU and instruction set: Introduction to the C2xx DSP Core and Code Generation - The Components of the C2xx DSP Core - Mapping External Devices to the C2xx Core and the Peripheral Interface -System Configuration Registers –Memory - Memory Addressing Modes - Assembly Programming Using the C2xx DSP Instruction Set

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to understand the basic concepts of DSP controller **L1**
- Able to understand the Assembly language programming **L2**

UNIT – II: **10 Hrs**

Parallel and Serial Data Transfer: Pin Multiplexing (MUX) and General Purpose I/O Overview - Multiplexing and General Purpose I/O Control Registers - Using the General Purpose I/O Ports, Serial Communication

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Pin Multiplexing and GPIO pins **L1**
- Analyze the serial Communication concepts **L2**
- Understand the concept of control Registers **L3**

UNIT – III: **10 Hrs**

Interrupt system of TMS320LF2407: Introduction to Interrupts - Interrupt Hierarchy - Interrupt Control Registers - Initializing and Servicing Interrupts in Software, real time control with interrupts

The analog-to-digital converter (ADC): ADC Overview - Operation of the ADC and programming modes

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Interrupts **L1**
- Analyze the concept of Analog to digital converter **L2**

UNIT – IV: **10 Hrs**

Event Managers (EVA, EVB): Overview of the Event Manager (EV) - Event Manager Interrupts - General Purpose (GP) Timers- Compare Units - Capture Units and Quadrature Encoded Pulse (QEP) Circuitry - General Event Manager Information – PWM Signal Generation with Event Managers and interrupts, Measurement of speed with Capture Units, Implementation of Space Vector Modulation with DSP TMSLF2407A

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Event Manager and Interrupts **L1**
- Apply the concept of Space Vector Modulation with processor **L2**

UNIT – V: **10 Hrs**

Field Programmable Gate Arrays: Introduction to Field Programmable Gate Arrays – CPLD Vs FPGA – Types of FPGA , Configurable logic Blocks (CLB), Input/Output Block (IOB) – Programmable Interconnect Point (PIP)- HDL programming –overview of Spartan 6 & ISE Design Suite, Implementation of PWM technique with SPARTAN-6 FPGA

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Field Programmable Gate Arrays. **L1**
- Apply the concept of HDL programming and PWM technique implementation **L2**

Text Books:

1. Hamid A. Tolyat, "DSP based Electromechanical Motion Control"-CRC press, 2004
2. Wayne Wolf,,,FPGA based system design", Prentice hall, 2004

Reference Books:

1. Application Notes from the website of Texas Instruments
2. Spartan-6 FPGA Configurable Logic Block, 2010
3. Xilinx Spartan 6 Data sheets

Course Outcomes:

At the end of this Course the student will be able to

- Write Assembly Language Programs for the Digital Signal Processors **L1**
- Configure and use Digital Input / Output lines and ADCs **L2**
- Configure and use Interrupts and Event Managers for PWM generation **L3**
- Employ DSPs & **L4**
- FPGAs for the real time control of Power Electronic Controllers **L5**



B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEE75c- IOT APPLICATIONS IN ELECTRICAL ENGINEERING

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn about a few applications of Internet of Things
- To distinguish between motion less and motion detectors as IOT applications
- To know about Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process
- To understand about applications of IOT in smart grid
- To introduce the new concept of Internet of Energy for various applications

UNIT – I: SENSORS **10 Hrs**

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance, temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidity and moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domain reflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactile sensors, Strain gauge, Piezoelectric

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic principles of sensors and their classification **L1**
- To learn about various motion less sensors **L2**

UNIT – II: Occupancy and Motion detectors **10 Hrs**

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement and level sensors, Potentiometric, Capacitive, Inductive, magnetic velocity and acceleration sensors, capacitive, Piezoresistive, piezoelectric cables, Flow sensors, Electromagnetic, Acoustic sensors - Resistive microphones, Piezoelectric, Photo resistors

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about Capacitive occupancy **L1**
- To understand about Motion detectors **L2**

UNIT – III: MEMS **10 Hrs**

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation and fabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressure sensor, RF MEMS switches, Electric and Magnetic field sensors

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about the basic concept of MEMS **L1**
- To know about electrostatic actuation **L2**

UNIT – IV: IOT FOR SMART GRID **10 Hrs**

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

Learning Outcomes:

At the end of this unit, the student will be able to

- To get exposure fundamental applications of IoT to Smart grid **L1**
- To learn about driving factors of IoT in Generation level **L2**

UNIT – V: IOE - Internet of Energy **10 Hrs**

Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation of IOE, Architecture, Energy routines, information sensing and processing issues, Energy internet as smart grid.

Learning Outcomes:

At the end of this unit, the student will be able to

- To get exposed the new concept of internet of energy **L1**
- To learn about architecture of IOE **L2**

Text Books:

1. Jon S. Wilson, Sensor Technology Hand book, Newnes Publisher, 2004
2. Tai Ran Hsu, MEMS and Microsystems: Design and manufacture, 1st Edition, Mc Grawhill Education, 2017
3. ErsanKabalci and YasinKabalci, From Smart grid to Internet of Energy, 1st Edition, Academic Press, 2019

Reference Books:

1. Raj Kumar Buyya and Amir VahidDastjerdi, Internet of Things: Principles and Paradigms, Kindle Edition, Morgan Kaufmann Publisher, 2016
2. Yen Kheng Tan and Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage and Power Management, 1st Edition, CRC Press, 2019
3. RMD SundaramShriram, K. Vasudevan and Abhishek S. Nagarajan, Internet of Things, Wiley, 2019

Course Outcomes:

At the end of this Course the student will be able to

- To get exposed to recent trends in few applications of IoT in Electrical Engineering **L1**
- To understand about usage of various types of motionless sensors **L2**
- To understand about usage of various types of motion detectors **L3**
- To get exposed to various applications of IoT in smart grid **L4**
- To get exposed to future working environment with Energy internet **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75a – SPECIAL TYPE OF VEHICLES

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the various types of special vehicles.
- Familiarize with the function of graders.
- Identify the applications of haulage vehicles and lift truck
- Understand the functions of scarifiers and scrapers
- Discuss the specifications of special purpose vehicles

UNIT – I: TRACTORS & CRANES AND EXCAVATORS 8 Hrs

TRACTORS : General description, specification and functions, light, medium and heavy wheeled tractors, crawler tracks mounted / wheeled - Bull dozers, tilt dozers and angle dozers, front end loaders, factors affecting efficiency of output of tractors, simple problems, merits and demerits.

CRANES AND EXCAVATORS: General description, specifications and functions, excavator mounted cranes, mobile cranes with strut and cantilever type jibs, tractor towed and tractor mounted cranes. General description, specification and functions, classification based on attachments, face shovel, drag shovel, hoe, drag-line and grab or clam shell, advantages and limitations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify various types of tractors **L1**
- Calculate the efficiency of output of tractors **L4**
- Discuss the functions of cranes and excavators **L2**
- Recall the advantages and limitations of cranes and excavators **L2**

UNIT – II: GRADERS 6Hrs

Description, specification of tractor towed graders and motor graders, classification and functions of graders, functional details of spreading, mixing, ditching, bank sloping, snow removal, stripping, scarifying, and finishing, elementary details of transmission system (coupling, clutches, gear box, driving axles, propeller shafts), running gear and operating equipment air braking system; hydraulic system and its components, steering system of lights, medium and heavy graders, merits and limitations of graders.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the terms spreading, mixing, ditching, back sloping, scarifying. **L2**
- Discuss elementary details of transmission system **L2**
- Demonstrate the hydraulic system and its components. **L3**
- List the merits and limitations of graders. **L2**

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UNIT – III: HAULAGE VEHICLES AND LIFT TRUCKS **6Hrs**

General description, specification and functions, self-propelled and tractor towed haulage vehicles and pneumatic – tires, dumpers – front tipping; trucks – rear tipping, tractor towed semi-trailers and trailers (rear and side tipping, bottom dumping). General description, specification and functions, fork lift trucks, alternative front end equipment (attachments) – Jib arm, shovel bucket, squeeze clamp, boom, fork extensions, barrel forks. Scissors lift trucks - Applications in industry, advantages and disadvantages.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of haulage vehicles and trucks in industries. **L2**
- Select haulage vehicles for a given application **L6**
- Illustrate the function of fork lift trucks. **L3**

UNIT – IV: Rooters, Scarifiers And Scrapers **6 Hrs**

General description, specification and functions, tractor towed rooters and scarifiers - Heavy duty, light duty. General description, specification and functions, tractor towed and motorized scrapers, scraper work in cutting, cambering, side hill cutting, spreading on embankments, compaction of fill merits and demerits.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the specifications of rooters **L2**
- Categorize Heavy duty and light duty scarifiers **L4**
- Recall the merits and demerits of scrapers. **L1**

UNIT – V: Compaction Vehicles And Other Special Purpose Vehicles **6Hrs**

General description, specification and functions, smooth wheeled rollers, pneumatic tired rollers, agricultural Rollers, sheep's foot rollers, vibrating compactors. General description, specification and functions, Ambulance, oil tankers, surveillance vehicle, television recording mobile UNIT, reefer vehicle, double decker bus, vestibule bus, fire fighting vehicle.

Learning Outcomes:

At the end of this unit, the student will be able to

- List various types of special purpose vehicles. **L1**
- Choose the rollers for a given application. **L1**
- Discuss the function of compactors. **L2**
- Explain the importance of special purpose vehicles in the society. **L2**

Text Books:

1. Peurifoy R L "Construction Planning, Equipment and Methods", Tata McGraw-Hill, NewDelhi, 2002.
2. Ian Graham, "Off-Road vehicles", Heinemann Library, 2008.

Reference Books:

1. Wong J "Terramechanics and Off-Road Vehicle Engineering", Butterworth-Heinemann, 2009.
2. Roninson E G, "Motor Graders", MIR Publications, Moscow, 1985.
3. Rodhiev and Rodhiev, "Tractors and Automobiles", MIR Publishers, Moscow, 1984.
4. Greenwich and Soreking, "Tractors", MIR Publishers, Moscow, 1967.

Course Outcomes:

At the end of this Course the student will be able to

- Classify excavators based on attachments. **L2**
- Understand the importance of graders. **L2**
- Identify the various types of fork lift attachments. **L2**
- Recall the advantages and disadvantages of special purpose vehicles. **L1**

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75b - SIX SIGMA AND LEAN MANUFACTURING

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the students, the basic concepts of six sigma and lean manufacturing.
- Expose with various quality issues in Inspection.
- Gain Knowledge on quality control and its applications to real time.
- Know the extent of cellular manufacturing and 5S.
- Understand the importance of Quality standards in manufacturing.

UNIT – 1: Introduction to Six-Sigma 8 Hrs

Probabilistic models-Six Sigma measures-Yield-DPMO-Quality level-Reliability function using Six-Sigma-MTTF using Six Sigma-Maintenance free operating period- Availability using Six-Sigma-Point availability-Achieved availability-Operational Availability-Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts of probabilistic models **L2**
- Determine the reliability function using six-sigma **L3**
- Explain about MTTF using six sigma concepts **L2**
- Illustrate the examples of availability using sigma **L2**

UNIT – II: The Elements of Six Sigma and their Determination 6Hrs

The Quality Measurement Techniques: SQC, Six Sigma, Cp and Cpk- The Statistical quality control (SQC) methods-The relationship of control charts and six sigma-The process capability index (Cp)-Six sigma approach-Six sigma and the 1.5 σ shift-The Cpk Approach Versus Six Sigma-Cpk and process average shift- Negative Cpk-Choosing six sigma or Cpk-Setting the process capability index-Examples.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the quality measurement techniques **L1**
- Discuss the process capability index (Cp).
- Compare the Cpk Approach and Six Sigma
- Explain about different statistical quality control methods
- State the relationship of control charts and six sigma **L2**

UNIT – III: Introduction To Lean Manufacturing 6Hrs

Conventional Manufacturing versus Lean Manufacturing – Principles of Lean Manufacturing – Basic elements of lean manufacturing – Introduction to LM Tools.

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate the basic elements of lean manufacturing **L2**
- List the various lean manufacturing tools. **L1**
- Describe the principles of lean manufacturing **L2**
- Compare conventional manufacturing and lean manufacturing system **L2**

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UNIT – IV: Cellular Manufacturing, JIT, TPM **6 Hrs**

Cellular Manufacturing – Types of Layout, Principles of Cell layout, Implementation. JIT – Principles of JIT and Implementation of Kanban. TPM – Pillars of TPM, Principles and implementation of TPM.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of cellular manufacturing **L2**
- Indentify the types of layouts. **L3**
- Describe the concepts of JIT and TPM **L2**
- Demonstrate the pillars of TPM **L2**
- Create the cell layout. **L6**

UNIT – V: Set Up Time Reduction, TQM, 5S, VSM 10 **6Hrs**

Set up time reduction – Definition, philosophies and reduction approaches. TQM – Principles and implementation. 5S Principles and implementation - Value stream mapping - Procedure and principles.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define set up time reduction. **L1**
- Illustrate the principles and implementation of 5S techniques. **L2**
- Discuss procedure and principles of value stream mapping **L6**
- List the various reduction approaches **L1**

Text Books:

1. U Dinesh Kumar, Crocker, Chitra and Harithe Saranga, Reliability and Six Sigma, Springer Publishers.
2. Sung H. Park, Six Sigma for Quality and Productivity Promotion, Asian Productivity Organization

Reference Books:

1. Sammy G. Shina, Six Sigma for Electronics Design and Manufacturing, McGraw-Hill.
2. Design and Analysis of Lean Production Systems, Ronald G. Askin & Jeffrey B. Goldberg, John Wiley & Sons, 2003.
3. Mikell P. Groover (2002) _Automation, Production Systems and CIM.
4. Rother M. and Shook J, 1999 _Learning to See: Value Stream Mapping to Add Value and Eliminate Muda' , Lean Enterprise Institute, Brookline, MA.

Course Outcomes:

At the end of this Course the student will be able to

- Summarize various techniques that are related to the six-sigma and lean manufacturing **L2**
- Outline the concepts of cellular manufacturing, JIT and TPM **L2**
- Illustrate the principles and implementation of 5S techniques **L2**
- Discuss procedure and principles of value stream mapping **L6**
- Determine the reliability function using six-sigma. **L3**

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75c – REVERSE ENGINEERING

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the concepts of reverse engineering
- Familiarize with the tools and techniques for reverse engineering
- Teach the principles of various rapid prototyping methods
- Discuss the legal aspects of reverse engineering.

UNIT – 1: Introduction 8 Hrs

Scope and tasks of RE, Process of duplicating, Definition and use of Reverse Engineering, Reverse Engineering as a Generic Process

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall the definition and use of reverse engineering. **L1**
- Identify reverse engineering as a generic process. **L2**
- List various tasks of reverse engineering. **L1**

UNIT – II: Tools and Techniques for RE 6Hrs

Object scanning: contact scanners, noncontact scanners, destructive method, coordinate measuring machine, Point Data Processing: pre processing and post processing of captured data, geometric model development, construction of surface model, solid model, noise reduction, feature identification, model verification

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize various techniques in reverse engineering. **L2**
- Compare preprocessing and post processing of captured data. **L4**
- Explain noise reduction, feature identification and model verification. **L2**

UNIT – III: Rapid Prototyping 6Hrs

Introduction, current RP techniques and materials, Stereo Lithography, Selective Laser Sintering, Fused Deposition Modelling, Three-dimensional Printing, Laminated Object Manufacturing, Multi – jet Modelling, Laser-engineered Net Shaping, Rapid Prototyping, Rapid Tooling, Rapid Manufacturing

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the developments in the rapid prototyping techniques **L2**
- Classify rapid prototyping techniques. **L2**
- List the advantages and disadvantages of rapid prototyping methods. **L1**

UNIT – IV: Integration 6 Hrs

Cognitive approach to RE, Integration of formal and structured methods in reverse engineering, Integration of reverse engineering and reuse.

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Learning Outcomes:
At the end of this unit, the student will be able to

- Explain the cognitive approach to reverse engineering. **L2**
- Discuss the integration of formal and structured methods in reverse engineering. **L2**

UNIT – V: Legal Aspects of Reverse Engineering **6Hrs**

Legal Aspects of Reverse Engineering: Introduction, Copyright Law.

Learning Outcomes:
At the end of this unit, the student will be able to

- Identify the legal aspects of reverse engineering **L2**
- Understand the concepts of copyright law. **L2**

Text Books:

1. Biggerstaff T. J., "Design Recovery for Maintenance and Reuse", IEEE Corporation, 1991.
2. Katheryn, A. Ingle, "Reverse Engineering", McGraw-Hill, 1994.

Reference Books:

1. Aiken Peter, "Data Reverse Engineering", McGraw-Hill, 1996.
2. Linda Wills,"Reverse Engineering" ,Kluiver Academic Publishers, 1996.
3. Donald R. Honsa , "Co-ordinate Measurement and reverse engineering", American Gear Manufacturers Association, 1996.

Course Outcomes:
At the end of this Course the student will be able to

- Understand the importance of reverse engineering. **L2**
- Make use of tools and techniques of reverse engineering. **L3**
- Identify the applications of rapid prototyping techniques. **L2**

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75d – ENERGY AUDITING

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce the concepts of energy scenario and need for energy policy for industries in India.
- Familiarize with the Energy Audit concepts and its approaches.
- Teach the principles and objectives of the Energy management.

UNIT – I: General Aspects **8 Hrs**

Review of energy scenario in India, General Philosophy and need of Energy Audit and Management, Basic elements and measurements - Mass and energy balances – Scope of energy auditing industries - Evaluation of energy conserving opportunities, Energy performance contracts, Fuel and Energy substitution, Need for Energy Policy for Industries, National & State level energy Policies.

Learning Outcomes:

At the end of this unit, thc student will be able to

- Explain the fundamental aspects of energy scenario in India. **L2**
- List the various national and state level energy policy. **L1**
- Identify the basic elements and measurements of energy audit. **L3**
- Summarize the evaluation of energy conserving balances **L2**

UNIT – II: Energy Audit Concepts **6Hrs**

Need of Energy audit - Types of energy audit – Energy management (audit) approach - understanding energy costs - Bench marking – Energy performance - Matching energy use to requirement - Maximizing system efficiencies -Optimizing the input energy requirements - Duties and responsibilities of energy auditors- Energy audit instruments - Procedures and Techniques.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize various concepts of energy audit. **L2**
- Compare various energy management approaches. **L4**
- Explain Bench marking and energy performance in energy auditing. **L2**

UNIT – III: Principles and Objectives of Energy Management **6Hrs**

Design of Energy Management Programmes - Development of energy management systems – Importance - Indian need of Energy Management - Duties of Energy Manager - Preparation and presentation of energy audit reports - Monitoring and targeting, some case study and potential energy savings.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the developments of energy management systems **L2**
- Explain the importance of energy management **L2**
- List the various duties of energy manager **L1**

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UNIT – IV: Thermal Energy Management **6 Hrs**

Energy conservation in boilers - steam turbines and industrial heating systems - Application of FBC - Cogeneration and waste heat recovery -Thermal insulation - Heat exchangers and heat pumps – HVC industries-Building Energy Management.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts of energy conservation in boilers **L2**
- Identify the thermal energy components **L3**
- Illustrate the applications of FBC boilers **L2**

UNIT – V: Electrical Energy Management **6Hrs**

Supply side Methods to minimize supply-demand gap- Renovation and modernization of power plants - Reactive power management – HVDC- FACTS - Demand side - Conservation in motors - Pumps and fan systems – Energy efficient motors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts of supply side methods to minimize supply. **L2**
- Explain the reactive power management. **L2**
- Identify the energy conservation methods in motors, pumps and fan systems. **L3**
- List the energy efficient motors. **L2**

Text Books:

1. Murphy, W. R., Energy Management, Elsevier, 2007.
2. Smith, C. B., Energy Management Principles, Pergamum, 2007
3. Handbook of Energy Audit, Sonal Desai, Mcgraw Hill Education Private Ltd.,

Reference Books:

1. Turner, W. C., Doty, S. and Truner, W. C., Energy Management Hand book, 7th edition, Fairmont Press, 2009.
2. De, B. K., Energy Management audit & Conservation, 2nd Edition, Vrinda Publication, 2010.
3. Energy Management Handbook – W.C. Turner (John Wiley and Sons, A Wiley a. Interscience publication)
4. Industrial Energy Management and Utilisation –L.C. Witte, P.S. Schmidt, D.R. Brown (Hemisphere Publication, Washington, 1988)
5. Industrial Energy Conservation Manuals, MIT Press, Mass, 1982
6. Energy Conservation guide book Patrick/Patrick/Fardo (Prentice hall1993)

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basic concepts of energy audit and energy management **L2**
- Explain different types of energy audit, maximizing and optimizing system efficiency. **L3**
- Summarize energy management systems, prepare and present energy audit report **L5**
- Identify energy saving potential of thermal and electrical systems **L3**
- Discuss Energy audit instruments, Procedures and Techniques. **L2**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75e – INTRODUCTION TO COMPOSITE MATERIALS

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce composite materials and their applications.
- Build proper background for stress analysis in the design of composite structures.
- Familiarize various properties of composite materials.
- Focus on biodegradable composites.

UNIT – I: Introduction to composites **8 Hrs**

Fundamentals of composites – Definition – classification– based on Matrix – based on structure – Advantages and applications of composites - Reinforcement – whiskers – glass fiber – carbon fiber - Aramid fiber – ceramic fiber – Properties and applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the fundamentals of composites. **L2**
- Classify the composites based on matrix and structure. **L2**
- Identify the practical applications of composites. **L3**
- Summarize the properties and advantages of reinforcement materials **L2**

UNIT – II: Polymer matrix composites **6Hrs**

Polymers - Polymer matrix materials – PMC processes - hand layup process – spray up process – resin transfer moulding – Pultrusion – Filament winding – Auto clave based methods - Injection moulding – sheet moulding compound – properties and applications of PMC's.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the properties of polymer matrix composites. **L2**
- Identify the polymer matrix composites. **L3**
- Explain various process used in making the polymer matrix composites **L2**
- Discuss the auto clave based methods. **L6**

UNIT – III: Metal matrix composites **6Hrs**

Metals - types of metal matrix composites – Metallic Matrices. Processing of MMC – Liquid state processes – solid state processes – In-situ processes. Properties and applications of MMC's.

Learning Outcomes:

At the end of this unit, the student will be able to

- Outline the various types of metal matrix composite **L2**
- Explain liquid state processes and solid state processes in MMCs preparation **L2**
- Demonstrate In-situ processes **L2**
- Identify the properties and applications of MMCs **L2**

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UNIT – IV: Ceramic matrix composites **6 Hrs**

Ceramic matrix materials – properties – processing of CMCs – Sintering - Hot pressing – Infiltration – Lanxide process – In-situ chemical reaction techniques – sol-gel polymer pyrolsis –SHS - Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing). Properties and Applications of CCMs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize the various types of ceramic matrix materials. **L2**
- Explain the sintering, hot pressing, infiltration and lanxide process **L2**
- Contrast between cold and hot isostatic pressing. **L2**
- Examine the properties and applications of CCMs. **L3**

UNIT – V: Advances in composites **6Hrs**

Advantages of carbon matrix – limitations of carbon matrix carbon fibre – chemical vapour deposition of carbon on carbon fibre perform. Properties and applications of Carbon-carbon composites. Composites for aerospace applications.

Characterization of composite materials - Mechanical Properties, Thermal Properties.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the advantages and disadvantages of carbon matrix **L2**
- Identify composites for aerospace applications **L3**
- Apply chemical vapour deposition of carbon on carbon fibre perform **L3**
- Select the carbon - carbon composites. **L1**
- Classify various bio- degradable composites **L3**

Text Books:

1. Chawla K.K, Composite materials, 2/e, Springer – Verlag, 1998.
2. Mathews F.L. and Rawlings R.D., Chapman and Hall, Composite Materials: Engineering and Science, 1/e, England, 1994.

Reference Books:

1. H K Shivanand, B V Babu Kiran, Composite Materials, ASIAN BOOKS, 2011.
2. A.B. Strong, Fundamentals of Composite Manufacturing, SME, 1989.
3. S.C. Sharma, Composite materials, Narosa Publications, 2000.
4. Maureen Mitton, Hand Book of Bioplastics & Bio-composites for Engineering applications, John Wiley publications.

Course Outcomes:

At the end of this Course the student will be able to

- Identify the practical applications of composites. **L3**
- Identify the polymer matrix composites. **L3**
- Classify of bio- degradable composites. **L2**
- Outline the various types of ceramic matrix materials. **L2**

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AME75f – CUSTOMER RELATIONSHIP MANAGEMENT

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- Introduce basic concepts and principles of customer relationship management (CRM).
- Familiarize with appreciate the role and changing face of CRM as an IT enabled function.
- Describe concept of managing and sharing customer data.
- Explain the principles of CRM links in e-Business.
- Expose the students on Enterprise resource planning (ERP),supply chain management (SCM) and Supplier relationship management (SRM).

UNIT – 1: CRM concepts **8 Hrs**

CRM concepts - Acquiring customers, - Customer loyalty and optimizing customer relationships - CRM defined - success factors, the three levels of Service/ Sales Profiling - Service Level Agreements (SLAs), creating and managing effective SLAs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts of customer relationship management **L2**
- Define customer relationship management (CRM) **L1**
- Illustrate the service level agreements (SLAs) **L2**

UNIT – II: CRM in Marketing **6Hrs**

CRM in Marketing - One-to-one Relationship Marketing - Cross Selling & Up Selling - Customer Retention, Behaviour Prediction - Customer Profitability & Value Modeling, - Channel Optimization - Event-based marketing. - CRM and Customer Service - The Call Centre, Call Scripting - Customer Satisfaction Measurement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of one-to-one relationship marketing **L2**
- Develop the skills related to predict the behaviour and retention of the customer **L6**
- Discus about customer profitability and value modeling. **L6**
- Illustrate the various methods for CRM and customer service **L2**

UNIT – III: Sales Force Automation **6Hrs**

Sales Force Automation - Sales Process, Activity, Contact- Lead and Knowledge Management - Field Force Automation. - CRM links in e-Business - E-Commerce and Customer Relationships on the Internet - Enterprise Resource Planning (ERP), - Supply Chain Management (SCM), - Supplier Relationship Management (SRM), - Partner relationship Management (PRM).

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of CRM links in e-Business. **L2**
- Discus E-commerce and customer relationship on the internet. **L6**
- Describe Enterprise resource planning (ERP), Supply chain management (SCM). **L2**
- Explain terms supplier relationship management and partner relationship management. **L2**

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UNIT – IV: Analytical CRM **6 Hrs**

Analytical CRM - Managing and sharing customer data - Customer information databases - Ethics and legalities of data use - Data Warehousing and Data Mining concepts - Data analysis - Market Basket Analysis (MBA), Click stream Analysis, Personalization and Collaborative Filtering.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain how to manage and sharing the customer data **L2**
- List the various ethics and legalities of customer database use **L1**
- Describe various data warehousing and data mining concepts **L3**
- Discus about market basket analysis (MBA) **L6**

UNIT – V: CRM Implementation **6Hrs**

CRM Implementation - Defining success factors - Preparing a business plan requirements, justification and processes. - Choosing CRM tools - Defining functionalities - Homegrown versus out-sourced approaches - Managing customer relationships - conflict, complacency, Resetting the CRM strategy. Selling CRM internally - CRM development Team - Scoping and prioritizing - Development and delivery - Measurement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define success factors for implementing the customer relationship management. **L1**
- Define functionalities of CRM. **L1**
- Explain the functions of CRM development team. **L2**
- Compare Home grown and out-sourced approaches. **L2**

Text Books:

1. Alok Kumar Rai, Customer Relationship Management Concept & Cases, Prentice Hall Of India Private Limted, New Delhi. 2011.
2. S. Shanmugasundaram, Customer Rela Tionship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.

Reference Books:

1. Kaushik Mukherjee, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.
2. Jagdish Seth, Et Al, Customer Rela Tionship Management.
3. V. Kumar & Werner J., Customer Rela Tionship Management, Willey India, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Summarizes the how CRM works in industries. **L2**
- Discus about market basket analysis (MBA). **L6**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Explain the concepts of customer relationship management. **L2**

Head
Mechanical Engineering Department,
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PULIVENDULA - 516 390.

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC75a-EMBEDDED SYSTEMS & IOT

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- To understand the basics of Embedded Systems and IOT.
- To learn the architecture and programming of ARM Microcontroller.
- To be able to work with Raspberry Pi using Python Programming.
- To know about the IOT standards, communication technologies and protocols.
- To implement real time projects using the tools and techniques of IOT Platform.

UNIT – I:

Introduction to Embedded Systems and Internet of Things (IOT): Architecture of Embedded Systems, Embedded Systems Development process, Architecture of Internet of Things, Applications of Embedded Systems and IOT, Design Methodology for IOT Products

Learning Outcomes:

At the end of this unit, the student will be able to

- Gain knowledge on basics of embedded systems and IOT Architectures. **L1**
- Understand the design methodology and applications of embedded systems and IOT. **L2**

UNIT – II:

ARM Microcontrollers Architecture and Programming: Architecture, Instruction set, Programming ports, Timer/Counter, Serial communication, interrupts in C, Introduction ARM mBed platform.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the architecture and programming of ARM Microcontrollers. **L2**
- Work with ARM Microcontrollers in implementing real time projects. **L6**

UNIT – III:

Fundamentals of Python Programming & Raspberry Pi: Introduction to python programming, Working with functions, classes, REST full Web Services, Client Libraries, Introduction & programming Raspberry Pi3, Integrating Input Output devices with Raspberry Pi3.

Learning Outcomes:

At the end of this unit, the student will be able to

- Write programs using Python to implement the given task. **L6**
- Use Raspberry Pi3 for integrating Input & Output devices. **L3**

UNIT – IV:

IOT Technologies, Standards and Tools: Fundamental characteristics and high level requirements of IOT, IOT Reference models; Introduction to Communication Technologies & Protocols of IOT: BLE, Wi-Fi, LORA, 3G/4G Technologies and HTTP, MQTT, COAP protocols; Relevant Practicals on above technologies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the characteristics and high level requirements to design new IoT devices. **L2**
- Summarize different Communication Technologies & Protocols of IoT. **L2**

UNIT – V:

IOT Platform, Cloud Computing Platforms for IoT Development: IOT Platform Architecture (IBM Internet of Things & Watson Platforms); API Endpoints for Platform Services; Devices Creation and Data Transmission; Introduction to NODE-RED and Application deployment.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn how to use API Endpoints for Platform Services, Devices Creation and Data Transmission. **L1**
- To implement real time projects using the tools and techniques of IoT Platform. **L6**

Text Books:

1. ArsheepBahga, Vijay Madisetti, "Internet of Things: A Hands-On Approach", 1st Edition, VPT, 2014.
2. K.V.K.K.Prasad, "Embedded Real Time Systems: Concepts, Design and Programming", 1st Edition, Dreamtech Publication, 2014.
3. Adrian McEwen, Hakim Cassimally, "Designing the Internet of Things", Wiley Publications, 2013

Reference Books:

1. Jonathan W Valvano, "Embedded Microcomputer Systems: Real-Time Interfacing", 3rd Edition, Thomson Engineering, 2012.
2. Olivier Hersent, David Boswarthick, Omar Elloumi, "The Internet of Things: Key applications and Protocols", 2nd Edition, Wiley Publications, 2012.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the basics of Embedded Systems and IOT. **L2**
- Correlate the architecture and programming of ARM Microcontroller. **L4**
- Work with Raspberry Pi using Python Programming. **L6**
- Summarize IOT standards, communication technologies and protocols. **L2**
- Implement real time projects using the tools and techniques of IOT Platform. **L6**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC75b-ELECTRONIC INSTRUMENTATION

(Open Elective-III)

L	T	P	C
2	0	0	2

Course Objectives: The objectives of the course are to make the students learn about

- To know about the performance characteristics of instruments and measurement of electrical quantities.
- To understand the construction, working and applications of different types of CRO"s.
- To analyze the working of different types of bridges.
- To study the working of signal & function generators.
- To analyze the working of transducers in measuring physical parameters

UNIT – I:

Measuring Instruments: Introduction, Errors in Measurement, Accuracy, Precision, Resolution and Significant figures. Basic PMMC Meter- construction and working, DC and AC Voltmeters-Multirange, Range extension, DC Ammeter, Multimeter for Voltage, Current and resistance measurements.

Digital Instruments: Digital Voltmeters – Introduction, DVM's based on V–T, V–F and Successive approximation principles, Resolution and sensitivity, General specifications, Digital Multimeters, Digital frequency meters, Digital measurement of time.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn about the performance characteristics of the instruments. **L1**
- Understand the working of different types of ammeters, voltmeters and multimeters. **L2**

UNIT – II:

Oscilloscopes: Introduction, Block diagram of CRO, Basic principle of CRT, CRT Construction and features, vertical amplifiers, horizontal dPeflection system- sweep, trigger pulse, delay line, sync selector circuits. Dual beam and dual trace CROs, Sampling and Digital storage oscilloscopes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Grasp the construction and working of different types of oscilloscopes. **L1**
- Use CRO to measure the amplitude, frequency, phase and time period of given signals. **L3**

UNIT – III:

Bridges: DC Bridges for Measurement of resistance - Wheat stone bridge, Kelvin's Bridge, AC Bridges for Measurement of inductance- Maxwell's bridge, Hay's Bridge, Anderson bridge, Measurement of capacitance - Schearing Bridge, Wien Bridge, Errors and precautions in using bridges.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the construction and working of different types of bridges. **L2**
- Measure parameters like resistance, capacitance, and inductance using bridges. **L3**

UNIT – IV:

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Laboratory type signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator, Sweep frequency generator.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the working and applications of signal generators. **L2**
- Gain knowledge on the working and applications of function generators. **L1**

UNIT – V:

Transducers: Introduction, Types of Transducers, Electrical transducers, Selecting a transducer, Resistive transducer, Strain gauges, Piezoelectric transducer, Photoelectric transducer, Photovoltaic transducer, Temperature transducers-RTD, LVDT.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic working principle and applications of transducers. **L2**
- Measure physical parameters using different types transducers. **L3**

Text Books:

1. H.S.Kalsi, "Electronic Instrumentation", Third edition, Tata McGraw Hill, 2010.
2. A.D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measurement Techniques", PHI, 6th Edition, 2010.

Reference Books:

1. A.K. Sawhney, Dhanpat Rai & Co., "A course in Electrical and Electronic Measurements and Instrumentation", 9th Edition, 2010.
2. David A. Bell, "Electronic Instrumentation & Measurements", PHI, 2nd Edition, 2006.

Course Outcomes:

At the end of this Course the student will be able to

- Know about the performance characteristics of instruments and measurement of electrical quantities. **L1**
- Understand the construction, working and applications of different types of CRO"s. **L2**
- Compare the working of different types of bridges. **L2**
- Learn the working of signal & function generators. **L1**
- Analyze the working of transducers in measuring physical parameters. **L4**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19AEC75c-BASICS OF VLSI DESIGN

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To give exposure to different steps involved in the fabrication of ICs and electrical properties of MOS devices.
- To know the design rules in drawing the layout of any logic circuit.
- To design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- To learn the concepts scaling and designing building blocks of data path of any system using gates.
- Understand the design and operation of basic programmable logic devices.

UNIT – I:

MOS Technology: Introduction to IC Technology. The IC Era, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, nMOS and CMOS Fabrication processes.

Basic Electrical Properties of MOS Circuits: I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Transconductance and Output Conductance, nMOS Inverter, Determination of Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, CMOS Inverter.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. **L2**
- Analyze the operation of NMOS, CMOS and BiCMOS inverters. **L4**

UNIT – II:

MOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2μm Double Metal, Double Poly CMOS rules, Layout Diagrams-A Brief Introduction, Symbolic Diagrams-Translation to Mask Form.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the VLSI design flow and stick diagrams. **L1**
- Understand the design rules in drawing the layout of any logic circuit. **L2**

UNIT – III:

Basic Circuit Concepts: Sheet Resistance. Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, standard unit of capacitance, area Capacitance calculations, the Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different types of logics in gate level design. **L2**
- Learn and compare different performance parameters in gate level design. **L1**

UNIT – IV:

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.

Sub System Design and Layout: Switch logic, Gate logic, Examples of Structured Design, parity generator, multiplexers, and grey to binary code converter.

Learning Outcomes:

At the end of this unit, the student will be able to

- Appreciate the importance, models and limitations of scaling. **L1**
- Explain the building blocks of data path of any system using gates. **L1**

UNIT – V:

Programmable Logic Devices: Read only memories, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Complex programmable logic devices, Field programmable gate arrays.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain different programmable logic devices. **L1**
- Compare the performance parameters and applications of different programmable logic devices. **L2**

Text Books:

1. Kamran Eshraghian. Douglas, A. Pucknell and Sholeh Eshraghian, "Essentials of LSI Circuits and Systems", Prentice Hall of India Private Limited, 2005 Edition.
2. Neil H.E.WESTE, David Harris andAyan Banerjee, "CMOS VLSI Design A Circuits and systems perspective", Pearson Education, 2006 Third Edition

Reference Books:

1. Richa Jain and Amrita Rai, "Principles of VLSI and CMOS Integrated Circuits", S.Chand and Company Limited. First edition.2012.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition.

Course Outcomes:

At the end of this Course the student will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. **L2**
- Know the design rules in drawing the layout of any logic circuit. **L1**
- Compare different types of logic gates using CMOS inverter and their transfer characteristics. **L2**
- Learn the concepts to design building blocks of data path of any system using gates. **L1**
- Gain knowledge about basic programmable logic devices and testing of CMOS circuits. **L1**

IV B.Tech I SEMESTER
JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
19ACS75a-MOBILE APPLICATION DEVELOPMENT
Open Elective-III

L	T	P	C
2	0	0	2

Course Objectives:

- Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

UNIT – 1: **8 Hrs**

Introduction Android Programming: What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L2**
- demonstrate their skills of using Android software development tools **L2**

UNIT – II: **8 Hrs**

Android User Interface: Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to develop software with reasonable complexity on mobile platform. **L3**
- demonstrate their ability to deploy software to mobile devices **L3**

UNIT – III: **8 Hrs**

Designing User Interface with Views: Basic Views, Picker Views, Using List Views to Display Long Lists.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to debug programs running on mobile devices **L4**
- demonstrate their ability to deploy software to mobile devices **L4**

UNIT – IV: **7 Hrs**

Displaying pictures and menus with views and Data Persistence: Views to Display pictures, menus with views, additional views, saving and loading user preferences, persisting data to files, creating and using databases.

Learning Outcomes:

At the end of this unit, the student will be able to

1. demonstrate their skills of using Android software development tools **L4**
2. demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**



UNIT – V: **08Hrs**

Content Providers: Sharing data in android, using a content provider, creating your own content providers.

Messaging and Networking: SMS Messaging, Sending E-Mail, Networking

Location-Based Services: Displaying Maps, Getting Location Data.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to deploy software to mobile devices **L5**
- demonstrate their ability to debug programs running on mobile devices **L5**

Text Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India
2. Beginning Swift Programming, Wei-Meng Lee, December 2014, ISBN: 978-1-119-00931-3

Reference Books:

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

Course Outcomes:

At the end of this Course the student will be able to

1. demonstrate their understanding of the fundamentals of Android operating systems **L3**
2. demonstrate their skills of using Android software development tools **L4**
3. demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**



IV B.Tech I SEMESTER

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS75b-REAL TIME OPERATING SYSTEMS AND APPLICATIONS

Open Elective-III

L	T	P	C
2	0	0	2

Course Objectives:

COURSE OBJECTIVES:

The objective of this course is to

- develop an understanding of various Real Time systems Application
- obtain a broad understanding of the technologies and applications for the emerging and exciting domain of real-time systems
- get in-depth hands-on experience in designing and developing a real operational system.

UNIT – 1: Introduction **8 Hrs**

Definition, Typical Real Time Applications: Digital Control, High Level Controls, Signal Processing etc., Release Times, Dead-lines, and Timing Constraints, Hard Real Time Systems and Soft Real Time Systems, Reference Models for Real Time Systems: Processors and Resources, Temporal Parameters of Real Time Workload, Periodic Task Model, Precedence Constraints and Data Dependency.

Learning Outcomes:

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods **L2**

UNIT – II: Real Time Scheduling **8 Hrs**

Common Approaches to Real Time Scheduling: Clock Driven Approach, Weighted Round Robin Approach, Priority Driven Approach, Dynamic Versus Static Systems, Optimality of Effective-Deadline-First (EDF) and Least-Slack-Time-First (LST) Algorithms, Rate Monotonic Algorithm, Offline Versus Online Scheduling, Scheduling A periodic and Sporadic jobs in Priority Driven and Clock Driven Systems..

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L3**
- Discuss about the functional and system testing methods **L3**

UNIT – III: Resources Sharing **8 Hrs**

Effect of Resource Contention and Resource Access Control (RAC), Non-preemptive Critical Sections, Basic Priority-Inheritance and Priority-Ceiling Protocols, Stack Based Priority- Ceiling Protocol, Use of Priority-Ceiling Protocol in Dynamic Priority Systems, Preemption Ceiling Protocol, Access Control in Multiple-Module Resources, Controlling Concurrent Accesses to Data Objects.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L4**
-

UNIT – IV: Real Time Communication **7 Hrs**

Basic Concepts in Real time Communication, Soft and Hard RT Communication systems, Model of Real Time Communication, Priority-Based Service and Weighted Round-Robin Service Disciplines for Switched Networks, Medium Access Control Protocols for Broadcast Networks, Internet and Resource Reservation Protocols..

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish characterstics of structural testing methods. **L5**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

UNIT – V:Real Time Operating Systems and Databases **08Hrs**

Features of RTOS, Time Services, UNIX as RTOS, POSIX Issues, Characteristic of Temporal data, Temporal Consistency, Con-currency Control, Overview of Commercial Real Time databases..

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L5**
- Demonstrate various issues for object oriented testing. **L5**

Text Books:

1. Real Time Systems – Jane W. S. Liu, Pearson Education Publication.

Reference Books:

1. . Real Time Systems – Mall Rajib, Pearson Education.
2. Real-Time Systems: Scheduling, Analysis, and Verification – Albert M. K. Cheng, Wiley.

Course Outcomes:

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L3**
- Distinguish characterstics of structural testing methods. **L4**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L5**
- Discuss about the functional and system testing methods. **L5**

IV B.Tech I SEMESTER

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACS75c-FUNDAMENTALS OF BLOCKCHAIN AND APPLICATIONS

Open Elective-III

L	T	P	C
2	0	0	2

Course Objectives:

1. To study fundamental concepts in software testing.
2. To discuss various software testing issues and solutions in software unit test, integration and system testing.
3. To expose the advanced software testing topics, such as object--oriented software testing methods.

UNIT – 1: Introduction **8 Hrs**

Grasping Blockchain Fundamentals, Tracing Blockchain's Origin,The shortcomings of current transaction systems, The emergence of bitcoin , 5 The birth of blockchain, Revolutionizing the Traditional Business, Network Exploring a blockchain application, Recognizing the key business benefits, Building trust with blockchain.

Learning Outcomes:

At the end of this unit, the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L1**
- Distinguish characterstics of structural testing methods. **L2**

UNIT – II: Blokchain working **8 Hrs**

Taking a Look at How Blockchain Works,Why It's Called "Blockchain", What Makes a Blockchain Suitable for Business, Shared ledger, Permissions Consensus, Smart contracts, Identifying Participants and Their Roles, Fundamentals of Blockchain.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible **L3**
- Discuss about the functional and system testing methods **L3**

UNIT – III: Business with Blockchain **8 Hrs**

Propelling Business with Blockchains, Recognizing Types of Market Friction, Information frictions, Interaction frictions, Innovation frictions, Moving Closer to Friction-Free Business, Networks Reducing information friction, Easing interaction friction, Easing innovation friction, Transforming Ecosystems through Increased Visibility.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L4**
- Demonstrate various issues for object oriented testing. **L4**

UNIT – IV: Blockchain in Action **7 Hrs**

Blockchain in Action: Use Cases, Financial Services, Commercial financing, Trade finance, Cross-border transactions, Insurance, Government Supply Chain Management Healthcare, Electronic medical records, Healthcare payments pre-authorization, The Internet of Things (IoT).

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish characterstics of structural testing methods. **L5**



- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L4**

UNIT – V:Hyperledger **10 Hrs**

Hyperledger, a Linux Foundation Project, Hyperledger Vision, Hyperledger Fabric, How Can IBM Help Developers Innovate With Blockchain?, Offering an easily accessible cloud and development platform, Individualized attention and industry expertise.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss about the functional and system testing methods. **L5**
- Demonstrate various issues for object oriented testing. **L5**

Text Books:

1. Fundamentals of Blockchain., RavindharVadapalli

Reference Books:

1. Block chain Technology Concepts and Applications, Kumar Saurabh, Ashutosh Saxena

Course Outcomes:

At the end of this Course the student will be able to

- List a range of different software testing techniques and statergies and be able to apply specific(automated) unit testing method to the projects. **L3**
- Distinguish characterstics of structural testing methods. **L4**
- Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible. **L5**
- Discuss about the functional and system testing methods. **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

19ACE77- CAD–LAB

L	T	P	C
0	0	3	1.5

Course Objectives: The objectives of the course are to make the students learn about

- To introduce fundamentals of computer aided Design and drawing in Civil Engineering.
- To enable the students Communicate designs graphically

UNIT – I:

SOFTWARE:

1. STAAD PRO or Equivalent

EXCERCISIES:

1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

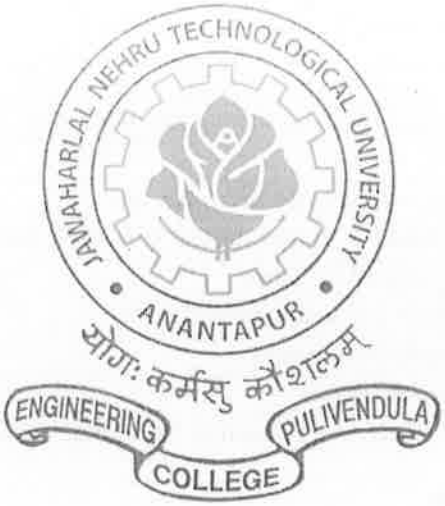
Text Books:

1. Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh

Course Outcomes:

At the end of this Course the student will be able to

- Design frames using Computer Aided Design and Drafting software's.
- Develop engineering project structural design using STAAD software



Jawaharlal Nehru Technological University Anantapur College of Engineering

Pulivendula –516 390 (A.P) India

B.Tech. in Civil Engineering

Course Structure

Under R20 Regulations

Effective from AY 2021-22

CIVIL ENGINEERING

Semester –0			
S.No	**Course Name**	**Category**	**L-T-P-C**
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counselling	MC	2-0-2-0
3	Orientation to all branches -- career options, tools, etc.	MC	3-0-0-0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2-0-0-0
5	Proficiency Modules & Productivity Tools	ES	2-0-0-0
6	Assessment on basic aptitude and mathematical skills	MC	2-0-3-0
7	Remedial Training in Foundation Courses	MC	2-0-3-0
8	Human Values & Professional Ethics	MC	3-0-3-0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2-0-2-0
10	Concepts of Programming	ES	2-0-0-0

B.Tech I Year I Semester

Semester –1					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS05	Linear Algebra and Calculus	BS	3-0-0	3
2	20ABS01	Engineering Physics	BS	3-0-0	3
3	20AHS01	Communicative English	HS	3-0-0	3
4	20ACS06	Basic Python Programming	ES	3-0-0	3
5	20AME04	Engineering workshop	ES	0-0-3	1.5
6	20ACS05	IT workshop	ES	0-0-3	1.5
7	20AHS02	Communicative English lab	HS	0-0-3	1.5
8	20ABS02	Engineering Physics Laboratory	ES	0-0-3	1.5
9	20ACS07	Basic Python Programming Lab	ES	0-0-3	1.5
				Total	**19.5**

B.Tech I Year II Semester

Semester – 2					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS06	Differential Equations and Vector Calculus	BS	3-0-0	3
2	20ABS07	Engineering Chemistry	BS	3-0-0	3
3	20ACE03	Building materials and construction	ES	3-0-0	3
4	20ACE01	Strength of materials -I	ES	3-0-0	3
5	20AME01	Engineering Graphics	ES	1-0-4	3
6	20ACE04	Civil Engineering Workshop Lab	ES	0-0-3	1.5
7	20ABS08	Engineering Chemistry Lab	BS	0-0-3	1.5
8	20ACE02	Strength of materials Lab	ES	0-0-3	1.5
				Total	**19.5**

BOS Chairman Vice-Principal Principal

B.Tech II Year I Semester

Semester – 3					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS13	Complex Variables, Transforms and Applications to Partial Differential Equations	BS	3-0-0	3
2	20ACE05	Strength of Materials – II	PC	3-0-0	3
3	20ACE06	Fluid Mechanics	PC	3-0-0	3
4	20ACE07	Surveying	PC	3-0-0	3
5	20ACE09	Concrete Technology	PC	3-0-0	3
6	20AHS03	Universal Human Values	MC	3-0-0	3
7	20ACE11	Building Planning And Drawing (skill oriented course – I)	SC	1-0-2	2
8	20ACE10	Concrete Technology Lab	PC	0-0-3	1.5
9	20ACE08	Surveying Lab-I	PC	0-0-3	1.5
10	20ACE12	Auto Cad Lab	PC	0-0-3	1.5
11	20ACE20	Design Thinking for Innovation	MC	3-0-0	**0**
				Total	**24.5**

B.Tech II Year II Semester

Semester – 4					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ABS15	Numerical methods, Probability and Statistics	BS	3-0-0	3
2	20ACE13	Engineering Geology	ES	3-0-0	3
3	20ACE15	Structural Analysis-I	PC	3-0-0	3
4	20ACE16	Hydraulics and Hydraulic Machinery	PC	3-0-0	3
5		Humanities Elective –I	HS	3-0-0	3
	20AHS04	Managerial Economics & Financial Analysis			
	20AHS05	Entrepreneurship & Incubation			
6	20ACE17	Estimation, Costing and Valuation (Skill Oriented Course – II)	SC	1-0-2	2
7	20ACE14	Engineering Geology Lab	ES	0-0-3	1.5
8	20ACE18	Surveying-II lab	PC	0-0-3	1.5
9	20ACE19	Fluid Mechanics and Hydraulics and Hydraulic Machinery Lab	PC	0-0-3	1.5
10	20ABS09	Environmental Science	MC	3-0-0	0
11	20AMC01	NSS activities	MC	0-0-2	0
				Total	**21.5**
Mandatory Community Service Project/ Internship during Summer Vacation					

- Eligible & interested students are permitted to register for Honours or a Minor in IV semester after the results of III Semester are declared and students may be allowed to take maximum two subjects per semester pertaining to their Honours or a Minor from V Semester onwards.
- A student is permitted to select a Minor program only if the institution is already offering a Major degree program in that discipline.

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B.Tech III Year I Semester

Semester - 5					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ACE51	Design of Reinforced Concrete Structures	PC	3-0-0	3
2	20ACE52	Geotechnical Engineering	PC	3-0-0	3
3	20ACE53	Environmental Engineering	PC	3-0-0	3
4	20ACE54	Professional Elective Course – I	PE	3-0-0	3
	20ACE54A	Structural Analysis – II			
	20ACE54B	Remote sensing and GIS			
	20ACE54C	Construction Technology and Project Management			
5	20ACE55	Open Elective Course – I	OE	3-0-0	3
6	20ACE50	BIM Fundamentals for Civil Engineers (Skill oriented course – III)	SC	1-0-2	2
7	20ACE57	Environmental Engineering Lab	PC	0-0-3	1.5
8	20ACE58	Geotechnical Engineering Lab	PC	0-0-3	1.5
9	20AMC02	Aptitude and Reasoning Skills	MC	3-0-0	0
10	20ACE59	Evaluation of Community Service Project/Internship	PR	-----	1.5
				Total	**21.5**

Open Elective I (Interdisciplinary)

Branch	Subject Code	Subject
Mathematics	20ABS55A	Fuzzy Set Theory, Arithmetic and Logic
Physics	20ABS55B	Functional Nanomaterials for Engineers
Chemistry	20ABS55C	Chemistry of Energy Materials
EEE	20AEE55A	Basics of Non-Conventional Energy Sources
ME	20AME55A	3D Printing
	20AME55B	Smart Materials
ECE	20AEC55A	Fundamentals of Electronics and Communication Engineering
	20AEC55B	Transducers and Sensors
CSE	20ACS55A	Fundamentals of Internet of Things
	20ACS55B	E-Marketing
	20ACS55C	Computer Architecture and organization

Note: A student shall not be permitted to take courses as Open Electives/Minor/Honours with content substantially equivalent to the courses pursued in the student's primary major.

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B.Tech III Year II Semester

Semester - 6					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ACE61	Design of Steel Structures	PC	3-0-0	3
2	20ACE62	Highway Engineering	PC	3-0-0	3
3	20ACE63	Hydrology and Irrigation Engineering	PC	3-0-0	3
4	20ACE64	Professional Elective Course – II(MOOC-I)	PE	3-0-0	3
5		Humanities Elective –II	HS	3-0-0	3
	20AHS12	Management Science			
	20AHS13	Business Environment			
6	20ACE66	Design Studio Lab	PC	0-0-3	1.5
7	20ACE67	Highway Engineering Lab	PC	0-0-3	1.5
8	20ACE68	Advanced Concrete Technology Lab	PC	0-0-3	1.5
9	20AHS10	Soft Skills (Skill Oriented Course -IV)	SC	1-0-2	2
10	20ACE69	Indian Constitution	MC	3-0-0	0
				Total	**21.5**
Industry Internship (Mandatory) for 6 - 8 weeks duration during summer vacation					

Note: Student shall register for MOOC Course in NPTEL/SWAYAM in concurrence with the department before commencement of semester. The advanced courses should opt which is not repetitive regular courses and syllabus.

B.Tech IV Year I Semester

Semester - 7					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ACE71	Professional Elective Course – III	PE	3-0-0	3
	20ACE71A	Hydraulic structures and Water power engineering			
	20ACE71B	Air pollution and control			
	20ACE71C	Advanced structural Design			
2	20ACE72	Professional Elective Course – IV	PE	3-0-0	3
	20ACE72A	Prestressed Concrete			
	20ACE72B	Design and Drawing of Irrigation Structures			
	20ACE72C	Ground Improvement Techniques			
3	20ACE73	Professional Elective Course –V	PE	3-0-0	3
	20ACE73A	Railways, Airport and harbor Engineering			
	20ACE73B	Bridge Engineering			
	20ACE73C	Foundation engineering			
4	20ACE65	Open Elective Course– II	OE	3-0-0	3
5	20ACE75	Open Elective Course – III	OE	3-0-0	3
6	20ACE76	Open Elective Course – IV (MOOC-II)	OE	3-0-0	3
7	20ACE70	Remote sensing &GIS Lab (Skill oriented course – V)	SC	1-0-2	2
8	20ACE79	Evaluation of Internship	PR	-------	3
				Total	**23**

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Open Elective II (Interdisciplinary)

Branch	Subject Code	Subject Name
Mathematics	20ABS65A	Numerical Techniques
Physics	20ABS65B	Materials Characterization Techniques
Chemistry	20ABS65C	Polymers and their applications
EEE	20AEE65A	Energy Conservation and Management
ME	20AME65A	Programming of Robots and Control
	20AME65B	Non-Conventional sources of Energy
ECE	20AEC65A	Introduction to Microcontrollers & Applications
	20AEC65B	Principles of Digital Signal Processing
CSE	20ACS65A	Machine Learning Applications
	20ACS65B	Object Oriented Programming
	20ACS65C	Web Design

Open Elective III (Interdisciplinary)

Branch	Subject Code	Subject Name
Mathematics	20ABS75A	Mathematical Modeling
Physics	20ABS75B	Sensors and Actuators for Engineering Applications
Chemistry	20ABS75C	Chemistry of Nano-materials and applications
EEE	20AEE75A	IOT Applications in Electrical Engineering
ME	20AME75A	Introduction to Composite Materials
	20AME75B	Customer Relationship Management
ECE	20AEC75A	Fundamentals of Image Processing
	20AEC75B	Basics of VLSI Design
CSE	20ACS75A	Applications of AI
	20ACS75B	Mobile Application Development

Open Elective-IV shall opt any of branch which shall not match with regular course and syllabus.

B.Tech IV Year II Semester

Semester - 8					
S.No	**Course No**	**Course Name**	**Category**	**L-T-P**	**Credits**
1	20ACE99	Full Internship & Project work	PR	---------	12
				Total	**12**

Courses offered for Honours degree

S. No.	Course Code	Course Title	Offered in Semester	Contact Hours per week		Credits
				L	T	
1	20ACEH01	Solid and hazardous waste management		3	1	4
2	20ACEH02	Repair & Rehabilitation of Structures		3	1	4
3	20ACEH03	Earth quake resistant design of structures		3	1	4
4	20ACEH04	Advanced Foundation Engineering		3	1	4
5	20ACEH07	MOOC Course				2
6	20ACEH08	MOOC Course				2

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Title of the Minor Degree
(Disciplines to which the Minor is offered)

S. No	Branch	Name of the Minor degree	Course Code	Course Title	Offered in Semester	Contact Hours per week			Credits
						L	T	P	
1	CE	Construction Technology	20ACEM01	Building Materials	V	3	1	0	4
2			20ACEM02	Building Construction	V	3	1	0	4
3			20ACEM03	Building planning and Drawing	VI	3	1	0	4
4			20ACEM04	Surveying	VI	3	1	0	4
5			20ACEM05	MOOC Course	VII				2
6			20ACEM06	MOOC Course	VII				2
1	EEE	Electrical Systems	20AEEM01	Basic Electric Circuits and Analysis	V	3	1	0	4
2			20AEEM02	Principles of Electrical Measurements	V	3	1	0	4
3			20AEEM03	Basics of Power Electronics and Devices	VI	3	1	0	4
4			20AEEM04	Fundamentals of Control Systems	VI	3	1	0	4
5			20AEEM05	MOOC Course	VII				2
6			20AEEM06	MOOC Course	VII				2
1	ME	3D Printing	20AMEM07	Materials science for Engineers	V	3	1	0	4
2			20AMEM08	Computer Aided Machine Drawing	V	3	1	0	4
3			20AMEM09	3D Printing materials	VI	3	1	0	4
4			20AMEM10	Applications of 3D Printing	VII	3	1	0	4
5			20AMEM11	MOOC Course	VI				2
6			20AMEM12	MOOC Course	VII				2
1	ME	Robotics and Automation	20AMEM13	Introduction to Robotics	V	3	1	0	4
2			20AMEM14	Industrial Automation	V	3	1	0	4
3			20AMEM15	Hydraulic and Pneumatic circuits	VI	3	1	0	4
4			20AMEM16	Programming and control of Robot	VII	3	1	0	4
5			20AMEM17	MOOC Course	VI				2
6			20AMEM18	MOOC Course	VII				2
1	ME	Industrial Engineering	20AMEM19	Production Planning and Control	V	3	1	0	4
2			20AMEM20	Marketing Management	VI	3	1	0	4
3			20AMEM21	Customer Relationship Management	VI	3	1	0	4
4			20AMEM22	Six Sigma & Lean Manufacturing	VII	3	1	0	4
5			20AMEM23	MOOC Course	V				2
6			20AMEM24	MOOC Course	VII				2
1	ECE	Electronics & Communication Engineering	20AECM01	Electronic Circuits	V	3	1	0	4
2			20AECM02	Digital Electronics	V	3	1	0	4
3			20AECM03	Principles of Communications	VI	3	1	0	4
4			20AECM04	Electronic Instrumentation	VI	3	1	0	4
5			20AECM05	MOOC Course	VII				2
6			20AECM06	MOOC Course	VII				2
1	CSE	Web Design & Development	20ACSM01	User Interface Design	V	3	1	0	4
2			20ACSM02	Advanced Java Script	VI	3	1	0	4
3			20ACSM03	Content Management & Distributed systems	VI	3	1	0	4
4			20ACSM04	Mongo DB	VII	3	1	0	4
5			20ACSM05	MOOC Course	V				2
6			20ACSM06	MOOC Course	VII				2

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4	PSE	Data Science	20ACSS07	Data Science	V	3	1	0	4
5			20ACSS08	Data Analytics using Python and Lab	V	2	0	2	3
6			20ACSS09	Data Visualization	VII	3	1	0	4
7			20ACSS10	Machine Learning	VI	3	1	0	4
8			20ACSM11	MOOC Course	VI				2
9			20ACSM12	MOOC Course	VII				2

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF MATHEMATICS
I B.TECH – I SEMESTER (R20)
(Common to all Branches of Engineering)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Linear Algebra and Calculus	3	0	-	3

COURSE OBJECTIVES	
1	This course will illuminate the students in the concepts of calculus and linear algebra.
2	To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications

COURSE OUTCOMES	
CO1	Develop the use of matrix algebra techniques that is needed by engineers for practical applications
CO2	Utilize mean value theorems for real life problems
CO3	Familiarize with functions of several variables which is useful in optimization
CO4	Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2 and 3- dimensional coordinate systems.
CO5	Students will learn the utilization of special functions.

SYLLABUS

Unit I: Matrix Operations and Solving Systems of Linear Equations

Rank of a matrix by echelon form, Normal form, solving system of non-homogeneous and homogeneous linear equations. Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalization of a matrix.

Unit II: Infinite series and Mean Value Theorems

Infinite series:

Series, Convergence and divergence, Geometric series, Integral test, P- series, comparison test, ratio test, root test.

Mean Value Theorems:

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem (without proof). Expansions of functions: Taylor's and Maclaurin's series, indeterminate forms and L-Hospital rule (Limits).

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Mathematics

Unit III: Multivariable calculus

Functions of several variables – Limit and Continuity, Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers for three variables.

Unit IV: Multiple Integrals

Double integrals, change of order of integration, areas enclosed by plane curves, Triple Integrals, Volume of solid as double integral and as triple integral, change of variables in double integral and Triple integral.

Unit V: Special Functions- Beta and Gamma functions

Beta and Gamma functions and their properties, relation between beta and gamma functions. Derichlet's integral and its applications (Areas and Volumes of solids).

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

References:

1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Grawhill publishing company Ltd., New Delhi.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA

B.Tech. I Year Syllabus (R20 Regulation)

Engineering Physics

(Civil & Mechanical Branches)

L T P C
3 0 0 3

COURSE OBJECTIVES	
1	To make a bridge between the physics in school and engineering courses.
2	To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
3	To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications
4	To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications. Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano materials, their properties and applications in modern emerging technologies are elicited.
5	To familiarize the concepts of theoretical acoustics to practical use in engineering field. To explain the significance of ultrasound and its application in NDT for diversified engineering application.
6.	To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through powder diffraction method, SEM and TEM.

Unit-I: Wave Optics **12hrs**

Interference- Principle of superposition – Interference of light –Interference by wavefront and amplitude division - Interference in thin films (Reflection Geometry) – Colours in thin films – Newton's Rings – Determination of wavelength of light source and refractive index of liquid.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit - Diffraction grating – Grating spectrum.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction (Qualitative) - Nicol's Prism - Half wave and Quarter wave plates with applications.

Unit Outcomes:

The students will be able to

- **Explain** the need of coherent sources and the conditions for sustained interference (L2)
- **Identify** engineering applications of interference (L3)
- **Analyze** the differences between interference and diffraction with applications (L4)
- **Illustrate** the concept of polarization of light and its applications (L2)
- **Classify** ordinary polarized light and extraordinary polarized light (L2)

Unit-II: Lasers and Fiber optics **8hrs**

Lasers- Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – CO_2 laser – Semi conductor Laser - Applications of lasers.

Fiber optics- Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Fiber optic communication system – Losses in optical fibers – Applications.

Unit Outcomes:

The students will be able to

- **Understand** the basic concepts of LASER light Sources (L2)
- **Apply** the concepts to learn the types of lasers (L3)
- **Identifies** the Engineering applications of lasers (L2)
- **Explain** the working principle of optical fibers (L2)
- **Classify** optical fibers based on refractive index profile and mode of propagation (L2)
- **Identify** the applications of optical fibers in various fields (L2)

UNIT III: Engineering Materials **12hrs**

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Orientation polarizations (Qualitative), Ionic and Electronic Polarizations – Lorentz internal field – Clausius-Mossotti equation – Dielectric breakdown and Loss – Piezoelectricity and Ferro electricity.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, Para Ferro, Ferri & Antiferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Nanomaterials- Introduction – Surface area and quantum confinement – Physical properties: electrical and magnetic properties – Synthesis of nanomaterials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

Unit Outcomes:

The students will be able to

- **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
- **Summarize** various types of polarization of dielectrics (L2)
- **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
- **Apply** the concept of polarization to materials like piezoelectric and ferroelectrics (L3)
- **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
- **Explain** the applications of dielectric and magnetic materials (L2)
- **Apply** the concept of magnetism to magnetic devices (L3)
- **Identify** the nano size dependent properties of nanomaterials (L2)
- **Illustrate** the methods for the synthesis and characterization of nanomaterials (L2)
- **Apply** the basic properties of nanomaterials in various Engineering branches (L3).

Unit-IV: Acoustics and Ultrasonics **08hrs**

Acoustics- Introduction – Requirements of acoustically good auditorium – Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method) – Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics- Introduction – Properties – Production by magnetostriction and piezoelectric methods – Detection – Acoustic grating – Non Destructive Testing – Pulse echo system through transmission and reflection modes – Applications.

Unit Outcomes:

The students will be able to

- **Explain** how sound is propagated in buildings (L2)
- **Analyze** acoustic properties of typically used materials in buildings (L4)
- **Recognize** sound level disruptors and their use in architectural acoustics (L2)
- **Identify** the use of ultrasonics in different fields (L3)

Unit-V: Crystallography and Characterization Techniques **8hrs**

Crystallography- Space lattice, Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC & FCC – NaCl Crystal - Miller indices – Separation between successive (hkl) planes.

Characterization Techniques: X-Ray Diffraction: Bragg's law – Bragg's X-ray Diffractometer – Crystal structure determination by Laue method – Electron microscopy: Scanning Electron Microscope – Transmission Electron Microscope.

Unit Outcomes:

The students will be able to

- **Classify** various crystal systems (L2)
- **Identify** different planes in the crystal structure (L3)
- **Analyze** the crystalline structure by Bragg's X-ray diffractometer (L4)
- **Apply** powder method to measure the crystallinity of a solid (L4)
- **Analyze** the crystal structure using electron microscopes (L4)

Text books:

1. Engineering Physics by M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy S.Chand Publications, 11th Edition (2019).
2. Engineering Physics" by D.K.Bhattacharya and Poonam Tandon, Oxford press (2018).

Reference Books:

1. Fundamentals of Physics – Halliday, Resnick and Walker, John Wiley &Sons, 11th Edition (2018).
2. Solid State Physics, A J Dekker, Macmillan India Limited (Publisher) (2000)
3. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers (2018).
3. Engineering Physics by M.R.Srinivasan, New Age international publishers (2014).
4. Engineering Physics by B.K. Pandey and S. Chaturvedi, Cengage Learning(2018)
5. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press(2016)
6. University Physics by H.D.Young and R.A. Freedman,Pearson(2017)

COURSE OUTCOMES	
CO1	**Study** the different realms of physics and their applications in both scientific and technological systems through physical optics. (L2)
CO2	**Identify** the wave properties of light and the interaction of energy with the matter (L3). **Asses** the electromagnetic wave propagation and its power in different media (L5).
CO3	**Understands** the response of dielectric and magnetic materials to the applied electric and magnetic fields. (L3) **Elucidates** the importance of nano materials along with their engineering applications. (L5)
CO4	**Explain** the basic concepts of acoustics and ultrasonics. (L2) **Apply** the concept of NDT to material testing. (L3)
CO5	**Study** the important properties of crystals like the presence of long-range order, periodicity and structure determination using X-ray diffraction technique (L5) and **Analyze** the crystal structure using electron microscopes (L4)

JNTUA COLLEGE OF ENGINEERING :(AUTONOMOUS), PULIVENDULA

I B.TECH

COMMUNICATIVE ENGLISH (R20)

(Common to All Branches of Engineering)

L	T	P	C
3	0	0	3

1. INTRODUCTION:

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

2. COURSE OBJECTIVES

1	Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
2	Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
3	Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
4	Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
5	Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

3. COURSE OUTCOMES

CO1	Retrieve the knowledge of basic grammatical concepts.
CO2	Understand the context, topic, and pieces of specific information from social or transactional dialogues spoken and the improve the fluency of English..
CO3	Apply grammatical structures to formulate sentences and correct word forms
CO4	Analyze discourse markers to speak clearly on a specific topic in informal discussions
CO5	Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.
CO6	Create a coherent paragraph interpreting a figure/graph/chart/table.

4. SYLLABUS:

UNIT –I

***Reading*: What Is My Name? —P Sathyavathi**

- ***Writing:*** Paragraph writing
- ***Listening***: Listening for theme-main
- ***Functional English***: Greeting, taking leave and introducing oneself and others
- ***Grammar:*** Parts of speech- Nouns –classification-usages- Pronouns - classifications-usages-
- ***Vocabulary*:** Homonyms- Homophones- Homographs

Non Detailed Study: Listening Skills from **English and Soft Skills**

UNIT-II

***Reading* : The Kitchen — Vimala**

- ***Writing*** : Essay Writing –Descriptive Essays
- ***Listening*** : Listening for theme -1
- ***Functional English***: Making requests
- ***Grammar:*** Types of sentences- Question Tags
- ***Vocabulary*** : Synonyms - Antonyms

Non detailed Study: Teamwork Skills from **English and Soft Skills**

UNIT-III

***Reading* : Adivasis — Kancha Ilaiah**

- ***Writing*** : Statement of Purpose
- ***Listening:*** Listening for main ideas
- ***Functional English:*** Inviting -Apologizing
- ***Grammar:***– Kinds of verbs – Auxiliaries- Tenses,
- ***Vocabulary*** : Prefixes –Suffixes – One-word substitutes

Non detailed Study: Assertive Skills from **English and Soft Skills**

UNIT-IV

***Reading*: The Bet – Anton Chekhov**

- ***Writing:*** Letter Writing –Official letters-business Letters-Application Letters
- ***Listening***: Listening for details
- ***Functional English:*** Interrupting - Asking for and giving opinions
- ***Grammar:*** Adjectives- Conjunctions- Articles – Active & Passive Voice
- ***Vocabulary***: Phrasal verbs -Idioms

Non detailed Study: Learning Skills from **English and Soft Skills**

UNIT-V

Reading **: The Gift of the Magi - O. Henry**

- ***Writing:*** Information Transfer
- ***Listening*** : Listening for opinions
- ***Functional English*** : Asking for the time and directions
- ***Grammar:*** Prepositions- Reported Speech
- ***Vocabulary*** : Commonly confused words

Non detailed Study : Emotional Intelligence Skills from **English and Soft Skills**

5. Prescribed Text books:

[1] **Detailed text: English for Fluency**, K Purushottam, Orient Black Swan,2013.

[2] **Non detailed text: English and Soft Skills**, S P Dhanavel, Orient Black Swan 2013Edition.

6. REFERENCES:

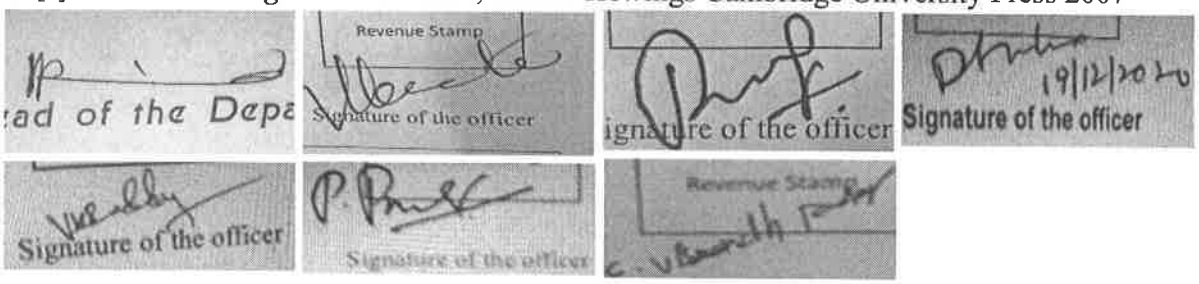
[1] **A Practical Course in Effective English Speaking Skills**. J.K.Gangal, PHI, New Delhi.2012

[2] **Fundamentals of Technical Communication,** Meenakshi Raman, Oxford University Press,2015.

[3] **Spoken English,** R.K. Bansal & JB Harrison, Orient Longman,2013, 4Th edition.

[4] **Murphy's English Grammar** with CD, Murphy, Cambridge University Press,3 Rd edition.

[5] **Advanced English Grammar** , Martin Hewings Cambridge University Press 2007



B.Tech I Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS06 - BASIC PYTHON PROGRAMMING

(CIVIL)

L	T	P	C
3	0	0	3

Course Objectives:

- To introduce programming through Visual programming tool – Scratch
- To teach problem solving through Flow charting tool – Raptor
- To elucidate problem solving through python programming language
- To introduce function-oriented programming paradigm through python
- To train in development of solutions using modular concepts
- To teach practical Pythonic solution patterns

UNIT – I: Computer Fundamentals **8hrs**

Computer Fundamentals: What is a Computer? , Introduction to Operating systems, and Operational overview of a Central Processing Unit.

Introduction to Programming, Algorithms and Flowcharts: Programs and Programming, Programming languages, Compiler, Interpreter, Loader, Linker, Program execution, Classification of Programming languages, Structured programming concept, Algorithms, Pseudo-code, Flowcharts, Strategy for designing algorithms, Tracing an algorithm to depict logic, Specification for converting algorithms into programs.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand the Basic Computer fundamentals. **L1**
- To learn about Algorithms. **L1**

UNIT – II: Flowchart design through Raptor **8hrs**

Flow chart symbols, Input/Output, Assignment, operators, conditional if, repetition, function and sub charts. Example problems(section 1) – Finding maximum of 3 numbers, Unit converters, Interest calculators, multiplication tables, GCD of 2 numbers, Factorial of a number, sum of even and sum of odd numbers between 1 to n.

Example problems (section 2) – Fibonacci number generation, prime number generation. Minimum, Maximum and average of n numbers, linear search, Binary Search.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn about flowchart. **L2**
- To learn how to flowchart in Raptor. **L2**

UNIT – III: Introduction to Python **8hrs**

Python – Numbers, Strings, Variables, operators, expressions, statements, String operations, Math function calls, Input/Output statements, Conditional If, while and for loops, User defined Functions, parameters to functions, recursive functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand why Python is a useful scripting language for developers. **L1**
- To learn how to design and program Python applications. **L1**

UNIT – IV: Data Structures and Idiomatic Programming in Python **7 Hrs**

Lists, Tuples, Dictionaries, Strings, Files and their libraries. Beautiful idiomatic approach to solve programming problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn about Data Structures. **L3**
- To learn how to read and write files in Python. **L3**
- To learn how to design object-oriented programs with Python classes. **L3**

UNIT – V: Event driven Programming

Turtle Bar Chart, Event Driven programming, Key press events, Mouse events, timer events, Turtle Graphics.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn how to use Event Driven programming in Python for reusability. **L4**
- To learn how to use Turtle Graphics in Python applications. **L5**

Text Books:

1. "Introduction to Python Programming" by Y. Daniel Liang, Georgia Southern University, Pearson Education, 2013.
2. "Computer Fundamentals and Programming in C" by Prof. P. Chenna Reddy, JNTUA, BSP Publications.
3. https://raptor.martincarlisle.com/
4. "A Practical Introduction toPython Programming" by Brian Heinold, Mount St Mary's University 2012.

Reference Books:

1. "Introduction to Computation and Programming Using Python: with applications to understanding Data" by John. V. Guttag, 2nd Edition, the MIT Press.
2. "How to Think like a Computer Scientist: Learning with Python 3 documentation" by Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, 3rdEdition, 2012.

Course Outcomes:

At the end of this Course the student will be able to

- Explain basic principles of Python programming language. **L2**
- Implement object oriented concepts. **L3**
- Implement Event Driven Programming. **L3**

B.Tech I Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS05 - IT – WORKSHOP

(Common for CSE, CIVIL & MECH)

L	T	P	C
0	0	3	1.5

Course Objectives:

- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, Presentations
- To make the students know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
- To learn about Networking of computers and use Internet facility for Browsing and Searching

List of Experiments:

Task 1: Learn about Computer: Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.

Task 2: Assembling a Computer: Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps). Students should record the process of assembling and trouble shooting a computer.

Task 3: Install Operating system: Student should install Linux on the computer. Student may install another operating system (including proprietary software) and make the system dual boot or multi boot. Students should record the entire installation process.

Task 4: **Productivity tools (6 weeks)**

Word Processor: Students should be able to create documents using the word processor tool. Some of the tasks that are to be performed are inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied. Students should submit a user manual of the word processor considered.

Task 5: Spreadsheet: Students should be able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells. Students should submit a user manual of the Spreadsheet application considered.

Task 6: Presentations : creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show. Students should submit a user manual of the Presentation tool considered.

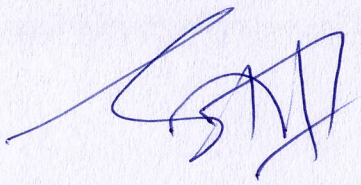
Optional Tasks:

Task 7: Laboratory Equipment: Students may submit a report on specifications of various equipment that may be used by them for the laboratories in their curriculum starting from I B.tech to IV. B.Tech. It can vary from department to department. Students can refer to their syllabus books, consult staff members of the concerned department or refer websites. The following is a sample list. Instructors may make modifications to the list to suit the department concerned.

- Desktop computer
- Server computer
- Switch (computer science related)
- Microprocessor kit
- Micro controller kit
- Lathe machine
- Generators
- Construction material
- Air conditioner
- UPS and Inverter
- RO system
- Electrical Rectifier
- CRO
- Function Generator
- Microwave benches

References:

1. "Introduction to Computers", Peter Norton, Mc Graw Hill
2. "LaTeX Companion" – Leslie Lamport, PHI/Pearson.
3. "MOS study guide for word, Excel, Powerpoint & Outlook Exams", Joan Lambert, Joyce Cox, PHI.
4. "Introduction to Information Technology", ITL Education Solutions limited, Pearson Education.
5. "Networking your computers and devices", Rusen, PHI



Course Outcomes: At the end of this Course the student will be able to

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

At the end of this Course the student will be able to

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use
- Prepare the Documents using Word processors
- Prepare Slide presentations using the presentation tool
- Interconnect two or more computers for information sharing
- Access the Internet and Browse it to obtain the required information
- Install single or dual operating systems on computer

JNTUA COLLEGE OF ENGINEERING :(AUTONOMOUS), PULIVENDULA
I B.TECH
COMMUNICATIVE ENGLISH LABORATORY (R20)
(Common to All Branches of Engineering)

L	T	P	C
0	0	3	1.5

Course Objectives

- students will be exposed to a variety of self-instructional, learner friendly modes of language learning
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

Course Outcomes

- CO1: Listening and repeating the sounds of English Language
- CO2: Understand the different aspects of the English language proficiency with emphasis on LSRW skills
- CO3: Apply communication skills through various language learning activities
- CO3: Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- CO5: Evaluate and exhibit acceptable etiquette essential in social and professional settings
- CO6: Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Unit 1

1. Phonetics-Importance -Introduction to Sounds of Speech
2. Vowels and Consonants Sounds
3. Phonetic Transcription

Learning Outcomes

At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit 2

1. Word Stress & Intonation
2. Communication skills
3. Role Play & JAM

Learning Outcomes
At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit 3

1. Describing people/objects/places
2. Speeches for Special Occasions
3. Etiquettes of Telephonic Communication

Learning Outcomes
At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit4

1. Group Discussions
2. Debates
3. Interviews Skills

Learning Outcomes
At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit 5

1. Resume writing & Practicing
2. Oral Presentations
3. Writing Video Speeches as it is & Book reviews – oral and written

Learning Outcomes

At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors

Suggested Software

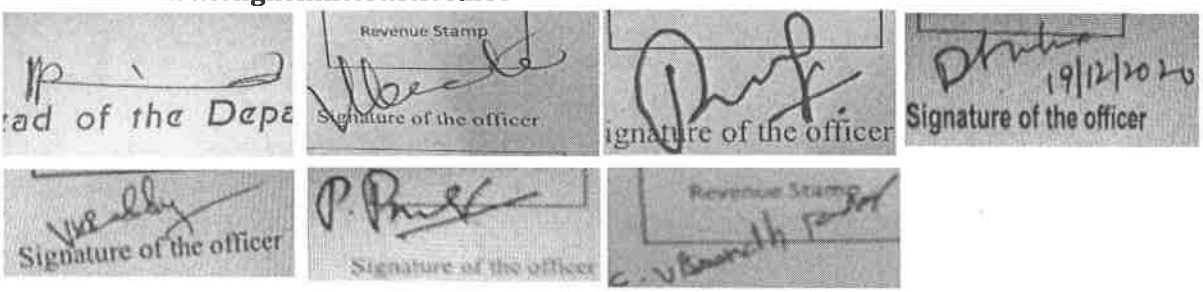
- Orell
- Walden Infotech
- Young India Films

Reference Books

- Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
- Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking*. Heinley ELT; 2nd Edition, 2018.
- Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
- Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
- A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

- **www.esl-lab.com**
- **www.englishmedialab.com**
- **www.englishinteractive.net**



JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)
PULIVENDULA
B.Tech I Year Syllabus (R20 Regulation)
Engineering Physics Laboratory
(Civil & Mechanical Branches)

L T P C
0 0 3 1.5

Course Objectives:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.
- Identifies the various sensor applications.

Note: - In the following list of experiments, out of 15 experiments any 10 experiments must be performed in a semester.

List of Engineering Physics Experiments

1. Determination of the thickness of the wire using wedge shape method
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the thickness of the wire using wedge shape method (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
2. Determination of the radius of curvature of the lens by Newton's ring method
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the radius of curvature of the lens (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
   Plots the square of the diameter of a ring with no. of rings (L3)
3. Determination of wavelengths of various spectral lines of mercury source using diffraction grating in normal incidence method
   Experimental outcomes:
   Operates optical instrument like spectrometer. (L2)
   Estimate the wavelength of the given source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)
4. Determination of dispersive power of prism.
   Experimental outcomes:
   Operates optical instrument like spectrometer. (L2)
   Estimate the refractive index and dispersive power of the given prism (L2)
   Identifies the formation of spectrum due to dispersion. (L2)
5. Determination of wavelength of LASER light using diffraction grating.
   Experimental outcomes:
   Operates various instrument (L2)
   Estimate the wavelength of laser source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)
6. Determination of particle size using LASER.
   Experimental outcomes:
   Operates various instrument (L2)
   Estimate the Particles size using laser (L2)
   Identifies the application of laser (L2)
7. To determine the numerical aperture and acceptance angle of an optical fiber
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit. (L2)
   Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
   Identifies the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)
8. Determination of dielectric constant by charging and discharging method.
   Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)
Estimate the dielectric constant of the given substance. (L2)
Identifies the significance of dielectric constant in various devices. (L2)

9. Study of variation of Magnetic field along the axis of a current carrying coil – Stewart-Gee's Method.

Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the magnetic field along the axis of a circular coil carrying current. (L2)
Plots the intensity of the magnetic field of circular coil carrying current with distance (L3)

10. Measurement of magnetic susceptibility by Gouy's method

Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the magnetic susceptibility of the given material. (L2)
Identifies the significance of magnetic susceptibility in various engineering applications. (L2)

11. Study of B-H curve of Ferromagnetic material

Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)
Classifies the soft and hard magnetic material based on B-H curve. (L2)
Plots the magnetic field H and flux density B (L3)

12. Determination of ultrasonic velocity in liquid (Acoustic grating)

Experimental outcomes:
Operates various instruments. (L2)
Estimate the velocity of ultrasonic waves in liquids. (L2)
Illustrates the basic applications of ultrasonics. (L3)

13. Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)

Experimental outcomes:
Operates various instruments. (L2)
Estimate the rigidity modules of a given wire (L2)
Plots length of the pendulum (l) with time period T^2 (L3)

14. Sonometer: Verification of the three laws of stretched strings

Experimental outcomes:
Operates various instruments. (L2)
Estimate the linear density of a given wire (L2)
Identify the frequency of tuning fork (L3)

15. Determination of losses in optical fiber.

Experimental outcomes:
Operates various instruments and connect them as per the circuit. (L2)
Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
Identifies the significance of losses in optical fiber and its engineering applications. (L2)

Course Outcomes:

The students will be able to

- **Operate** various optical instruments (L2)
- **Estimate** wavelength of laser and particles size using laser(L2)
- **Evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
- **Estimate** the susceptibility and related magnetic parameters of magnetic materials (L2)
- **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
- **Determine** magnetic susceptibility of the material and its losses by B-H curve (L3)
- **Apply** the concepts of ultrasonics by acoustic grating (L2)

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

B.Tech I Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS07 - BASIC PYTHON PROGRAMMING LABORATORY

(CIVIL)

L	T	P	C
0	0	3	1.5

Course Objectives:

- To introduce object oriented programming using an easy-to-use language.
- To use iterators and generators.
- To test objects and handle changing requirements.
- To be exposed to programming over the web.

List of Experiments:

1. Download and install the Python IDLE
2. Construct flowcharts to
   a. Calculate the maximum, minimum and average of N numbers
   b. Develop a calculator to convert time, distance, area, volume and temperature from one unit to another

3. Construct flowcharts with separate procedures to
a. calculate simple and compound interest for various parameters specified by the user
b. calculate the greatest common divisor using iteration and recursion for two numbers as specified by the user

4. Construct flowcharts with procedures to
a. generate first N numbers in the Fibonacci series
b. generate N Prime numbers

5. Design a flowchart to perform Linear search on list of N unsorted numbers(Iterative and recursive)

6. Design a flowchart to perform Binary search on list of N sorted numbers(Iterative and recursive)
7. Design a flowchart to determine the number of characters and lines in a text file specified by the user
8. Design a Python script to convert a Binary number to Decimal number and verify if it is a Perfect number.
9. Design a Python script to determine if a given string is a Palindrome using recursion
10. Design a Python script to sort numbers specified in a text file using lists.

11. Design a Python script to determine the difference in date for given two dates in YYYY:MM:DD format(0 <= YYYY <= 9999, 1 <= MM <= 12, 1 <= DD <= 31) following the leap year rules.

12. Design a Python Script to determine the Square Root of a given number without using inbuilt functions in Python.
13. Design a Python Script to determine the time difference between two given times in HH:MM:SS format.(0 <= HH <= 23, 0 <= MM <= 59, 0 <= SS <= 59)
14. Design a Python Script to find the value of (Sine, Cosine, Log, PI, *e*) of a given number using infinite series of the function.
15. Design a Python Script to convert a given number to words
16. Design a Python Script to convert a given number to roman number.
17. Design a Python Script to generate the frequency count of words in a text file.
18. Design a Python Script to print a spiral pattern for a 2 dimensional matrix.
19. Design a Python Script to implement Gaussian Elimination method.
20. Design a Python script to generate statistical reports (Minimum, Maximum, Count, Average, Sum etc) on public datasets.
21. Design a Python script using the Turtle graphics library to construct a turtle bar chart representing the grades obtained by N students read from a file categorizing them into distinction, first class, second class, third class and failed.

Course Outcomes:

At the end of this Course the student will be able to

- Explain basic principles of Python programming language L2 **L2**
- 2. Implement object oriented concepts, L3 **L3**
- 3. Implement database and GUI applications. L3 **L3**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF MATHEMATICS
I B.TECH – II SEMESTER (R20)
(Common to all Branches of Engineering)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Differential Equations and Vector Calculus	3	0	-	3

COURSE OBJECTIVES	
1	To enlighten the learners in the concept of differential equations and vector calculus
2	To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

COURSE OUTCOMES	
CO1	Solve the linear differential equations related to various engineering fields
CO2	Solve the differential equations reducible to linear, and finds the relevant applications.
CO3	Identify solution methods for partial differential equations that model physical processes
CO4	Interpret the physical meaning of different operators such as gradient, curl and divergence
CO5	Estimate the work done against a field, circulation and flux using vector calculus and also to establish the relations between them using vector integral theorems.

SYLLABUS

UNIT I: Differential Equations

First order and first degree differential equations – Formation, Exact, Linear and Bernoulli equations. Applications to Newton's law of cooling and law of natural growth and decay.

Non-homogeneous Linear Differential Equations of second Higher Order with constant coefficients with RHS terms of the type $e^{ax+b}, \sin(ax+b), \cos(ax+b)$, polynomials in x, $e^{ax}V(x), xV(x)$ where $V(x)$ is a function of x, Method of variation of parameters.

UNIT II: Equations Reducible to Linear Differential Equations with constant coefficients and Applications

Cauchy's and Legendre's linear equations, simultaneous linear equations with constant coefficients.

Applications: Mass spring system and L-C-R Circuit problems.

UNIT III: Partial Differential Equations

Linear partial differential equations of first order, non-linear PDEs of first order (standard forms). Solutions to homogenous linear partial differential equations with constant coefficients, Rules for finding the complementary function and the particular integral.

UNIT IV: Vector differential Calculus

Scalar and vector point functions, Del applied to scalar point functions: Gradient, Del applied to vector point functions: Divergent and Curl and their properties.

Del applied to twice to point functions and Del applied to products of point functions (Identities).

UNIT V: Vector integral Calculus

Line integral- Circulation -work done - potential function, Surface integral-flux, volume integral.

Vector integral theorems: Green's theorem in the plane, Stoke's theorem, Gauss Divergence theorem (all theorems without proof) and related problems.

Textbooks:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

References:

1. B. V. Ramana, Higher Engineering Mathematics, Tata Mc-Grawhill publishing company Ltd., New Delhi.
2. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. Dennis G. Zill and Warren S. Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2011.
4. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA

B.Tech – I Yr II Sem (R20)

L	T	P	C
3	0	0	3

Engineering Chemistry
(MECH and CIVIL)

Course Objectives:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

Unit 1: Water Technology (8 hrs)

Introduction: hardness of water and units, Estimation of hardness of water by EDTA Method - Boiler troubles – Priming, foaming, scale and sludge, Caustic embrittlement, Municipal water treatment – specifications for drinking water, Bureau of Indian Standards(BIS) and World health organization(WHO) standards, ion-exchange processes – desalination of brackish water - reverse osmosis (RO) and electrodialysis.

Learning outcomes:

The student will be able to

- **list** the differences between temporary and permanent hardness of water (L1)
- **explain** the principles of reverse osmosis and electro dialysis. (L2)
- **compare** quality of drinking water with BIS and WHO standards. (L2)
- **illustrate** problems associated with hard water - scale and sludge. (L2)
- **explain** the working principles of different Industrial water treatment processes (L2)
-

Unit 2: Electrochemistry and Applications: (10 hrs)

Electrodes – concepts, electrochemical cell, Nernst equation, cell potential calculations.

Primary cells – Zinc-air, Na-air batteries, Secondary cells – Nickel-Cadmium (NiCd),and lithium ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry corrosion, Pilling Bedworth rule and Factors affecting the corrosion, cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper)..

Learning Outcomes:

At the end of this unit, the students will be able to

- **apply** Nernst equation for calculating electrode and cell potentials (L3)
- **recall** working and importance of batteries(L1)
- **apply** Pilling Bedworth rule for corrosion and corrosion prevention (L3)
- **demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)

- **compare** primary and secondary batteries and their applications (L2)

Unit 3: Polymers and Fuel Chemistry: (12 hrs)

Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth and coordination polymerization.

Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene. PVC and Bakelite, Calculation of molecular Weight of polymer by weight average and number average methods, Poly dispersity Index

Elastomers – Preparation, properties and applications of Buna S, Buna N, Thiokol, Calculation of Molecular Wt of Polymer by Wt Avg. and Number Avg methods, poldispersity Index.

Fuels – Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal, **Liquid Fuels** refining of petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils; alternative fuels- propane, methanol and ethanol, bio-fuels(Coal gas, Biogas).

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** different types of polymers and their applications (L2)
- **find** various alternate fuels and its importance (L1)
- **solve** the numerical problems based on Calorific value(L3)
- **select** suitable fuels for IC engines (L3)
- **explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)

UNIT-4 Advanced Engineering Materials (8 hrs)

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories- Classification, Properties, Factors affecting the refractory materials (Refractoriness, Refractory under load, Porosity, Refractive index, Dimensional stability) and Applications.

Lubricants- Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials- Portland Cement, Rapid Hardening Cement, Quick Setting Cement, constituents, phases and reactivity of clinker, Setting and Hardening of cement.

Learning Outcomes:

At the end of this unit, the students will be able to

- **explain** the constituents of Composites and its classification (L2)
- **recall** properties of refractories and lubricants (L1)
- **identify** the factors affecting the refractory material(L3)
- **illustrate** the functions and properties of lubricants (L2)
- **demonstrate** the phases and reactivity of concrete formation (L2)
- **identify** the constituents of Portland cement (L3)

- **enumerate** the reactions at setting and hardening of the cement (L3)

Unit 5: Surface Chemistry and Applications: (10 hrs)

Introduction to surface chemistry, colloids, micelle formation, synthesis of colloids (Chemical methods - double decomposition, reduction, hydrolysis and oxidation; electrical disintegration or Bredig's Arc method), chemical and electrochemical methods (sol-gel method, Thermally activated chemical vapor deposition method) of preparation of nanometals and metal oxides, stabilization of colloids and nanomaterials by stabilizing agents, solid-gas interface, solid-liquid interface, adsorption isotherm- Langmuir, Freundlich, BET equation (no derivation) applications of colloids and nanomaterials – catalysis, medicine, sensors.

Learning Outcomes:

At the end of this unit, the students will be able to

- **summarize** the concepts of colloids, micelle and nanomaterials (L2)
- **explain** the synthesis of colloids with examples (L2)
- **select** suitable methods for synthesis of Nanometals (L1)
- **outline** the preparation of nanomaterials and metal oxides (L2)
- **identify** the application of colloids and nanomaterials in medicine, sensors and catalysis (L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S.Chand Publication, New Delhi 2012..

Reference Books:

1. G.V.Subba Reddy, K.N.Jayaveera and C. Ramachandraiah, Engineering Chemistry, Mc Graw Hill, 2020.
2. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
3. K. Sesha Maheswaramma and Mridula Chugh, Engineering Chemistry, Pearson Publication Pvt. Ltd.
4. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman,1992.

Course Outcomes:

At the end of the course, the students will be able to

- **demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
- **explain** the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
- **find** important properties of various engineering materials, polymers, colloids and its applications(L1)
- **explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)
- **explain** the setting and hardening of cement and concrete phase (L2)
- **summarize** the concepts of colloids, micelle and nanomaterials (L2).

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF CIVIL ENGINEERING
I B.TECH – II SEMESTER (R20)

Subject Code	Title of the Subject	L	T	P	C
	BUILDING MATERIALS AND CONSTRUCTION	3	0	--	3

OBJECTIVES: *To give the students a basic idea about the traditional and modern construction materials a brief knowledge on building components and its construction methodologies.*

COURSE OUTCOMES	
CO1	Identify and characterize the properties of various building materials.
CO2	Be aware of various Traditional, Organic and Modern building materials emerging materials in the field of civil engineering construction.
CO3	Understand the manufacturing process of various building materials like stones, Bricks, Ceramics, Glass and Plastic.
CO4	Understand the basic principles of low-cost, Alternate and Sustainable materials and capable to practice Eco friendly Civil engineering materials.
CO5	Analyze and design the masonry buildings using IS-code provisions.

UNIT – I
INTRODUCTION TO BUILDING MATERIALS
Traditional & OrganicBuilding Materials – Stone – Dressing of Stones – Modern Building Materials – Bricks – Manufacturing process – Ceramic Products – Manufacturing Process – Building Materials for Low Cost Housing – Utilisation of Wastes for Alternative Building Materials –Sustainable Materials in Construction, Concepts of energy efficient building envelopes as per ECBC – National Standards.

UNIT – II
GLASS:
Introduction to Fenestration- Functions of Glass in Buildings – Constituents and Classification of Glass – Manufacturing Process –Properties of Glass – Common Types of Glass – Special Glass – Advantages and Disadvantages of Glass – National Standards such as ECBC.
PLASTIC:
Introduction – Polymerisation – Classification of Plastics – Commonly Used Plastics – Moulding and Fabricating for Plastic Products – Applications – Advantages – Disadvantages – Intelligent Use of Plastics in Buildings – National Standards such as ECBC.

UNIT – III
INSULATING MATERILAS
Thermal Insulating Materials: Introduction – Thermal Insulation – Heat Transfer Fundamentals – Thermal Properties of Insulating Materials – Selection of Insulating Materials – Classification of Insulation materials – Reflective Insulation Systems – Commonly Used Building Insulation Materials – Insulation that Should not be Used – National Standards such as ECBC.
Sound Insulating Materials: Introduction – Basics of Acoustics – Sound Absorption or Insulation – Green Insulation – Cool Roof, Green Roof, Power Roof – National Standards such as ECBC.

UNIT – IV
STRUCTURAL COMPONENTS:–
Foundations – classification of Foundations – consideration in selection of foundation types –
Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars –

Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures – Components – Construction Procedure – Panel walls – National Standards such as ECBC.

UNIT – V

INTERNAL CONSTRUCTION AND FINISHES

Internal elements – Internal walls – Construction joints – Internal walls, fire protection –separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door sets – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Types of Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion Paints – Whitewash and Colourwash – Application of Paints –Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards such as ECBC.

TEXT BOOKS:

1. Building Material by S K Duggal – New Age International Publishers; Second Edition
2. Building Construction by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain - Laxmi Publications (P) ltd., New Delhi
3. A Textbook on Building Construction by S.K.Sharma, S.ChandPubilishers.
4. Building Materials by M.L.Gambhir, TMH Pubilishers.
5. ECBC (Energy Conservation Building Code).

REFERENCES:

1. Building construction by W.B.Mckay, Vol.I, II, III & IV Pearson Publications, 2013 edition.
2. R.Chudly "Construction Technology – Volumes I and II" 2nd Edition, Longman, UK, 1987.
3. Building materials by S.C.Rangawala, CharotarPubilishing House, Anand- INDIA.
4. Building Construction by S.C.Rangawala, CharotarPubilishing House, Anand- INDIA
5. Building Construction by P.C. Varghese, Prentice-Hall of India private Ltd, New Delhi.
6. BEE (Bureau of Energy Efficiency) Manuals on Energy efficient building envelope concepts.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF CIVIL ENGINEERING
I B.TECH – II SEMESTER (R20)

Subject Code	Title of the Subject	L	T	P	C
	STRENGTH OF MATERIALS-I	2	1	--	3

OBJECTIVE: *The subject provides the knowledge how toresolve forces and moments in a given system, analyze various types of friction for moving bodies, determine the centroid and second moment of area, simple stress strains flexural stresses in members, shear stresses and deflection in beams so that the concepts can be applied to the Engineering problems.*

COURSE OUTCOMES	
CO1	Understand the frictional forces on bodies
CO2	Determine the centroid and moment of inertia for different cross-sections
CO3	Understand the concepts of stress, strain, generalized Hooke's law, elastic moduli and strain energy.
CO4	Develop shear force and bending moment diagrams for different load cases.
CO5	Compute the flexural stresses for different load cases and different cross-sections.

UNIT-I

Introduction to Mechanics: Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space Resultant -Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial systems- Analysis of trusses by Method of Joints & Sections- **Friction**: Types of friction -Limiting friction -Laws of Friction -static and Dynamic Frictions -Motion of Bodies.

UNIT-II

Centroid and Center of Gravity: Introduction – Centroids of rectangular, circular, I, L and T sections - Centroids of built up sections. **Area moment of Inertia**: Introduction – Definition of Moment of Inertia of rectangular, circular, I, L and T sections - Radius of gyration. Moments of Inertia of Composite sections.

UNIT – III

Simple Stresses and Strains:

Types of stresses and strains – Hooke's law – Stress – strain diagram for mild steel – working stress – Factor of safety – lateral strain, Poisson's ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of Varying section – Composite bars – Temperature stresses. Strain energy – Resilience – Gradual, Sudden, impact and shock loadings – simple applications.

UNIT – IV

Shear Force and Bending Moment:

Definition of beam – types of beams – Concept of Shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and over changing beams subjected to point loads, uniformly

distributed load, uniformly varying loads and combination of these loads – point of contra flexure – Relation between S.F, B.M and rate of loading at section of a beam.

UNIT – V

Flexural Stresses:

Theory of simple bending – Assumptions – Derivation of bending equation: M/I = f/Y = E/R – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hallow), I, T, Angle and Channel Sections – Design of simple beam sections.

TEXT BOOKS:

1. R.K Bansal, Engineering Mechanics, Lakshmi Publications.
2. R. Subramanian, Strength of Materials, Oxford University Press.

REFERENCES:

1. Shesagiri Rao, Engineering Mechanics, Universities Press, Hyderabad.
2. S. Timoshenko, D.H. Young and J.V. Rao, Engineering Mechanics, Tata McGraw-Hill Company.
3. R. K. Bansal, Strength of Materials, Lakshmi Publications House Pvt. Ltd.
4. Sadhu Singh, Strength of Materials, Khanna Publishers 11th edition 2015.

B.Tech I Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME01 - ENGINEERING GRAPHICS

(Common to CIVIL,MECHANICAL & CSE)

L	T	P	C
1	0	2	2

Course Objectives:

- To bring awareness that Engineering Drawing is the Language of Engineers.
- To familiarize how industry communicates technical information.
- To teach the practices for accuracy and clarity in presenting the technical information.
- To develop the engineering imagination essential for successful design.
- To train the usage of 2D and 3D modeling

UNIT – 1: Introduction to Engineering Graphics **6 Hrs**

Principles of Engineering Graphics and their significance – Conventions in drawing – Lettering – BIS conventions.

(a) Conic sections including the rectangular hyperbola – general method only.
(b) Cycloids, Epicycloids and Hypocycloids.
(c) Involutes

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand basic principles of engineering graphics (L2)
- Identify the various BIS conventions (L3)
- Draw conic sections used in engineering graphics (L3)
- Draw cycloids and involutes (L3)

UNIT – II: Projection of Points, Lines and Planes **7 Hrs**

Projection of points in any quadrant, Lines inclined to one and both planes, Finding true lengths, Angle made by line. Projections of regular plane surfaces.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of projections. (L2)
- Find the true lengths of line when the line inclined to both the planes. (L5)
- Draw projections of regular plane surfaces (L3)

UNIT – III: Projections of Solids **7Hrs**

Projections of Solids : Projections of regular solids inclined to one and both planes by rotational and auxiliary views method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify 2D projections of regular solids (L1)
- Draw projections of regular solids when inclined to both the planes. (L3)

UNIT – IV: Sections of Solids **7 Hrs**

Section planes and sectional view of right regular solids – Prism, Cylinder, Pyramid and Cone. True shapes of the sections.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use section plane to show the sectional view of regular solids. (L3)
- Draw sectional view of prism and cylinder (L3)
- Draw true shape of sections.(L3)

UNIT – V: Development of Surfaces: **7 Hrs**

Development of surfaces of right regular solids – Prism, Cylinder, Pyramid, Cone and their sectional parts

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand basics of development of surfaces (L1)
- Draw development of surface of prism and cylinder(L3)
- Draw development of surface of cone and their sectional parts(L3)

Text Books:

1. K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2. N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1. Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009.
2. Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009.
3. Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000.
4. K.C.John, Engineering Graphics, 2/e, PHI, 2013.
5. Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Draw various curves applied in engineering. (L3)
- Show projections of Lines, planes and solids. (L1)
- Draw the sections of solids and development of surfaces of solids. (L3)
- Use computers as a drafting tool. (L3)
- Draw isometric and orthographic drawings. (L3)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF CIVIL ENGINEERING
I B.TECH – II SEMESTER (R20)

Subject Code	Title of the Subject	L	T	P	C
	Civil Engineering Workshop	0	0	3	1.5

1) Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape only.

2) Setting out of a building: The student should set out a building (single room only) as per the given building plan using tape and cross staff.

3) Construct a wall of height 50 cm and wall thickness 1½ bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.

4) Construct a wall of height 50 cm and wall thickness 2 bricks using English bond (No mortar required) - corner portion – length of side walls 60 cm.

5) Computation of Centre of gravity and Moment of inertia of a given rolled steel section by actual measurements.

6) Installation of plumbing and fixtures like Tap, T-Joint, Elbow, Bend, Threading etc;

7) Plastering and Finishing of wall

8) Application of wall putty and painting a wall

9) Application of base coat and laying of Tile flooring of one square meter

10) Preparation of soil cement blocks for masonry and testing for compressive strength

11) Casting and testing of Fly ash Blocks

12) Preparation of cover blocks for providing cover to reinforcement



JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS), PULIVENDULA

B.Tech – I Yr II Sem(R20)(R20) **L T P C**

0 0 3 1.5

Engineering Chemistry Lab

(MECH and CIVIL)

Course Objectives:

- To Verify the fundamental concepts with experiments

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of dissolved oxygen by Winklers method.
3. Estimation of Copper by EDTA method.
4. Determination of Strength of an acid in Pb-Acid battery.
5. Estimation of Ferrous Iron by dichrometry.
6. Preparation of a polymer- Bakelite .
7. Determination of percentage of Iron in Cement sample by colorimetry.
8. Estimation of Calcium in port land Cement.
9. Preparation of nanomaterials by precipitation.
10. Adsorption of acetic acid by charcoal.
11. Determination of percentage Moisture content in a coal sample.
12. Determination of Viscosity of lubricating oil by Redwood Viscometer 1.
13. Determination of Viscosity of lubricating oil by Redwood Viscometer 2.
14. Determination of Calorific value of gases by Junker's gas Calorimeter

Course Outcomes:

At the end of the course, the students will be able to

- **determine** the cell constant and conductance of solutions (L3)
- **prepare** advanced polymer materials (L2)
- **determine** the physical properties like surface tension, adsorption and viscosity (L3)
- **estimate** the Iron and Calcium in cement (L3)
- **calculate** the hardness of water (L4)
- **find** calorific values of various fuels, hardness of water samples (L1)

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF CIVIL ENGINEERING
I B.TECH – II SEMESTER (R20)

Subject Code	Title of the Lab	L	T	P	C
	STRENGTH OF MATERIALS LAB	0	0	3	1.5

OBJECTIVE: *The object of the course to make the student to understand the behavior of materials under different types of loading for different types structures.*

COURSE OUTCOMES	
CO1	To acquire the knowledge and behavior in finding the properties of different materials
CO2	An ability to understand the testing procedure of mild steel, HYSD specimens.
CO3	To know the hardness number of different materials
CO4	To know the shear resistance capacity, torsion resistance of mild steel specimens
CO5	Ability to know how to test the strength of wood specimen.

LIST OF EXERCISES:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simple support beam.
4. Torsion test.
5. Hardness test.
6. Spring test.
7. Compression test on wood or concrete
8. Impact test
9. Shear test
10. Verification of Maxwell's Reciprocal theorem on beams.
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

II Year B.Tech. I-Sem (R20)

20ABS13 - COMPLEX VARIABLES, TRANSFORMS & APPLICATIONS TO PARTIAL DIFFERENTIAL EQUATIONS

(Common for MECH & CIVIL)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the student

- To acquire the knowledge on the calculus of functions of complex variables. (L2)
- To acquire the knowledge on Laplace transforms and its applications in solving ordinary differential equations. (L3)
- To expand the given function in Fourier series in a given interval. (L3)
- Evaluate improper integrals of complex functions using Residue theorem. (L3)
- To analyze the solutions of partial differential equations. (L4)

UNIT – 1: Complex Variables – Differentiation:

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations in Cartesian and Polar coordinates (without proof), analytic functions, harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method. Properties of elementary functions of exponential, trigonometric, hyperbolic, and logarithm.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand functions of Complex variable and its properties. L2
- Find derivatives of complex functions. L3
- Understand the analyticity of complex functions. L2

UNIT – II: Complex Variables – Integration:

Line integral-Contour integration, Cauchy's integral theorem (with proof), Cauchy Integral formula, generalized Cauchy Integral formula (All theorems without Proof).

Power series expansions: Taylor's series and Laurent's series (without proof); zeros of analytic functions, singularities.

Residues: Evaluation of residue by formula and by Laurent's series, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi-circle with f(z) not having poles on real axis).

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the integration of complex functions. L2
- Apply Cauchy's integral theorem and Cauchy's integral formula. L3
- Understand singularities of complex functions. L2
- Evaluate improper integrals of complex functions using Residue theorem. L3

UNIT – III: Laplace Transforms:

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of Laplace transforms and finds the Laplace transforms of elementary functions. L2
- Find the Laplace transforms of general functions using its properties. L3
- Understand Laplace transforms of special functions (Unit step function, Unit Impulse & Periodic). L2
- Apply Laplace transforms to solve Differential Equations. L3

UNIT – IV: Fourier series:

Fourier Series : Fourier coefficients (Euler's formulae) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand finding Fourier series expression of the given function. L2
- Determine Fourier coefficients (Euler's) and identify existence of Fourier series of the given function. L3
- Expand the given function in Fourier series given in Half range interval. L3

UNIT – V: Partial Differential Equations & Applications:

Solution of PDEs by Method of separation of variables –Solutions of one dimensional wave equation, one dimensional heat equation and Laplace equation in two dimensions under initial and boundary conditions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the method of separation of variables. L2
- Solve applications of Partial Differential Equations. L3

Text Books:

1. B.S.Grewal, "Higher Engineering Mathematics", Khanna publishers.
2. Erwin Kreyszig, "Advanced Engineering Mathematics", Wiley India

Reference Books:

1. B.V.Ramana, "Higher Engineering Mathematics", McGraw Hill publishers.
2. Alan Jeffrey, "Advanced Engineering Mathematics", Elsevier.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the analyticity of complex functions and conformal mappings. L1
- Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours. L3
- Understand the usage of Laplace Transforms. L2
- Evaluate the Fourier series expansion of periodic functions. L3
- Formulate/solve/classify the solutions of Partial differential equations and also find the solution of one dimensional wave equation and heat equation. L4

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
B.Tech (R-20 Civil Engineering)
Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	STRENGTH OF MATERIALS – II	2	1	--	3

Course Objectives

1) To teach the student with basic concepts for determination of principal stresses and strains in various structural elements.
2) To demonstrate analytical methods for determining strength & stiffness and assess stability of structural members.
3) To make the student analyze circular shafts subjected to torsion
4) To make the student determine critical loads for columns with different end conditions.

UNIT-I

Compound Stresses and Strains:

Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, and its applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain.

Unit Outcomes:

- Identify critical planes in two dimensional stress systems
- Estimate principals stresses
- Assess safety of structural elements under principal stresses

UNIT -II

Torsion:

Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft – Torsional moment of resistance – Polar section modulus – power transmission through shafts – Combined bending and torsion –. Springs - Types of springs – deflection of close coiled helical springs under axial pull and axial couple – Carriage or leaf springs.

Unit Outcomes

- Analyze members subjected to torsion, combined torsion and bending moment
- Calculate power transmission through shafts
- Estimate energy absorption in springs.

UNIT -III

Combined Direct and Bending stresses:

Introduction-eccentric loading – Columns with eccentric loading – Symmetrical columns with eccentric loading about one axis –about two axes – Unsymmetrical columns with eccentric loading – limit of eccentricity.

Theories of failure:

Maximum Principal stress theory- Maximum shear stress theory- Maximum strain theory- Maximum strain energy theory-Maximum distortion energy theory

Unit Outcomes:

- To know about the effect of eccentricity effect in columns
- To know about the various theories of failures

UNIT -IV

Deflection of Beams:

Uniform bending – slope, deflection and radius of curvature – Differential equation for elastic line of a beam – Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. uniformly varying load-Mohr's theorems – Moment area method – application to simply supported and overhanging beams-

Propped cantilevers:

Analysis of propped cantilever beams under UDL and point loads.

. **Unit Outcomes:**

- Understand types of loads acting on beams
- Compute slopes and deflections of beams with different boundary conditions
- Evaluate effect of different loads on propped cantilever beams

UNIT -V

Columns and Struts:

Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Eccentric loading and Secant formula – Prof. Perry's formula.

Unit Outcomes

- Classify columns
- Understand Euler's theory on columns and assess crippling loads
- Analyze compression members using different theories
- Assess load carrying capacity using different formulae

TEXT BOOKS:

1. Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.
2. Strength of Materials by R.K Rajput, S.Chand & Company Ltd.
3. Strength of materials by Dr. Sadhu Singh, Khanna Publishers.

REFERENCES:

1) R. K. Bansal, A Text book of Strength of materials, Laxmi Publications (P) Ltd., New Delhi.
2) Strength of Materials, Fourth edition, S.S. Bhavikatti, Vikas Publishing House, Pvt. Ltd.
3) D. S. Prakasa Rao Strength of Materials by, Universities Press Pvt Ltd, Hyderabad.
4) Schaum's outline series Strength of Materials, Mc Graw hill International Editions.
5) L.S. Srinath, Strength of Materials, Macmillan India Ltd., New Delhi.
6) S. Basavarajaiah and P. Mahadevappa, Strength of Materials in SI units, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2010.

Course Outcomes:

On completion of the course, the student will be able to:

- Understand principal stresses and principal planes.
- Determine deflection at any point on a beam under simple and combined loads
- Analyze members under torsion, deformation in springs,
- Know the effect of eccentricity of load in columns, apply failure criteria to implement in design of structural members.
- Know the crippling load for the columns.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
B.Tech (R-20 Civil Engineering)

Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	FLUID MECHANICS	2	1	0	3

Course Objectives:

To explain concepts of fluid mechanics used in Civil Engineering.

1) To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
2) To impart ability to solve engineering problems in fluid mechanics
3) To enable the students measure quantities of fluid flowing in pipes, tanks and channels
4) To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
5) To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

UNIT -I:

Basic concepts and definitions:

Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapor pressure, boiling point, surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Fluid statics:

Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Unit Outcomes :

Student will be able to

1. Understand basic characteristics of fluids
2. Understand Newton's Law of Viscosity
3. Understand concepts of fluid statics
.4. Demonstrate stability of floating bodies

UNIT -II:

Fluid kinematics:

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three -dimensional continuity equations in Cartesian coordinates.

Unit Outcomes :

Student will be able to

Understand fundamentals of fluid kinematics

- Understands different types of fluid flows
- Derivation of Continuity equations of using Cartesian coordinates

UNIT -III:

Fluid Dynamics:

Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

Unit Outcomes :

Student will be able to

Demonstrate applications of Bernoulli's equations

- Experiment with different equipments under fluid flow
- Apply principles of fluid dynamics along with governing equations.

UNIT -IV:

Analysis Of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

Unit Outcomes :

Student will be able to

Estimate Energy losses in pipelines

- Determine flow characteristics through Pipes.

Unit-V

DIMENSIONAL ANALYSIS: Introduction, dimensions Dimensional homogeneity, Methods of dimensional analysis- Rayleigh's method Buckingham Pi theorem, model analysis, similitude-types of similarities. Dimensionless numbers. Model laws Partially submerged objects types of models, Scale effect

BOUNDARY LAYER THEORY & DRAG AND LIFT: Boundary layer - concepts. Prandtl's contribution, Characteristics of boundary layer along a thin flat plate laminar and turbulent Boundary layers, separation of BL. expression for drag and lift Lift and Drag Coefficients, pressure drag and friction drag, Streamlined and bluff bodies

Unit Outcomes :

Student will be able to

Under stand dimensional analysis

Under stand boundary layer theory and its charcterstics

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.

REFERENCES:

1. Fluid Mechanics and Hydraulic Machines, S.C.Gupta, Pearson publication
2. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi.
3. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill
4. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
5. K. Subramanya, Open Channel flow, Tata Mc.Grawhill Publishers.
6. S K SOM and G Biswas, "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw Hill,New Delhi

Course Outcomes:

At the end of the course, the student will be able to:

- Understand the principles of fluid statics, kinematics and dynamics
- Familiarize basic terms used in fluid mechanics
- Understand flow characteristics and classify the flows
- Apply the continuity, momentum and energy principles
- Estimate various losses in flow through channels

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
B.Tech (R-20 Civil Engineering)
Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	SURVEYING	2	1	--	3

Course Objectives:

- To make the student to get well conversant with the fundamentals of various basic methods and instruments of surveying.
- To introduce to the students in identifying reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings.
- To make the student to use angular measuring instruments for horizontal and vertical control.
- To enable the student to set simple horizontal curves.
- To introduce the knowledge construction surveys and usage of modern instrument such as total station.

UNIT – I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying. Measurement of Distances and Directions Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods- E.D.M. method.
Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip.
Plane table surveying: Introduction, accessories, setting up of plane table, techniques, testing, adjustments, errors, advantages and disadvantages.

Unit Outcomes

- To impart basic concepts of surveying.
- To introduce the usage and applications of linear and angular measurements through chain, tape, compass and plane table.

UNIT - II

Levelling - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.
Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.
Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary, Planimeter. Volumes - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

Unit Outcomes

- To impart basic principles in levelling and contouring.
- To calculate the areas of irregular boundaries and volumes of earth work quantities.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.
Traversing: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

Unit Outcomes

- To impart basic principles in Trigonometric levelling.
- To inculcate the knowledge of traversing.

UNIT - IV

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves.

Unit Outcomes

- To impart basic principles in Tacheometric surveying.
- To inculcate the knowledge of simple horizontal circular curve setting.

UNIT - V

Construction surveys: Introduction-staking out buildings-pipelines and sewers-highways-culverts. Bridge surveys-determining the length of a bridge-locating centres of piers- surface surveys and tunnel alignment-underground surveys-connection of surface and underground surveys-levelling in tunnels.

Total station Surveying: Basic principles, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments.

Unit Outcomes:

- To induce the knowledge of construction surveying.
- To inculcate the knowledge of advanced surveying instrument such as total station.

Text Books:

1. S.S Bhavikatti, "Surveying theory and Practice", 2nd edition, Dreamtech press, Wiley distributors.
2. C.Venkatramaiah, "Text book of surveying", 2nd edition, Universities press, 2018

References:

1. Arthur R Benton and Philip J Taety, "Elements of Plane Surveying", McGraw Hill – 2000.
2. Arora K R "Surveying" Vol 1, 2 & 3, Standard Book House, Delhi, 2004.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain,"Surveying" (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Bhavikatti "Surveying" Vikas publishing house ltd.
6. S K Duggal, "Surveying" (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. R. Agor Khanna Publishers 2015 "Surveying and leveling".
8. R. Subramanian, "Surveying and levelling" Oxford university press, New Delhi.
9. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
10. S.S Bhavikatti "Surveying and Levelling", Vol. 1 and 2, Dreamtech press, Wiley distributors.
11. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System – "Theory and Practice", Springer -Verlag Publishers, 2001.

Course Outcomes:

At the end of the course, the student will be able to:

- Calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments
- Estimate the volumes of earth work
- Able to use modern survey instruments.

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B.Tech (R-20 Civil Engineering)

Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	CONCRETE TECHNOLOGY	3	0	0	3

Course Objectives:

- Lot of advances is taking place in the concrete technology as par with development taking place in the engineering.
- The present day industry needs the knowledge of concrete technology thoroughly.
- The subject is designed to give the basic knowledge as well as latest developments in concrete technology.

UNIT I
CEMENTS ,CONCRETE AND ITS INGREDIENTS :
Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures. AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

Unit Outcomes
- List different ingredients of concrete
- Conduct tests on materials
- Explain characteristics of water
- Understand conformity to IS Codes

UNIT – II
FRESH & HARDENED CONCRETE:
Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.Water / Cement ratio – Abram"s Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compressive & tensile strength - Curing.Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests –

Unit Outcomes
- List various properties of fresh concrete
- Conduct experiments for determination of fresh concrete properties
- List various properties of hardened concrete
- Conduct experiments for determination of hardened concrete properties • Carryout Non Destructive tests on Concrete

UNIT – III
ELASTICITY, CREEP & SHRINKAGE:– Modulus of elasticity – Dynamic modulus of elasticity – Poisson"s ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of

creep – Effects of creep – Shrinkage – types of shrinkage. Introduction to Non-destructive testing methods – Rebound Hammer – Ultra Pulse Velocity method – Pullout - Codal provisions for NDT

Unit Outcomes

- Understand curing methods and its importance
- Understand phenomenon of shrinkage and creep of concrete.
- Evaluate factors influencing creep and concrete

UNIT – IV.

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

Unit Outcomes

- Study properties of concrete mixes
- Design concrete mixes using different methods
- Estimate quantities for target strength of concretes

UNIT – V

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – Bacterial concrete(self healing concrete)

Unit Outcomes

- Label different types of special concretes with the objectives
- Understand properties of special concretes.

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004

REFERENCES:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete: Micro structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, McGraw Hill Publishers
3. Design of Concrete Mix by Krishna Raju, CBS pubilishers.

Course Outcomes:

After completing the course, the student should be able to do the following:

1. The students should be able to check and recommend different constituent of concrete.
2. The students should be able to test strength and quality of plastic and set concrete.
3. The students should have understanding of application admixture and its effect on properties of concrete.
4. The students should be able to design mix of concrete according to availability of ingredients and design needs.
5. The students should be able to test various strength of concrete by destructive and nondestructive testing method

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AHS03 - UNIVERSAL HUMAN VALUES

(Common to all branches)

L	T	P	C
3	0	0	0

Course Objectives:

- Exposure to the value of life, society and harmony.
- Leading towards holistic perspective based on self-exploration about themselves (human being), family, and society and nature/existence.
- Bringing transition from the present state to Universal Human Order.
- Instill commitment and courage to act.
- Know about appropriate technologies and management patterns.

UNIT –I : HUMAN VALUES 12 Hrs

Importance of UHV- Morals-Values –Ethics- definitions and differences-Integrity-Work Ethic-Service learning –Respect for others –Caring and Sharing – Honesty – self confidence-Courage-Co Operation –Commitment – Empathy –Character-Spirituality- Moral dilemmas.

Learning Outcomes:

At the end of this unit, the student will be able to

Understand the concept of morals, Ethics. **L1**

Able to analyse Moral dilemmas. **L2**

UNIT – II: PERSONALITY DEVELOPMENT 12 Hrs

Concept Of Personality- Types-Determinants-Intrapersonal Skills-meaning-types- Techniques -Interpersonal Skills- meaning-types- Techniques-SWOT Analysis -Building Right Attitude.-Communication skills-Non Verbal Communication skills.

Learning Outcomes:

At the end of this unit, the student will be able to

Analysing SWOT. **L1**

Knowing about self personality. **L2**

UNIT – III : ENGINEERING AS EXPERIMENTATION 12 Hrs

Engineering as an Experimentation-Engineers as Responsible Experimenters -Codes Of Ethics and Industrial Standards-Case Study: The Challenger-Confidentiality-Conflicts of Interests-Risk and Analysis methods-Safety and Safety Measures.

Learning Outcomes:

At the end of this unit, the student will be able to

Understand the concept of Ethics in industry. **L1**

Able to assesment safety standards. **L2**

UNIT – IV : FAMILY AND SCOCIETY **12 Hrs**

Family -Importance –Types-Functions-Influences and generation gap- Premarital counseling-Good family-Characteristics-Building a healthy family- Parents and Children -Honouring Parents-Society Definition—Types-Roles-Responsibilities-Social Evils-reasons-remedies.

Learning Outcomes:

At the end of this unit, the student will be able to

Development of a holistic perspective based on self-exploration about themselves. **L1**

Strengthening of self-reflection. **L2**

UNIT – V : GLOBAL ISSUES **12 Hrs**

Globalization: Globalization-MNCs-Technology-Cross culture issues- Environmental Ethics-Disasters- global pandemics-Computer Ethics and Net Etiquettes -Human and Employee Rights-Weapons Development -Ethics and Research-Intellectual Property Rights(IPR).

Learning Outcomes:

At the end of this unit, the student will be able to

Understand various cross culture issues. **L1**

Identifying Employee Rights. **L2**

Text Books:

1. **"Engineering Ethics" by Harris, Pritchard and Rabins, CENGAGE Learning, India Edition, 2009.**
2. **Engineering Ethics includes Human Values" by M.Govindarajan, S.Natarajan and V.S.SenthilKumar-PHI Learning Pvt. Ltd-2009.**
3. **"Ethics in Engineering" by Mike W. Martin and Roland Schinzinger – Tata McGrawHill– 2003.**
4. **"Professional Ethics and Morals" by Prof.A.R.Aryasri, Dharanikota Suyodhana Maruthi Publications.**
5. **"Professional Ethics and Human Values" by A.Alavudeen, R.Kalil Rahman and M.Jayakumaran- Laxmi Publications.**

Reference Books:

1. **"Indian Culture, Values and Professional Ethics" by PSR Murthy-BS Publication.**
2. **"Professional Ethics and Human Values" by Prof.D.R.Kiran.**

Course Outcomes:

At the end of this Course the student will be able to

- Define terms like Natural Acceptance, Happiness and Prosperity. **L1**
- Know about appropriate technologies and management patterns Understand awareness of oneself, and ones surroundings (family, society, nature). **L2**
- Apply what they have learnt to their own self in different day-to-day settings in real life. **L3**
- Relate human values with human relationship and human society. **L4**
- Justify the need for universal human values and harmonious existence. **L5**

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COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
B.Tech (R-20 Civil Engineering)

Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	CONCRETE TECHNOLOGY LABORATORY	0	0	3	1.5

Course Objective *To know the concept and procedure of different type of tests to be conducted on cement, aggregate and finished concrete and designing the concrete mix of given specification of its ingredients along with appropriate water cement ratio and admixtures.*

SYLLABUS:

1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement.
4. Soundness of cement.
5. Compressive strength of cement.
6. Workability test on concrete by compaction factor,
7. Workability test on concrete by slump
8. Workability test on concrete by Vee-bee test
9. Young's modulus and compressive strength of concrete.
10. Specific Gravity and Water Absorption of Coarse aggregate.
11. Bulking of Fine aggregate.
12. Non-Destructive testing on concrete (for demonstration)
13. Fineness modulus of sand and importance of zoning
14. Bulk density of Coarse Aggregate.
15. Bulk density of Fine Aggregate.

Course outcomes	
CO 1	*To be able to determine the importance of testing of cement and its properties*
CO 2	*To be able to assess the different properties of aggregate*
CO 3	*To be able to summarize the concept of workability and testing of concrete*
CO 4	*To be able to assess the properties of hardened concrete*

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COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
B.Tech (R-20 Civil Engineering)

Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	SURVEYING LAB -I	-	-	3	1.5

Course objectives:

OBJECTIVE: To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

LIST OF EXERCISES:

(1) Survey of an area by chain survey (Closed traverse) & Plotting
(2) Chaining across obstacles
(3) Determination of distance between two inaccessible points with compass.
(4) Surveying of a given area by prismatic compass (Closed traverse) and plotting after adjustment.
(5) Radiation method, intersection methods by plane Table survey
(6) Two point and three point problems in plane table survey.
(7) Traversing by plane table survey
(8) Fly leveling (differential leveling)
(9) An exercise of L.S. and C.S. and plotting.
(10) Two exercises on contouring.
(11) Introduction to theodolite

Course Outcomes:

By performing the various experiments on field in this laboratory the student will be able to know the principles of surveying in chain surveying, compass surveying, plane table surveying, levelling.

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COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
B.Tech (R-20 Civil Engineering)

Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
-	**Computer Aided Drafting Lab**	0	0	3	1.5

Course Objectives:

LIST OF EXERCISES:

1. Introduction to computer aided drafting
2. Software for CAD – Introduction to different software‘s
3. Practice exercises on CAD software
4. Drawing of plans of buildings using software for Single storied buildings
5. Drawing of plans of buildings using software for multi storied buildings
6. Developing sections and elevations for Single storied buildings
7. Developing sections and elevations for multi storied buildings
8. Detailing of building components like Doors, Windows, Roof Trusses etc. using CAD software
9. Exercises on development of working of buildings

Course outcome

After completion of the course

1. A student will able to know how to apply engineering drawing using computers
2. A student can understand about the scope of Auto CAD software
3. A student will know what is plan and how it should drawn in auto CAD software.

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COLLEGE OF ENGINEERING (Autonomous), PULIVENDULA
B.Tech (R-20 Civil Engineering)

Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	Building Planning and Drawing	1	0	2	2

OBJECTIVE: *This subject provides the knowledge of building by laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.*

PART-A

UNIT -I

PLANING OF BUILDINGS: Types of buildings, types of residential buildings, site selection for residential building, orientation of buildings; aspect; prospect; privacy; furniture requirement;grouping;circulation;sanitation;lighting;ventilation;cleanliness;flexibility;elegancy;Economy; practical considerations.

BUILDING BYELAWS AND REGULATIONS: Introduction- Terminology ;Objectives of building byelaws; Minimum plot sizes; Open space requirements ;Plinth area, floor area, carpet area; Floor area ratio (FAR), Floor space Index (FSI) ;areas for different units; Principles underlying building byelaws ; built up area limitations – Height of Buildings ,Wall thickness, lighting and ventilation requirement, safety from fire, drainage and sanitation; applicability of the bye-laws.

UNIT –II

PLANNING OF RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings

PLANNING OF PUBLIC BUILDING: Planning of Educational institutions, Hospitals, Office buildings, Banks, Industrial buildings, Hotels and Motels, Hostels, Bus Station.

UNIT -III

BUILDINGS: SAFETY AND COMFORT: aspects of safety-structural, health, fire and constructional safety. Components of building automation system - HVAC, electrical lighting, Security, fire-fighting, communication etc. design for thermal comfort, ventilation comfort, air conditioning comfort, lighting comfort, noise and acoustic comfort.

PART-B

UNIT -IV

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, and white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond; odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

DOORS WINDOWS, VENTILATORS AND ROOFS: Paneled Door – paneled and glazed door; glazed windows – paneled windows; Swing ventilator – Fixed ventilator; Couple roof – Collar roof; Kind Post truss – Queen post truss.

UNIT –V

Given line diagram with specification to draw plan, section and elevation of the following :

1. Residential Building
2. Hospital
3. Schools
4. Post office
5. Corporate Office Building
6. Hotels
7. Bank buildings
8. Bus stations
9. Industrial buildings

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part- A and Part-B. Part- A consists of three questions with either or choice from three units in planning portion .Each question carries 10 marks. Total marks for Part-A is 30 marks. Part- B consists of two questions with either or choice from drawing portion. Question from unit-IV carries 10 marks and question from unit-V carries 30 marks. Total marks for Part-B is 40 marks.

TEXT BOOKS:

1. Planning and Designing and Scheduling – Gurucharan Singh and Jagadish Singh- Standard publishers.

2. Building Planning and Design – N.Kumara Swamy and A.Kameswara Rao. Charotar publications.

REFERENCE:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code

2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill

COURSE OUTCOMES

1. The scope of this course is to introduce the concepts of building planning and drawing with emphasis on architectural planning.
2. This subject is designed as an introduction for subjects who wish to develop their competence and skills in the preparation of architectural and building drawings.
3. Able to know the requirements of different rooms and characteristics of various types of residential buildings.
4. Able to know about building byelaws and regulations.
5. Ability to draw line sketch and planning and bi section of a building

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
II Year B.Tech. II-Sem (R20)
20ABS15 - NUMERICAL METHODS, PROBABILITY AND STATISTICS
(Common to CIVIL, ME, EEE & CSE)

L	T	P	C
3	0	0	3

Course Objectives:

- To familiarize the students with numerical methods of solving the non-linear equations, interpolation, differentiation, integration, and ordinary differential equations.
- To impart knowledge in basic concepts and few techniques in probability and statistics in various applications in engineering.

UNIT – 1: Solution to algebraic and transcendental equations& Interpolation:
Solution of algebraic and transcendental equations: bisection method, Newton-Raphson method and Regula-Falsi method, Finite differences, relation between operators, interpolation using Newton's forward and backward difference formulae. Interpolation with unequal intervals: Newton's divided difference and Lagrange's formulae.

Learning Outcomes:
At the end of this unit, the student will be able to

- find approximate roots of the an equation by using different numerical methods L2
- explain various discrete operators and find the relation among operators L2
- apply Newton forward and backward formulas for equal and unequal intervals L3

UNIT – II: Numerical differentiation, integration & Solution of Initial Value Problems to Ordinary Differential Equations of first order:
Numerical Differentiation and Numerical integration: Numerical differentiation using Newton's forward & backward interpolation formulae; Numerical Integration by trapezoidal rule, Simpson's $1/3^{rd}$ and $3/8^{th}$ rules.
Numerical Solutions of Ordinary differential equation: Solution by Taylor's series, Picard's method of successive approximations, Euler's method, modified Euler's method and Runge-Kutta method of fourth order.

Learning Outcomes:
At the end of this unit, the student will be able to

- find integration of a function by different numerical methods L3
- solve ordinary differential equations using different numerical schemes L3

UNIT – III: Probability & Random Variables:
Probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem.
Random variables (discrete and continuous), probability distribution: Binomial - Poisson approximation to the binomial distribution and normal distribution-their properties. (All concepts without proofs)

Learning Outcomes:
At the end of this unit, the student will be able to

- explains the basic concepts of probability theory and elementary theorems on probability. L2
- applies the knowledge of discrete random variable and continuous random variable and the respective probability distributions. L3

UNIT – IV: Testing of hypothesis:
Formulation of hypothesis, critical region, level of significance. Large sample tests: test for single proportion, difference of two proportions, test for single mean and difference of two means.

Learning Outcomes:

At the end of this unit, the student will be able to

- explain the concept of testing of hypothesis L2
- apply the concept of hypothesis testing for large samples L3

UNIT – V: Small Sample Tests:

Student t-distribution (single mean, two means and paired t-test), Testing of equality of variances (F-test), $\chi 2$ - test for independence of attributes and goodness of fit.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply the concept of testing hypothesis for small samples L3
- apply the concept of hypothesis testing for large samples and estimate the goodness of fit L3

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008
3. S.S.Sastry, "Introductory methods of Numerical Analysis", 5th edition, PHI, 2012.
4. Advanced Engineering Mathematics, R K Jain and S R K Iyengar, Narosa Publishing House, New Delhi.

Reference Books:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons publications, 2012.
2. Erwin kreyszig, Advanced Engineering Mathematics, 9/e, John Wiley & Sons, 2006.
3. P. Kandasamy, K. Thilagavathy, S. Gunavathy, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.

Course Outcomes:

At the end of this Course the student will be able to

- apply different methods to find roots of the equations and find approximate the solutions of ordinary differential equations **L3**
- apply the Laplace transform for solving differential equations **L3**
- explain the concepts of probability and their applications **L3**
- apply discrete and continuous probability distributions in practical problems **L4**
- use the statistical inferential methods based on small and large sampling tests **L3**

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JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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B.Tech (R-20 Civil Engineering)

Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	ENGINEERING GEOLOGY	3	0	0	3

Course LearningObjectives:

The objective of this course is:

- To introduce the course: Engineering Geology to the Civil Engineering graduates.
- To enable the students, understand what minerals and rocks are and their formation and identification.
- To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures
- To enable the student, realise its importance and applications of Engineering Geology in Civil Engineering constructions.

UNIT – I

INTRODUCTION:

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS : Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"

MINERALOGY:

Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT OUTCOMES :

Understand importance of geology in civil engineering

Understand how different rocks are formed and the minerals presents in rocks

UNIT – II

PETROLOGY:

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY:

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT OUTCOMES :

Understand different types of structures in geological formations

Understand geological classification of rocks and their structures and textures

UNIT – III

GROUND WATER, EARTH QUAKE & LAND SLIDES:-

Ground water, Water table, common types of ground water, springs, cone of depression, geological controls of ground water movement, ground water exploration. Earth quakes, their causes and effects, shield areas and seismic belts. Seismic waves, Richter scale, precautions to be taken for building construction in seismic areas. Land slides, their causes and effect; measures to be taken to prevent their occurrence. Importance of study of ground water, earth quakes and land slides.

UNIT OUTCOMES :

Obtain knowledge on ground water, earth quakes and land slides

Understand the effects due to land slides and earthquakes

UNIT –IV

GEOPHYSICAL STUDIES:-

Importance of Geophysical studies Principles of geophysical study by Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Special importance of Electrical resistivity methods, and seismic refraction methods. Improvement of competence of sites by grouting etc.

UNIT OUTCOMES :

Knowledge on geophysical studies

Understand the principles used for geophysical studies

UNIT – V

GEOLOGY OF DAMS, RESERVOIRS AND TUNNELS :

Types of dams and importance of Geology of site in their selection, Geological Considerations in the selection of a dam site. Analysis of dam failures of the past. Factor's Contributing to the success of a reservoir. Geological factors influencing water Lightness and life of reservoirs. Purposes of tunneling, Effects of Tunneling on the ground Role of Geological Considerations (ie. Tithological, structural and ground water) in tunneling over break and lining in tunnels.

UNIT OUTCOMES :

Understand the need of geology in site selection

Understand the effects failures of structures

TEXT BOOKS:

1) Engineering Geology by N.Chennkesavulu, Mc-Millan, India Ltd. 2005

2) Engineerring Geology by Vasudev Kanthi, Universities press, Hyderabad.

REFERENCES:

1. Engineerring geology by Prabin singh, Katson Pubilcations
2. Engineering geology by Duggal, TMH Publishers.
3. Engineering Geology by Subinoy Gangopadhyay, Oxford University press.
4. Principals of Engineering Geology by K.V.G.K. Gokhale – B.S publications
5. K. S. Valdiya, " Environmental Geology",, Tata Mc Graw Hill.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify and classify the geological minerals
- Measure the rock strengths of various rocks
- Classify and measure the earthquake prone areas to practice the hazard zonation
- Classify, monitor and measure the Landslides and subsidence
- Prepares, analyses and interpret the Engineering Geologic maps
- Analyses the ground conditions through geophysical surveys.
- Test the geological material and ground to check the suitability of civil engineering project construction

. • Investigate the project site for mega/mini civil engineering projects. Site selection for mega engineering projects like Dams, Tunnels, disposal sites etc.

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	STRUCTURAL ANALYSIS – I	2	1	0	3

Course Learning Objectives:

- To give preliminary concepts of assessment of bending moment and shear force in fixed beams and continuous beams due to various loading conditions.
- To impart concepts of Bending Moment and Shear force for beams with different boundary and loadingconditions
- The procedure for development of slope deflection equations and moment distribution method and to solve application to continuous beams with and without settlement ofsupports

UNIT – I

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT OUTCOMES

- Understand Energy concepts
- Develop expression for strain energy due to axial load Bending moment and shear force
- Calculate deflections in simple beams and pin joined trusses
- Analyze simple structural elements using energy principles.

UNIT – II

ANALYSIS OF INDETERMINATE STRUCTURES : Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's theorem.

UNIT OUTCOMES

- Differentiate determinate and indeterminate structures
- Understand static and kinematic indeterminacies
- Solve truss problems

UNIT – III

FIXED BEAMS & CONTINUOUS BEAMS : Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT OUTCOMES

Unit Outcomes

- Categorize fixed and continuous beams and their performance
- Understand different loads on beams with different boundary conditions.
- Analyze the beams subjected to loads
- Study effect of sinking of supports of performance

UNIT – IV

SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations- application to continuous beams with and without settlement of supports - Analysis of single bay portal frames without sway **UNIT OUTCOMES**

. • Develop slope deflection expressions

• Analyze structures with and without support sinking

• Analyze 2D frames using slope-deflection method.

UNIT – V

MOMENT DISTRIBUTION METHOD: Introduction to moment distribution method- Application to continuous beams with and without settlement of supports-Analysis of single bay storey portal frames without sway .

UNIT OUTCOMES

• Develop moment distribution expressions

• Analyze structures with and without support sinking

• Analyze single storey portal frames

TEXT BOOKS:

(1) Analysis of Structures – Vol-I&II by V.N.Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.

(2) Structural Analysis by S S Bhavikatti – Vikas Publishing House.

(3) Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

REFERENCES :

(1) Structural analysis – Hibbler – Pearson education

(2) Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.

(3) Structural Analysis – D.S.Prakasa rao - Univeristy press.

(4) Introduction To Structural Analysis-Nautial- New Age Pubilishers

(5) Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, NewDelhi.

(6) Structual analysis Vol.I and II by Dr. R.Vaidyanathan and Dr.P Perumal – Laxmi publications.

(7) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	HYDRAULICS AND HYRAULIC MACHINERY	2	1	0	3

Course Objectives:

1) To Introduce concepts of laminar and turbulent flows
2) To teach principles of uniform and non-uniform flows through open channel.
3) To impart knowledge on design of turbines.
4) To impart knowledge on design of pumps.

UNIT -I:

Laminar & Turbulent flow in pipes:

Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram – Introduction to boundary layer theory.

Unit Outcomes

- Understand Laminar Flow through plates
- Understand Turbulent flow and transition
- Apply energy and momentum principles to fluid flow situations
- Solve problems for forces in static and moving fluids

UNIT -II:

Uniform flow in Open Channels:

Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Hydraulically efficient channel sections: Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors.

Unit Outcomes

- Differentiate open and closed channel flows
- Understand different formulae on open channel flow
- Design open-channel flow systems.

UNIT III:

Non-Uniform flow in Open Channels:

Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

Unit Outcomes

- Understand the concepts of varying flow in pipes
- Measure discharge and velocity
- Understand gradually varied flow
- Solve introductory problems of forces and dynamics

UNIT -IV:

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - velocity triangles at inlet and outlet - Work done and efficiency

Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects.

Unit Outcomes

- Understand hydrodynamic force of jets different vanes
- Calculate efficiency of jets
- Understand and design Pelton wheel, Francis and Kaplan turbine

UNIT -V:

Pumps:

Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies .

Unit Outcomes

- Understand principles of centrifugal pumps
- Calculate losses and efficiencies of centrifugal pumps
- Design centrifugal pumps including multi stage pumps.

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. K. Subramanya, Open channel Flow, Tata McGraw Hill.

REFERENCES:

1. Rajput, Fluid mechanics and fluid machines , S. Chand & Co
2. D. S. Kumar Fluid Mechanics & Fluid Power Engineering, Kataria & Sons.
3. Srinivasan, Open channel flow by, Oxford University Press
4. Banga & Sharma, Hydraulic Machines, Khanna Publishers.
5. Fluid Mechanics and Hydraulic Machines, S.C.Gupta, Pearson publications,
6. R.K. Bansal, "A Text book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi

Course Outcomes:

At the end of the course, the student will be able to

- Understand characteristics of laminar and turbulent flows.
- Analyze characteristics for uniform and non-uniform flows in open channels.
- Design different types of turbines
- Design centrifugal and multi stage pumps.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AHS04 - MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- To inculcate the basic knowledge of micro economics and financial accounting.
- To make the students learn how demand is estimated for different products, input- output relationship for optimizing production and cost.

UNIT – I

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the nature and scope of Managerial Economics and its importance. **L1**
- Understand the concept of demand and its determinants. **L2**

UNIT – II

Theory of Production: Production Function- Isoquants and Isocosts, MRTS, Cobb-Douglas Production function.

Cost Analysis: Cost concepts, Opportunity cost, Fixed Vs Variable costs, Explicit costs Vs. Implicit costs, Out of pocket costs vs. Imputed costs. Break even analysis -Determination of Break-Even Point (simple problems) - Managerial Significance and limitations of BEP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the production function, Input-Output relationship and different cost concepts. **L1**
- Apply the least-cost combination of inputs. **L2**

UNIT – III

Introduction to Markets: Market structures: Types of competition, Features of Perfect Competition, Monopoly and Monopolistic Competition. Price-Output Determination under Perfect Competition, Monopoly, Monopolistic Competition.

Pricing Policies: Methods of Pricing-Marginal Cost Pricing, Limit Pricing, Market Skimming Pricing, Penetration Pricing, Bundling Pricing, and Peak Load Pricing. Internet Pricing Models: Flat rate pricing, Usage sensitive pricing, Transaction based pricing, Priority pricing, charging on the basis of social cost, Precedence model, Smart market mechanism model.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the price output relationship in different markets. **L1**
- Evaluate price-output relationship to optimize cost, revenue and profit. **L2**

UNIT – IV

Types of Industrial Organization: Characteristic features of Industrial organization, Features and evaluation of Sole Proprietorship, Partnership, Joint Stock Company, State/Public Enterprises and their types.

Capital Budgeting: Introduction to capital, Meaning of capital budgeting, Need for capital budgeting – Capital budgeting decisions (Examples of capital budgeting) - Methods of Capital Budgeting: Payback Method, Accounting Rate of Return (ARR), IRR and Net Present Value Method (simple problems).

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the concept of capital budgeting and its importance in business. **L1**
- Contrast and compare different investment appraisal methods. **L2**

UNIT – V

Introduction to Financial Accounting: Introduction to Double-entry system, Journal, Ledger, Trial Balance- Final Accounts (with simple adjustments) - Limitations of Financial Statements.

Interpretation and analysis of Financial Statement: Ratio Analysis – Liquidity ratios, Profitability ratios and solvency ratios – Preparation of changes in working capital statement and fund flow statement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the concept, convention and significance of accounting. **L1**
- Apply the fundamental knowledge of accounting while posting the journal entries. **L2**

Text Books:

1. **J.V. Prabhakar Rao**: Managerial Economics and Financial Analysis, Maruthi Publications, 2011.
2. **Prof. C.Viswanatha Reddy:** 'Financial Accounting-1' Himalaya Publishing House, Newdelhi.

Reference Books:

1. **A R Aryasri** - Managerial Economics and Financial Analysis, TMH 2011.
2. **Suma damodaran**- Managerial Economics, **Oxford** 2011.
3. **S.A. Siddiqui & A.S. Siddiqui**, Managerial Economics and Financial Analysis, New Age International Publishers, 2011.
4. **N. Appa Rao. & P. Vijaya Kumar**: 'Managerial Economics and Financial Analysis', Cengage Publications, New Delhi, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Be able to perform and evaluate present worth, future worth and annual worth analyses on one of more economic alternatives. **L1**
- Be able to perform and evaluate payback period and capitalized cost on one or more economic alternatives. **L2**
- Be able to carry out and evaluate benefit/cost, life cycle and breakeven analyses on one or more economic alternatives. **L3**
- Evaluate the capital budgeting techniques. **L4**
- Students can analyze how to invest their capital and maximize returns. **L5**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AHS05 - ENTERPRENUARSHIP AND INNOVATION MANAGEMENT

(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- To enable students understand the opportunities available to start a business.
- To impart knowledge about various sources of support (Financial and Non-financial) available to start an enterprise.

UNIT – 1: FUNDAMENTALS OF ENTREPRENEURSHIP

Fundamentals of Entrepreneurship – Evolution and Theories of Entrepreneurship – Characteristics of Entrepreneurs –Myths of Entrepreneurship – Kakinada Experiment -Elements of leadership –Role of Entrepreneurs in Indian economy – Social and Ethical Perspectives of Entrepreneurship - Corporate entrepreneurship – Social Entrepreneur, women Entrepreneurship - Opportunities & challenges.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define entrepreneurship and the characteristics of an entrepreneur. **L1**
- Explain the significance of entrepreneurship in the economic development of a nation. **L2**

UNIT – II: IDEATION AND EVALUATION OF BUSINESS IDEAS

Opportunity identification – Ideations process - Sources of business ideas – Role of creativity – Sources of Innovation - Business Idea Evaluation - Product/ Service design – Design Thinking - Customer Value Proposition (CVP) – Business models.

Case study: Business cases of OYO, Paytm and Flipkart/ Smartmart.

Activity: Idea generation in groups and CVP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Select the right business ideas. **L1**
- Explain the business idea evaluation process **L2**

UNIT – III: Business Organizations and Venture Establishment

Forms of business organisations/ownership – Techno-economic feasibility assessment – Financial feasibility – Market feasibility – Preparation of Business plan – Business canvas & Lean canvas – Challenges & Pitfalls in selecting new venture.

Activity: Preparation of business plan (draft).

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall different forms of business organizations. **L1**
- Develop business canvas. **L2**

UNIT – IV: Introduction to Innovation

Creativity, Invention and innovation, Types of Innovation, Relevance of Technology for Innovation, The Indian innovations and opportunities.

Learning Outcomes:

At the end of this unit, the student will be able to

- Able to develop new ideas to discover new ways of looking problems and opportunities. **L1**
- Apply technology to innovation. **L2**

UNIT – V: Promoting and managing innovation

Innovators and Imitators, Patents, Trademarks, Intellectual Property, Exploring, Executing, Leveraging and renewing innovation, Enhancing Innovation Potential & Formulating strategies for Innovation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Intellectual Property Licensing. **L1**
- Summarize the importance of IPR. **L2**

Text Books:

1. Robin Lowe and Sue Marriott, Enterprise: Entrepreneurship and Innovation Concepts, Contexts and Commercialization.
2. John Bessant and Joe Tidd, Innovation and Entrepreneurship.

Reference Books:

1. Rabindra N. Kanungo "Entrepreneurship and innovation", Sage Publications, New Delhi, 1998.
2. Peter F. Drucker, Innovation and Entrepreneurship.
3. EDII "Faculty and External Experts – A Hand Book for New Entrepreneurs Publishers: Entrepreneurship Development" Institute of India, Ahmadabad, 1986.
4. Philips, Bonefiel and Sharma (2011), Social Entrepreneurship, Global vision publishing house, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- Choose entrepreneurship as an alternative career. **L1**
- Distinguish between corporate and social entrepreneurs. **L2**
- Examine and build customer value proposition. **L3**
- Analyze feasibility of business ideas. **L4**
- Compare various supports schemes provided by GOI. **L5**

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	ENGINEERING GEOLOGY LAB	0	0	3	1.5

Course LearningObjectives:

The objective of this courseis:

- To identify the Megascopic types of Ore minerals & Rock forming minerals.
- To identify the Megascopic types of Igneous, Sedimentary, Metamorphic rocks.
- To identify the topography of the site & material selection.

1. Study of physical properties and identification of minerals referred under theory.
2. Megascopic description and identification of rocks referred under theory.
3. Interpretation and drawing of sections for geological maps showing tilted beds, faults, uniformities etc.
4. Simple Structural Geology problems.

LAB EXAMINATION PATTERN:

1. Description and identification of SIX minerals
2. Description and identification of Six (including igneous, sedimentary and metamorphic rocks)
3. Interpretation of a Geological map along with a geological section.
4. Simple strike and Dip problems.

Text Books:-

1. Elementary Exercises in Geology by CVRK Prasad, Universities press.
2. B.S.Satyanarayana Swamy, Engineering Geology Laboratory Manual , Dhanpat Rai Sons, New Delhi

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify Megascopic minerals & their properties.
- Identify Megascopic rocks & their properties.
- Identify the site parameters such as contour, slope & aspect for topography.
- Know the occurrence of materials using the strike & dip problems.

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	SURVEYING LAB-II	0	0	3	1.5

OBJECTIVE: To impart the practical knowledge in the field, it is essential to introduce in curriculum. Drawing of Plans and Maps and determining the area are pre requisites before taking up any Civil Engineering works.

LIST OF EXERCISES:

1. Study of theodolite in detail – practice for measurement of horizontal and vertical angles.
2. Measurement of horizontal angles by method of repetition and reiteration.
3. Trigonometric Leveling – Heights and distance problem (Two Exercises).
4. Heights and distance using Principles of tachometric surveying (Two Exercises)
5. Curve setting – different methods. (Two Exercises)
6. Setting out works for buildings & pipe lines.
7. Determination of area using total station.
8. Traversing using total station.
9. Contouring using total station.
10. Determination of remote height using total station.
11. Distance, gradient, Diff. height between tow inaccessible points using total stations.

Course Outcomes :

By performing the various experiments in this laboratory the student will be able to know the principles of surveying in thedolite surveying and total station.

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	FLUID MECHANICS AND HYDRAULIC MACHINERY LAB	0	0	3	1.5

COURSE OBJECTIVE:
To make the students understand the fluid flow concepts
To get familiarity with flow measuring devices.
SYLLABUS:

1. Calibration of Venturimeter
2. Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Verification of Bernoulli's equation.
8. Impact of jet on vanes.
9. Study of Hydraulic jump.
10. Performance test on Pelton wheel turbine.
11. Performance test on Francis turbine.
12. Efficiency test on centrifugal pump.

COURSE OUTCOMES

1. To calibrate the flow measuring devices.
2. To calculate loss coefficients for use in the pipe-flow analysis.
3. To prepare the characterstics for curves of the pumps and turbines.
4. To find the performance of francis, pelton wheel turbines.
5. To understand the efficiency of centrifugal, reciprocating pumps, and to calibrate venturimeter, orifice meter.

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	STRENGTH OF MATERIALS – II	2	1	--	3

Course Objectives

1) To teach the student with basic concepts for determination of principal stresses and strains in various structural elements.
2) To demonstrate analytical methods for determining strength & stiffness and assess stability of structural members.
3) To make the student analyze circular shafts subjected to torsion
4) To make the student determine critical loads for columns with different end conditions.

UNIT-I

Compound Stresses and Strains:

Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, and its applications. Two dimensional stress-strain system, principal strains and principal axis of strain, circle of strain.

Unit Outcomes:

- Identify critical planes in two dimensional stress systems
- Estimate principals stresses
- Assess safety of structural elements under principal stresses

UNIT -II

Torsion:

Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft – Torsional moment of resistance – Polar section modulus – power transmission through shafts – Combined bending and torsion –. Springs - Types of springs – deflection of close coiled helical springs under axial pull and axial couple – Carriage or leaf springs.

Unit Outcomes

- Analyze members subjected to torsion, combined torsion and bending moment
- Calculate power transmission through shafts
- Estimate energy absorption in springs.

UNIT -III

Combined Direct and Bending stresses:

Introduction-eccentric loading – Columns with eccentric loading – Symmetrical columns with eccentric loading about one axis –about two axes – Unsymmetrical columns with eccentric loading – limit of eccentricity.

Theories of failure:

Maximum Principal stress theory- Maximum shear stress theory- Maximum strain theory- Maximum strain energy theory-Maximum distortion energy theory

Unit Outcomes:

- To know about the effect of eccentricity effect in columns
- To know about the various theories of failures

UNIT -IV

Deflection of Beams:

Uniform bending – slope, deflection and radius of curvature – Differential equation for elastic line of a beam – Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. uniformly varying load-Mohr's theorems – Moment area method – application to simply supported and overhanging beams-

Propped cantilevers:

Analysis of propped cantilever beams under UDL and point loads.

. **Unit Outcomes:**

- Understand types of loads acting on beams
- Compute slopes and deflections of beams with different boundary conditions
- Evaluate effect of different loads on propped cantilever beams

UNIT -V

Columns and Struts:

Introduction – Classification of columns – Axially loaded compression members – Euler's crippling load theory – Derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – Eccentric loading and Secant formula – Prof. Perry's formula.

Unit Outcomes

- Classify columns
- Understand Euler's theory on columns and assess crippling loads
- Analyze compression members using different theories
- Assess load carrying capacity using different formulae

TEXT BOOKS:

1. Mechanics of Materials – Dr.B.C.Punmia, Ashok Kumar Jain, Arun Kumar Jain, Lakshmi Publications.
2. Strength of Materials by R.K Rajput, S.Chand & Company Ltd.
3. Strength of materials by Dr. Sadhu Singh, Khanna Publishers.

REFERENCES:

1) R. K. Bansal, A Text book of Strength of materials, Laxmi Publications (P) Ltd., New Delhi.
2) Strength of Materials, Fourth edition, S.S. Bhavikatti, Vikas Publishing House, Pvt. Ltd.
3) D. S. Prakasa Rao Strength of Materials by, Universities Press Pvt Ltd, Hyderabad.
4) Schaum's outline series Strength of Materials, Mc Graw hill International Editions.
5) L.S. Srinath, Strength of Materials, Macmillan India Ltd., New Delhi.
6) S. Basavarajaiah and P. Mahadevappa, Strength of Materials in SI units, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2010.

Course Outcomes:

On completion of the course, the student will be able to:

- Understand principal stresses and principal planes.
- Determine deflection at any point on a beam under simple and combined loads
- Analyze members under torsion, deformation in springs,
- Know the effect of eccentricity of load in columns, apply failure criteria to implement in design of structural members.
- Know the crippling load for the columns.

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	FLUID MECHANICS	2	1	0	3

Course Objectives:

To explain concepts of fluid mechanics used in Civil Engineering.

1) To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
2) To impart ability to solve engineering problems in fluid mechanics
3) To enable the students measure quantities of fluid flowing in pipes, tanks and channels
4) To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
5) To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

UNIT -I:

Basic concepts and definitions:

Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapor pressure, boiling point, surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Fluid statics:

Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Unit Outcomes :

Student will be able to

1. Understand basic characteristics of fluids
2. Understand Newton's Law of Viscosity
3. Understand concepts of fluid statics
.4. Demonstrate stability of floating bodies

UNIT -II:

Fluid kinematics:

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three -dimensional continuity equations in Cartesian coordinates.

Unit Outcomes :

Student will be able to

Understand fundamentals of fluid kinematics

- Understands different types of fluid flows
- Derivation of Continuity equations of using Cartesian coordinates

UNIT -III:

Fluid Dynamics:

Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

Unit Outcomes :

Student will be able to

Demonstrate applications of Bernoulli's equations

- Experiment with different equipments under fluid flow
- Apply principles of fluid dynamics along with governing equations.

UNIT -IV:

Analysis Of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

Unit Outcomes :

Student will be able to

Estimate Energy losses in pipelines

- Determine flow characteristics through Pipes.

Unit-V

DIMENSIONAL ANALYSIS: Introduction, dimensions Dimensional homogeneity, Methods of dimensional analysis- Rayleigh's method Buckingham Pi theorem, model analysis, similitude-types of similarities. Dimensionless numbers. Model laws Partially submerged objects types of models, Scale effect

BOUNDARY LAYER THEORY & DRAG AND LIFT: Boundary layer - concepts. Prandtl's contribution, Characteristics of boundary layer along a thin flat plate laminar and turbulent Boundary layers, separation of BL. expression for drag and lift Lift and Drag Coefficients, pressure drag and friction drag, Streamlined and bluff bodies

Unit Outcomes :

Student will be able to

Under stand dimensional analysis

Under stand boundary layer theory and its charcterstics

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, Fluid Mechanics and Machinery, Oxford University Press, 2010.

REFERENCES:

1. Fluid Mechanics and Hydraulic Machines, S.C.Gupta, Pearson publication
2. R. K. Bansal, A text of Fluid mechanics and hydraulic machines, Laxmi Publications (P) Ltd., New Delhi.
3. K. Subrahmanya, Theory and Applications of Fluid Mechanics, Tata McGraw Hill
4. N. Narayana Pillai, Principles of Fluid Mechanics and Fluid Machines, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
5. K. Subramanya, Open Channel flow, Tata Mc.Grawhill Publishers.
6. S K SOM and G Biswas, "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw Hill,New Delhi

Course Outcomes:

At the end of the course, the student will be able to:

- Understand the principles of fluid statics, kinematics and dynamics
- Familiarize basic terms used in fluid mechanics
- Understand flow characteristics and classify the flows
- Apply the continuity, momentum and energy principles
- Estimate various losses in flow through channels

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	SURVEYING	2	1	--	3

Course Objectives:

- To make the student to get well conversant with the fundamentals of various basic methods and instruments of surveying.
- To introduce to the students in identifying reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings.
- To make the student to use angular measuring instruments for horizontal and vertical control.
- To enable the student to set simple horizontal curves.
- To introduce the knowledge construction surveys and usage of modern instrument such as total station.

UNIT – I

Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying. Measurement of Distances and Directions Linear distances- Approximate methods, Direct Methods- Chains- Tapes, ranging, Tape corrections, indirect methods- optical methods- E.D.M. method.
Prismatic Compass- Bearings, included angles, Local Attraction, Magnetic Declination, and dip.
Plane table surveying: Introduction, accessories, setting up of plane table, techniques, testing, adjustments, errors, advantages and disadvantages.

Unit Outcomes

- To impart basic concepts of surveying.
- To introduce the usage and applications of linear and angular measurements through chain, tape, compass and plane table.

UNIT - II

Levelling - Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels- HI Method-Rise and Fall method, Effect of Curvature of Earth and Refraction.
Contouring- Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.
Computation of Areas and Volumes: Areas - Determination of areas consisting of irregular boundary and regular boundary, Planimeter. Volumes - Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

Unit Outcomes

- To impart basic principles in levelling and contouring.
- To calculate the areas of irregular boundaries and volumes of earth work quantities.

UNIT - III

Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.
Traversing: Methods of traversing, traverse computations and adjustments, Gale's traverse table, Omitted measurements.

Unit Outcomes

- To impart basic principles in Trigonometric levelling.
- To inculcate the knowledge of traversing.

UNIT - IV

Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves.

Unit Outcomes

- To impart basic principles in Tacheometric surveying.
- To inculcate the knowledge of simple horizontal circular curve setting.

UNIT - V

Construction surveys: Introduction-staking out buildings-pipelines and sewers-highways-culverts. Bridge surveys-determining the length of a bridge-locating centres of piers- surface surveys and tunnel alignment-underground surveys-connection of surface and underground surveys-levelling in tunnels.

Total station Surveying: Basic principles, applications, comparison with conventional surveying. Electromagnetic wave theory - electromagnetic distance measuring system - principle of working and EDM instruments.

Unit Outcomes:

- To induce the knowledge of construction surveying.
- To inculcate the knowledge of advanced surveying instrument such as total station.

Text Books:

1. S.S Bhavikatti, "Surveying theory and Practice", 2nd edition, Dreamtech press, Wiley distributors.
2. C.Venkatramaiah, "Text book of surveying", 2nd edition, Universities press, 2018

References:

1. Arthur R Benton and Philip J Taety, "Elements of Plane Surveying", McGraw Hill – 2000.
2. Arora K R "Surveying" Vol 1, 2 & 3, Standard Book House, Delhi, 2004.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain,"Surveying" (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Bhavikatti "Surveying" Vikas publishing house ltd.
6. S K Duggal, "Surveying" (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. R. Agor Khanna Publishers 2015 "Surveying and leveling".
8. R. Subramanian, "Surveying and levelling" Oxford university press, New Delhi.
9. Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
10. S.S Bhavikatti "Surveying and Levelling", Vol. 1 and 2, Dreamtech press, Wiley distributors.
11. Hoffman. B, H. Lichtenegga and J. Collins, Global Positioning System – "Theory and Practice", Springer -Verlag Publishers, 2001.

Course Outcomes:

At the end of the course, the student will be able to:

- Calculate angles, distances and levels
- Identify data collection methods and prepare field notes
- Understand the working principles of survey instruments
- Estimate the volumes of earth work
- Able to use modern survey instruments.

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	CONCRETE TECHNOLOGY	3	0	0	3

Course Objectives:

- Lot of advances is taking place in the concrete technology as par with development taking place in the engineering.
- The present day industry needs the knowledge of concrete technology thoroughly.
- The subject is designed to give the basic knowledge as well as latest developments in concrete technology.

UNIT I
CEMENTS ,CONCRETE AND ITS INGREDIENTS :
Portland cement – chemical composition – Hydration, Setting of cement – Structure of hydrated cement – Test`s on physical properties – Different grades of cement – Admixtures – Mineral and chemical admixtures. AGGREGATES: Classification of aggregate – Particle shape & texture – Bond, strength & other mechanical properties of aggregate – Specific gravity, Bulk density, porosity, adsorption & moisture content of aggregate – Bulking of sand – Deleterious substance in aggregate – Soundness of aggregate – Alkali aggregate reaction – Thermal properties – Sieve analysis – Fineness modulus – Grading curves – Grading of fine & coarse Aggregates – Gap graded aggregate – Maximum aggregate size.

Unit Outcomes
- List different ingredients of concrete
- Conduct tests on materials
- Explain characteristics of water
- Understand conformity to IS Codes

UNIT – II
FRESH & HARDENED CONCRETE:
Workability – Factors affecting workability – Measurement of workability by different tests – Setting times of concrete – Effect of time and temperature on workability – Segregation & bleeding – Mixing and vibration of concrete – Steps in manufacture of concrete – Quality of mixing water.Water / Cement ratio – Abram"s Law – Gel space ratio – Nature of strength of concrete – Maturity concept – Strength in tension & compression – Factors affecting strength – Relation between compressive & tensile strength - Curing.Compression tests – Tension tests – Factors affecting strength – Flexure tests – Splitting tests –

Unit Outcomes
- List various properties of fresh concrete
- Conduct experiments for determination of fresh concrete properties
- List various properties of hardened concrete
- Conduct experiments for determination of hardened concrete properties • Carryout Non Destructive tests on Concrete

UNIT – III
ELASTICITY, CREEP & SHRINKAGE:– Modulus of elasticity – Dynamic modulus of elasticity – Poisson"s ratio – Creep of concrete – Factors influencing creep – Relation between creep & time – Nature of

creep – Effects of creep – Shrinkage – types of shrinkage. Introduction to Non-destructive testing methods – Rebound Hammer – Ultra Pulse Velocity method – Pullout - Codal provisions for NDT

Unit Outcomes

- Understand curing methods and its importance
- Understand phenomenon of shrinkage and creep of concrete.
- Evaluate factors influencing creep and concrete

UNIT – IV.

MIX DESIGN: Factors in the choice of mix proportions – Durability of concrete – Quality Control of concrete – Statistical methods – Acceptance criteria – Proportioning of concrete mixes by various methods – ACI method & IS 10262 method

Unit Outcomes

- Study properties of concrete mixes
- Design concrete mixes using different methods
- Estimate quantities for target strength of concretes

UNIT – V

SPECIAL CONCRETES: Light weight aggregates – Light weight aggregate concrete – Cellular concrete – No-fines concrete – High density concrete – Fibre reinforced concrete – Different types of fibres – Factors affecting properties of F.R.C – Applications – Polymer concrete – Types of Polymer concrete – Properties of polymer concrete – Applications – High performance concrete – Self consolidating concrete – SIFCON – Bacterial concrete(self healing concrete)

Unit Outcomes

- Label different types of special concretes with the objectives
- Understand properties of special concretes.

TEXT BOOKS:

1. Properties of Concrete by A.M.Neville – Pearson publication – 4th edition
2. Concrete Technology by M.S.Shetty. – S.Chand & Co. ; 2004

REFERENCES:

1. Concrete Technology by M.L. Gambhir. – Tata Mc. Graw Hill Publishers, New Delhi
2. Concrete: Micro structure, Properties and Materials – P.K.Mehta and J.M.Monteiro, McGraw Hill Publishers
3. Design of Concrete Mix by Krishna Raju, CBS pubilishers.

Course Outcomes:

After completing the course, the student should be able to do the following:

1. The students should be able to check and recommend different constituent of concrete.
2. The students should be able to test strength and quality of plastic and set concrete.
3. The students should have understanding of application admixture and its effect on properties of concrete.
4. The students should be able to design mix of concrete according to availability of ingredients and design needs.
5. The students should be able to test various strength of concrete by destructive and nondestructive testing method

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	Building Planning and Drawing	1	0	2	2

OBJECTIVE: *This subject provides the knowledge of building by laws, registration, planning of various types of buildings different sign convention of various Civil Engineering Materials, Doors, windows, tiles of roof, drawing of building plans etc.*

PART-A

UNIT -I

PLANING OF BUILDINGS: Types of buildings, types of residential buildings, site selection for residential building, orientation of buildings; aspect; prospect; privacy; furniture requirement;grouping;circulation;sanitation;lighting;ventilation;cleanliness;flexibility;elegancy;Economy; practical considerations.

BUILDING BYELAWS AND REGULATIONS: Introduction- Terminology ;Objectives of building byelaws; Minimum plot sizes; Open space requirements ;Plinth area, floor area, carpet area; Floor area ratio (FAR), Floor space Index (FSI) ;areas for different units; Principles underlying building byelaws ; built up area limitations – Height of Buildings ,Wall thickness, lighting and ventilation requirement, safety from fire, drainage and sanitation; applicability of the bye-laws.

UNIT –II

PLANNING OF RESIDENTIAL BUILDINGS: Minimum standards for various parts of buildings – requirements of different rooms and their grouping – characteristics of various types of residential buildings

PLANNING OF PUBLIC BUILDING: Planning of Educational institutions, Hospitals, Office buildings, Banks, Industrial buildings, Hotels and Motels, Hostels, Bus Station.

UNIT -III

BUILDINGS: SAFETY AND COMFORT: aspects of safety-structural, health, fire and constructional safety. Components of building automation system - HVAC, electrical lighting, Security, fire-fighting, communication etc. design for thermal comfort, ventilation comfort, air conditioning comfort, lighting comfort, noise and acoustic comfort.

PART-B

UNIT -IV

SIGN CONVENTIONS AND BONDS: Brick, Stone, Plaster, Sand filling, Concrete, Glass, Steel, Cast iron, Copper alloys, Aluminum alloys etc., Lead, Zinc, tin, and white lead etc., Earth, Rock, Timber and Marble. English bond & Flemish bond; odd & even courses for one, one and half, two and two and half brick walls in thickness at the junction of a corner.

DOORS WINDOWS, VENTILATORS AND ROOFS: Paneled Door – paneled and glazed door; glazed windows – paneled windows; Swing ventilator – Fixed ventilator; Couple roof – Collar roof; Kind Post truss – Queen post truss.

UNIT –V

Given line diagram with specification to draw plan, section and elevation of the following :

1. Residential Building
2. Hospital
3. Schools
4. Post office
5. Corporate Office Building
6. Hotels
7. Bank buildings
8. Bus stations
9. Industrial buildings

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part- A and Part-B. Part- A consists of three questions with either or choice from three units in planning portion .Each question carries 10 marks. Total marks for Part-A is 30 marks. Part- B consists of two questions with either or choice from drawing portion. Question from unit-IV carries 10 marks and question from unit-V carries 30 marks. Total marks for Part-B is 40 marks.

TEXT BOOKS:

1. Planning and Designing and Scheduling – Gurucharan Singh and Jagadish Singh- Standard publishers.

2. Building Planning and Design – N.Kumara Swamy and A.Kameswara Rao. Charotar publications.

REFERENCE:

1. Building by laws by state and Central Governments and Municipal corporations. National Building Code

2. Building drawing with an integrated approach to building environment-M.G.Saha, G.M.Kale, S.Y.patki-Tata Mc Graw Hill

COURSE OUTCOMES

1. The scope of this course is to introduce the concepts of building planning and drawing with emphasis on architectural planning.
2. This subject is designed as an introduction for subjects who wish to develop their competence and skills in the preparation of architectural and building drawings.
3. Able to know the requirements of different rooms and characteristics of various types of residential buildings.
4. Able to know about building byelaws and regulations.
5. Ability to draw line sketch and planning and bi section of a building

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Semester-3 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	CONCRETE TECHNOLOGY LABORATORY	0	0	3	1.5

Course Objective *To know the concept and procedure of different type of tests to be conducted on cement, aggregate and finished concrete and designing the concrete mix of given specification of its ingredients along with appropriate water cement ratio and admixtures.*

SYLLABUS:

1. Normal Consistency of fineness of cement.
2. Initial setting time and final setting time of cement.
3. Specific gravity of cement.
4. Soundness of cement.
5. Compressive strength of cement.
6. Workability test on concrete by compaction factor,
7. Workability test on concrete by slump
8. Workability test on concrete by Vee-bee test
9. Young's modulus and compressive strength of concrete.
10. Specific Gravity and Water Absorption of Coarse aggregate.
11. Bulking of Fine aggregate.
12. Non-Destructive testing on concrete (for demonstration)
13. Fineness modulus of sand and importance of zoning
14. Bulk density of Coarse Aggregate.
15. Bulk density of Fine Aggregate.

Course outcomes	
CO 1	*To be able to determine the importance of testing of cement and its properties*
CO 2	*To be able to assess the different properties of aggregate*
CO 3	*To be able to summarize the concept of workability and testing of concrete*
CO 4	*To be able to assess the properties of hardened concrete*

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	ENGINEERING GEOLOGY	3	0	0	3

Course LearningObjectives:

The objective of this course is:

- To introduce the course: Engineering Geology to the Civil Engineering graduates.
- To enable the students, understand what minerals and rocks are and their formation and identification.
- To highlight significance/ importance/ role of Engineering Geology in construction of Civil Engineering structures
- To enable the student, realise its importance and applications of Engineering Geology in Civil Engineering constructions.

UNIT – I

INTRODUCTION:

Importance of geology from Civil Engineering point of view. Brief study of case histories of failure of some Civil Engineering constructions due to geological draw backs. Importance of Physical geology, Petrology and Structural geology.

WEATHERING OF ROCKS : Its effect over the properties of rocks importance of weathering with REFERENCE to dams, reservoirs and tunnels weathering of common rock like "Granite"

MINERALOGY:

Definition of mineral, Importance of study of minerals, Different methods of study of minerals. Advantages of study of minerals by physical properties.Role of study of physical properties of minerals in the identification of minerals. Study of physical properties of following common rock forming minerals: Feldspar , Quartiz , Flint , Jasper, Olivine , Augite , Hornblende , Muscovite , Biotite , Asbestos, Chlorite , Kyanite , Garnet, Talc , Calcite. Study of other common economics minerals such as Pyrite, Hematite , Magnetite, Chrorite , Galena , Pyrolusite , Graphite, Magnesite, and Bauxite.

UNIT OUTCOMES :

Understand importance of geology in civil engineering

Understand how different rocks are formed and the minerals presents in rocks

UNIT – II

PETROLOGY:

Definition of rock: Geological classification of rocks into igneous, Sedimentary and metamorphic rocks. Dykes and sills, common structures and textures of Igneous. Sedimentary and Metamorphic rocks. Their distinguishing features, Megascopic study of Granite, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Gneiss, Schist, Quartzite, Marble and Slate.

STRUCTURAL GEOLOGY:

Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance Insitu and drift soils, common types of soils, their origin and occurrence in India

UNIT OUTCOMES :

Understand different types of structures in geological formations

Understand geological classification of rocks and their structures and textures

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	STRUCTURAL ANALYSIS – I	2	1	0	3

Course Learning Objectives:

- To give preliminary concepts of assessment of bending moment and shear force in fixed beams and continuous beams due to various loading conditions.
- To impart concepts of Bending Moment and Shear force for beams with different boundary and loadingconditions
- The procedure for development of slope deflection equations and moment distribution method and to solve application to continuous beams with and without settlement ofsupports

UNIT – I

ENERGY THEOREMS: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear forces – Castigliano's first theorem-Deflections of simple beams and pin jointed trusses.

UNIT OUTCOMES

- Understand Energy concepts
- Develop expression for strain energy due to axial load Bending moment and shear force
- Calculate deflections in simple beams and pin joined trusses
- Analyze simple structural elements using energy principles.

UNIT – II

ANALYSIS OF INDETERMINATE STRUCTURES : Indeterminate Structural Analysis – Determination of static and kinematic indeterminacies – Solution of trusses with upto two degrees of internal and external indeterminacies – Castigliano's theorem.

UNIT OUTCOMES

- Differentiate determinate and indeterminate structures
- Understand static and kinematic indeterminacies
- Solve truss problems

UNIT – III

FIXED BEAMS & CONTINUOUS BEAMS : Introduction to statically indeterminate beams with uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – Deflection of fixed beams effect of sinking of support, effect of rotation of a support.

UNIT OUTCOMES

Unit Outcomes

- Categorize fixed and continuous beams and their performance
- Understand different loads on beams with different boundary conditions.
- Analyze the beams subjected to loads
- Study effect of sinking of supports of performance

UNIT – IV

SLOPE-DEFLECTION METHOD: Introduction-derivation of slope deflection equations- application to continuous beams with and without settlement of supports - Analysis of single bay portal frames without sway **UNIT OUTCOMES**

. • Develop slope deflection expressions

• Analyze structures with and without support sinking

• Analyze 2D frames using slope-deflection method.

UNIT – V

MOMENT DISTRIBUTION METHOD: Introduction to moment distribution method- Application to continuous beams with and without settlement of supports-Analysis of single bay storey portal frames without sway .

UNIT OUTCOMES

• Develop moment distribution expressions

• Analyze structures with and without support sinking

• Analyze single storey portal frames

TEXT BOOKS:

(1) Analysis of Structures – Vol-I&II by V.N.Vazirani & M.M.Ratwani, Khanna Publications, New Delhi.
(2) Structural Analysis by S S Bhavikatti – Vikas Publishing House.
(3) Analysis of Structures by T.S. Thandavamoorthy, Oxford University Press, New Delhi.

REFERENCES :

(1) Structural analysis – Hibbler – Pearson education
(2) Introduction to structural analysis by B.D.Nautiyal, New Age international publishers, New Delhi.
(3) Structural Analysis – D.S.Prakasa rao - Univeristy press.
(4) Introduction To Structural Analysis-Nautial- New Age Pubilishers
(5) Strength of Materials and Mechanics of Structures by B.C.Punmia, Khanna Publications, NewDelhi.
(6) Structual analysis Vol.I and II by Dr. R.Vaidyanathan and Dr.P Perumal – Laxmi publications.
(7) Basic Structural Analysis by C.S.Reddy., Tata McGraw Hill Publishers.

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Semester-4 Syllabus

Subject Code	Title of the Subject	L	T	P	C
	HYDRAULICS AND HYRAULIC MACHINERY	2	1	0	3

Course Objectives:

1) To Introduce concepts of laminar and turbulent flows
2) To teach principles of uniform and non-uniform flows through open channel.
3) To impart knowledge on design of turbines.
4) To impart knowledge on design of pumps.

UNIT -I:

Laminar & Turbulent flow in pipes:

Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram – Introduction to boundary layer theory.

Unit Outcomes

- Understand Laminar Flow through plates
- Understand Turbulent flow and transition
- Apply energy and momentum principles to fluid flow situations
- Solve problems for forces in static and moving fluids

UNIT -II:

Uniform flow in Open Channels:

Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Hydraulically efficient channel sections: Rectangular, trapezoidal and triangular channels, Energy and Momentum correction factors.

Unit Outcomes

- Differentiate open and closed channel flows
- Understand different formulae on open channel flow
- Design open-channel flow systems.

UNIT III:

Non-Uniform flow in Open Channels:

Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Gradually Varied Flow- Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

Unit Outcomes

- Understand the concepts of varying flow in pipes
- Measure discharge and velocity
- Understand gradually varied flow
- Solve introductory problems of forces and dynamics

UNIT -IV:

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - velocity triangles at inlet and outlet - Work done and efficiency

Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects.

Unit Outcomes

- Understand hydrodynamic force of jets different vanes
- Calculate efficiency of jets
- Understand and design Pelton wheel, Francis and Kaplan turbine

UNIT -V:

Pumps:

Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies .

Unit Outcomes

- Understand principles of centrifugal pumps
- Calculate losses and efficiencies of centrifugal pumps
- Design centrifugal pumps including multi stage pumps.

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, Hydraulics and Fluid Mechanics, Standard Book House
2. K. Subramanya, Open channel Flow, Tata McGraw Hill.

REFERENCES:

1. Rajput, Fluid mechanics and fluid machines , S. Chand & Co
2. D. S. Kumar Fluid Mechanics & Fluid Power Engineering, Kataria & Sons.
3. Srinivasan, Open channel flow by, Oxford University Press
4. Banga & Sharma, Hydraulic Machines, Khanna Publishers.
5. Fluid Mechanics and Hydraulic Machines, S.C.Gupta, Pearson publications,
6. R.K. Bansal, "A Text book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi

Course Outcomes:

At the end of the course, the student will be able to

- Understand characteristics of laminar and turbulent flows.
- Analyze characteristics for uniform and non-uniform flows in open channels.
- Design different types of turbines
- Design centrifugal and multi stage pumps.

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SEMESTER -4

Subject code	Title of the Subject	L	T	P	C
	Estimation Costing & Valuation	**1**	**-**	**2**	**2**

Course Objectives:

- To impart basic knowledge on different types of estimation
- To enrich with specifications and tender procedures.
- To give insights on various types of contract agreements.
- To inculcate data preparation for abstract estimation
- To teach procedure for valuation of buildings.

UNIT –I

INTRODUCTION:

General items of work in Building – Standard Units Principles of working out quantities for detailed and abstract estimates – Approximate method of Estimating.

STANDARD SPECIFICATIONS:

Standard specifications for different items of building construction

Learning Outcomes:

After completing this Unit, students will be able to

- Understand methods of Estimation
- Prepare detailed and general specifications for a project

UNIT – II

ESTIMATION OF BUILDINGS:

Detailed Estimates of Buildings- -detailed estimates of residential buildingssingle storied and multi-storied buildings-earthwork-foundations-Super structure-Fittings including sanitary and electrical fittings-paintings.

Learning Outcomes:

After completing this Unit, students will be able to

- Carryout estimation of quantities for structural components
- Estimate cost while using different types of sanitary and electrical fittings

UNIT – III

EARTHWORK ESTIMATION:

Earthwork for roads and canals.

REINFORCEMENT ESTIMATION:

Reinforcement bar bending and bar requirement schedules.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the reinforcement requirement estimation
- Calculate the earthwork for roads and canals

UNIT – IV

CONTRACTS AND TENDERS:

Contracts – Types of contracts – Contract Documents – Conditions of contract – Types of Tenders – Requirement of Tendering.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand tender schedule and tender notices
- Draft tender documents for projects
- Prepare documents for different types of contracts
- Identify arbitration and legal issues and mitigation methods

UNIT – V

RATE ANALYSIS:

Working out data for various items of work over head and contigent charges.

VALUATION: Principles of valuation-Value and Cost-value engineering-value analysis-phases in value engineering-information-function-escalation-evaluation-recommendation-implementation-Audit.

Learning Outcomes:

After completing this Unit, students will be able to

- Carry out valuation of buildings.
- Explain Auditing procedures and implementation
- Understand procedures for entries in measurement books and its importance
- Prepare abstract estimates based on SSR.

TEXTBOOKS:

1. Estimating and Costing by B.N. Dutta, UBS publishers, 2000.
2. Contracts and estimations by B.S.Patil, Universities.Press, Hyderabad.
3. Estimation, Costing and Specifications by M. Chakraborthi; Laxmi publications.

REFERENCES:

1. Estimating and Costing by G.S. Birdie, Dhanpat Rai Publishing Company (P) Ltd
2. A Text book of Estimating and Costing by D.D.Kohli, S.Chand Pubilishers.

Course Outcomes

On completion of the course, the students will be able to:

- Understand basics on methods and types of estimation.
- Formulate specifications and tender documents.
- Prepare contract agreements
- Determine rate analysis of different items.
- Valuation of buildings

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS):: PULIVENDULA
DEPARTMENT OF CHEMISTRY
II B.TECH – I/II SEMESTER Mandate Course (MC)
(THEORY)

Subject Code	Title of the Subject	L	T	P	C
	Environmental Science	3	0	-	0

COURSE OBJECTIVES	
1	To make the student understand multi disciplinary nature of environment and its components.
2	To investigate the relationship between human life and environment from scientific prospective.
3	To impart knowledge to the students about fundamental concepts of Ecosystem and Biodiversity
4	Necessasity of analyzing regional, national and global environmental problems
5	To understand and apply the fundamentals of Environmental science to important local, regional, national and global environmental problems and potential issues

COURSE OUTCOMES	
CO1	Solve the environmental problems based fundamental concepts of Environmental Science.
CO2	Describe the structure and function of significant environmental systems
CO3	Differentiate Natural and Polluted environment and asses its impact different on the environmental components.
CO4	Apply the Pyramid of number, mass and Energy, Demonstrate about Renweable energy resources. Illustrate the Forest ecosystem, Discuss about Grass and Net biomass productivity
CO5	Differentiate between Forest and desert Ecosystems, Critically evaluate arguments regarding environmental issues. Illustrate the Food chain and food web, Identify the applications of rain water harvesting, Interpret advantages of In-situ and Ex-situ conservation of biodiversity

Mapping between Course Outcomes and Programme Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1												
CO2												
CO3												
CO4												
CO5												

BOS Chairman
Chemistry

SYLLABUS

UNIT-I:

i) Multidisciplinary nature of environmental studies

The **Multidisciplinary** nature of environmental studies Definition; Scope and importance, Need for public awareness.

ii) Natural Resources:

Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water, dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification.

- Role of an individual in conservation of natural resources.
- Equitable use of resources for sustainable lifestyles.

UNIT-II:

i) Ecosystems

Concept of an ecosystem, Structure and function of an ecosystem, Producers, consumers and decomposers. Energy flow in the ecosystem, Ecological succession. Food chains, food webs and ecological pyramids.

Introduction, types, characteristic features, structure and function of the following ecosystem: -

a. Forest ecosystem b. Grassland ecosystem c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

ii) Biodiversity and its Conservation

Introduction-Definition: genetic, species and ecosystem diversity. Biogeographical classification of India. Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values. Biodiversity at global, National and local levels. India as a mega-diversity nation. Hot-spots of biodiversity. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts. Endangered and endemic species of India. Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

UNIT-III:

Environmental Pollution:

Definition - Causes, effects and control measures of: -

a. Air pollution b. Water pollution c. Soil pollution d. Marine pollution

e. Noise pollution f. Thermal pollution g. Nuclear hazards

Solid waste Management: Causes, effects and control measures of urban and industrial wastes. Role of an individual in prevention of pollution. Pollution case studies. Disaster management: floods, earthquake, cyclone and landslides.

UNIT-IV:

BOS Chairman

BOS chemistry

Social Issues and the Environment

From Unsustainable to Sustainable development. Urban problems related to energy.
Water conservation, rain water harvesting, watershed management.
Resettlement and rehabilitation of people; its problems and concerns. Case studies. Environmental ethics: Issues and possible solutions. Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case studies.
Wasteland reclamation.
Environment Protection Act. Air (Prevention and Control of Pollution) Act. Water (Prevention and Control of Pollution) Act. Wildlife Protection Act. Forest Conservation Act.
Issues involved in enforcement of environmental legislation. Public awareness.

UNIT-V:

i) Human Population and the Environment

Population growth, variation among nations. Population explosion-Family welfare Programme. Environment and human health. Human Rights. Value Education. HIV/AIDS. - Women and Child Welfare. Role of information Technology in Environment and human health.
- Case Studies.

ii) Field Work

- Visit to a local area to document environmental assets-river/forest/grassland/ hill/mountain.
- Visit to a local polluted site-Urban/Rural/Industrial/Agricultural.
- Study of common plants, insects, birds.
- Study of simple ecosystems-pond, river, hill slopes, etc.

Text Books:

1. Shashi Chawla, A Text Book of Environmental Studies, Mc Graw Hill Education, 4th edtion, 2014
2. De A.K., Environmental Chemistry, Wiley Eastern Ltd , 2012

Reference Books

1. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad -380013, India, Email: mapin@icenet. net (R).
2. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p.
3. Cunningham, W.P.Cooper, T.H. Gorhani, E & Hepworth, M.T.2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.
4. Anubha Kaushik and C.P.Kaushik, Basics of Environment and Ecology, New Age International Publishers, 4th Edition, 2012.

BOS Chairman
Chemistry

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE51- DESIGN OF REINFORCED CEMENT CONCRETE STRUCTURES

L	T	P	C
3	0	0	3

Course Objectives:

- *Familiarize Students with different types of designphilosophies.*
- *Equip student with concepts of design of flexuralmembers.*
- *Understand Concepts of shear, bond andtorsion.*
- *Familiarize students with different types of compressions members and Design.*
- *Understand different types of footings and theirdesign.*

UNIT –I

Introduction: RCC design philosophy–Different methods of design

Working stress Design: working stress method, design constants; Design singly reinforced beams

Limit state design: Concepts of limit state design – Comparison between two methods- Basic statistical principles – Characteristic loads – Characteristic strength – Partial load and safety factors – representative stress-strain curves for cold worked deformed bars and mild steel bars. Assumptions in limit state design-stress – block parameters-limiting moment of resistance- Limit state design of singly reinforced beams.

Learning Outcomes:

At the end of this unit, the student will be able to

- Familiarize with working stress and limit stress method of design.

UNIT –II

Design of Beams:T and L sections by limit state method,design of doubly reinforced beams by Limit state method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand stress block parameters in methods of analysis
- Design of beams of varying cross sections adopting IS Code

UNIT –III

Shear, Torsion, Bond, & Serviceability: Limit state design of section for shear and torsion – concept of bond, anchorage and development length.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand behavior of beams under shear and torsion
- Visualize importance of bond and anchorage
- Design and Detail RC beams under due to shear and torsion adopting IS Code.

UNIT –IV

Slabs: Design of one way slab - Two-way slab, continuous slab,Limit state design of serviceability for deflection, cracking and codal provision.

Stair cases: Types of stair cases -Design of Dog-legged stair cases

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify understand performance of slabs based on dimensions
- Design reinforced concrete slabs & Stair cases as per IS codal provisions.

UNIT – V

Columns & Footings: Short columns – under axial loads, uni-axial bending and **biaxial bending(Not for Examination)**, I S Code provisions. Different types of footings – Design of isolated, square, Rectangular, stepped and sloped footings.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify footings based on shape and utility
- Examine the field conditions and suggest appropriate footings
- Design reinforced concrete footings.

TEXTBOOKS

1. Design of Reinforced Concrete Structures (Limit State) – A.K.Jain, 1st Edition, NemchandBrothers,Roorkee.
2. Reinforced concrete structures, Vol.1, by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt.Ltd., NewDelhi.
3. Reinforced concrete structures – I.C. Syal&A.K.Goel, S.ChandPublishers.
4. Limit State Design by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., NewDelhi.

REFERENCE

1. Reinforced concrete structural elements – behaviour, Analysis and design by P.Purushotham, Tata Mc.Graw-Hill, 1994.
2. Reinforced concrete design by S.Unnikrishna Pillai &DevdasMenon, Tata Mc.Graw Hill, New Delhi.
3. Limit state designed of reinforced concrete – P.C.Varghese, Prentice Hall of India, New Delhi..
4. Design of concrete structures – ArthusH.Nilson, David Darwin, and Chorles W. Dolar, Tata Mc.Graw-Hill, 3rd Edition, 2005.
5. Fundamentals of reinforced concrete by N.C. Sinha and S.K Roy, S. Chand publishers.

Course Outcomes:

After completing the course, the student should be able to do the following:

- Will be able to understand the basic concepts of reinforced concrete analysis and design.
- Will be able to understand the behavior and various modes of failure of reinforced concrete members.
- Will be able to analyze and design various reinforced concrete members.
- Will be able to understand and analyze the effect of various support conditions on design of structures.
- Will be able to implement the knowledge in using analysis and design softwares.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE52- GEOTECHNICAL ENGINEERING

L	T	P	C
3	0	0	3

OBJECTIVE:

The objective of this course is:

- To enable the student to find out the index properties of the soil and classify it.
- To enable the student to determine permeability of soils using various methods.
- To impart the concept of seepage of water through soils and determine the seepage discharge.
- To enable the students to differentiate between compaction and consolidation of soils and to Determine the consolidation settlement.
- To impart knowledge on soil exploration.
- To teach slope stability and safety assessment of earth retaining structures.
- To impart knowledge on bearing capacity and settlement of shallow foundations.
- To throw light on pile and well foundation designs.

UNIT – I

INTRODUCTION: Soil formation – soil structure and clay mineralogy – Adsorbed water – Mass- volume relationship – Relative density.

INDEX PROPERTIES OF SOILS: Moisture Content, Specific Gravity, In-Situ density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils

LEARNING OUTCOMES:

After completion of this unit student will

- Understand the characteristics of soils
- Assess relationships between different parameters
- Determine soil properties
- Determine Liquid, Shrinkage and Plasticity Limits
- Characterize and classify soils based on different limits.

UNIT–II PERMEABILITY:

Soil water – capillary rise – flow of water through soils – Darcy's lawpermeability – Factors affecting – laboratory and Field determination of coefficient of permeability –Permeability of layered systems.

SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flownets: Characteristics and Uses.

Learning Outcomes:-

After completion of this unit student will

- Determine the permeability of soils and stratified soils
- Explain factors effecting permeability
- Estimate the rate of seepage using flow net

UNIT – III

STRESS DISTRIBUTION IN SOILS:

Boussinesq's and Westergaard's theories for point loads and areas of different shapes – New-mark's influence Chart.

COMPACTION:

Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

Learning Outcomes:-

After completion of this unit student will

- Compute stresses in soils under various loading conditions.
- Explain compaction of soils
- Compaction control can be understood.

UNIT – IV

CONSOLIDATION:

Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil – pre-consolidation pressure and its determination –Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods - computation of total settlement and time rate of settlement.

Learning Outcomes:-

After completion of this unit student will

- Understand the consolidations and settlement of soils.
- Differentiate compaction and consolidation
- Assessment of final settlements of soil
- Differentiate primary and secondary consolidation

UNIT – V

SHEAR STRENGTH OF SOILS: Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops – Shear strength of sands - dilatancy – critical void ratio – Liquefaction- shear strength of clays.

Learning Outcomes:-

After completion of this unit student will

- Can able to determine the shear strength of the soil.
- To understand the various shear tests based on drainage conditions.

TEXTBOOKS:

1. Soil Mechanics and Foundation Engg. By K.R. Arora, Standard Publishers andDistributors, Delhi.
2. Soil Mechanics and Foundation by byB.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., NewDelhi
3. Geotechnical Engineering by C. Venkataramiah, New age International Pvt . Ltd, (2002).

REFERENCES:

1. Basic and Applied Soil Mechanics by GopalRanjan& ASR Rao, New age International Pvt . Ltd, NewDelhi.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, PearsonPubilications
3. Geotechnical Engineering V.N.S.Murthy, CRC Press, Newyork, Special IndianEdition
4. Geotechnical Engineering by Brije.M.Das, Cengage Publications, New Delhi.

OUTCOMES:

On completion of the course, the students will be able to:

- carry out soil classification
- solve any practical problems related to soil stresses estimation, permeability and seepage including flow net diagram
- estimate the stresses under any system of foundation loads
- solve practical problems related to consolidation settlement and time rate of settlement

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE53- ENVIRONMENTAL ENGINEERING

L	T	P	C
3	0	0	3

Course objectives:

- *To make the students conversant with sources and its demand of water*
- *To understand the basic characteristics of water and its determination*
- *To expose the students to understand the design of water supply lines*
- *To provide adequate knowledge about the water treatment processes and its design*
- *To have adequate knowledge on safe disposal methods*

UNIT – I

Introduction: Necessity of protected water supply –Flow chart of public water supply system - Role of Environmental Engineer.

Water Demand and Water Quality: Population forecasts, design period – water demand, types of water demands – factors affecting – fluctuations – fire demand – Characteristics of water – Physical, Chemical & Biological and their testing – drinking water standards - Waterborne diseases - Comparison from quality and quantity and other considerations.

Water collection structures at source: intakes – infiltration galleries.

UNIT OUTCOMES

- Understand importance of water quality
- Explain water quality standards

UNIT-II

Water Treatment (Sedimentation, Filtration and Disinfection): Layout and general outline of water treatment units – sedimentation – principles – design factors – coagulation flocculation clarifier design – coagulants – feeding arrangements– Filtration – theory – working of slow and rapid gravity filters – multimedia filters – design of filters – troubles in operation comparison of filters – disinfection – theory of chlorination, chlorine demand, other disinfection practices

LEARNING OUTCOMES:

After completion of this unit student will

- Design waste water treatment systems
- Categorize different water treatment procedures

UNIT-III

Water Distribution Network Analysis : Distribution systems – Requirements, Layout of Water distribution systems – Design procedures- Hardy Cross and equivalent pipe methods - service reservoirs – joints, valves such as sluice valves, air valves, scour valves and check valves water meters – laying and testing of pipe lines – pump house.

LEARNING OUTCOMES:

After completion of this unit student will

- Plan water supply systems in terms of transmission and distribution

UNIT IV

Waste Water Collection : House plumbing– inverted siphon – catch basins – flushing tanks– ejectors - Conservancy and water carriage systems – sewage and storm water estimation -fluctuations – types of sewers – Hydraulics of sewers and storm drains– design of sewers–shapes and materials.

Waste Water Characteristics: Characteristics of sewage – cycles of decay –decomposition of sewage. - B.O.D. – C.O.D. equations.

LEARNING OUTCOMES:

After completion of this unit student will

- Distinguish characteristics of domestic and storm water
- Assess quality of waste water parameters

UNIT – V

Waste Water Treatment : Layout and general outline of various units in a waste water treatment plant – primary treatment design of screens – grit chambers – skimming tanks – sedimentation tanks – principles of design – trickling filters – ultimate disposal of sewage – Construction and design of Oxidation ponds – sewage farming – dilution. Sludge digestion – factors effecting – design of Digestion tank – Sludge disposal by drying – septic tanks and Imhoff -Tanks working principles and design – soakpits.

LEARNING OUTCOMES:

After completion of this unit student will

- Plan Sewage treatment and disposal methodologies
- Design waste water treatment systems leading to cleaning of rivers

TEXT BOOKS

1. Water supply and sanitary Engineering by G.S. Birdi, DhanpatRai&SonsPublishers.
2. Water supply and sanitary Engineering byS.A.Garg,
3. Elements of environmental engineering by K.N. Duggal, S. ChandPublishers.
4. Manual on Water supply and Treatment – CPHEEO,1999.
5. Punmia B.C, Ashok Jain &Arun Jain, Water Supply Engineering, Laxmi Publications,Pvt. Ltd., New Delhi,2004.

REFERENCS

1. Water and Waste Water Technology by Mark J Hammar and Mark J. HammarJr.
2. Water and Waste Water Technology bySteel
3. Water and Waste Water Engineering by Fair Geyer andOkun
4. Waste water treatment- concepts and design approach by G.L. Karia and R.A.Christian, Prentice Hall ofIndia
5. Waste water Engineering by Metcalf andEddy.
6. Unit operations in Environmental Engineering by R. Elangovan and M.K. Saseetharan, New age International
7. Environmental Engineering by georad.KielyTMHPubilications.
8. IntroductiontoEnvironmentalEngineeringbyMackenzie,DevisandDavid.A.Cornwell, TMH Publications, NewDelhi.

Water Supply Engineering, Vol. 1, waste water Engineering, Vol. II, B.C.Punmia, AshokJain&Arun Jain, Laxmi Publications Pvt.Ltd,NewDelhi.

Course Outcomes:

At the end of the course, the student will be able to:

- Understand about quality of water and purification process
- Design waste water treatment systems
- Select appropriate technique for treatment of waste water.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE54a- STRUCTURAL ANALYSIS – II

(Professional Elective-I)

L	T	P	C
3	0	0	3

OBJECTIVE: *Indeterminate structures are subjected to different loading with different supported conditions; hence it is necessary to study the behaviour of the structures.*

COURSE OUTCOMES	
CO1	To demonstrate the behaviour of arches and their methods of analysis
CO2	To use various classical methods for analysis of indeterminate structures
CO3	Ability to analyse the beam and frames for vertical and horizontal loads and draw SFD and BMD
CO4	To determine the effect of support settlements for indeterminate structures. Able to calculate forces in members of truss due to load by stiffness method.
CO5	Ability to analyse and perform plastic analysis on various structural elements.

UNIT I

ARCHES :Three hinged and Two hinged arches, Elastic theory of arches – Eddy's theorem – Determination of horizontal thrust, bending moment, normal thrust and radial shear – effect of temperature-Determination of horizontal thrust bending moment, normal thrust and radial shear – Rib shortening and temperature stresses.

LEARNING OUTCOMES:

After completion of this unit student will

- Understand different types of arches
- Determination of horizontal thrust , normal thrust and radial shear for two hinged and there hinged arches

UNIT-II

APPROXIMATION METHODS OF ANALYSIS:-Analysis of single bay single storey portal frame including side sway–Substitute frame analysis by two cycle method - Portal method - cantilever method.

LEARNING OUTCOMES:

After completion of this unit student will

- Develop moment distribution expressions
- Analyze single storey portal frames with sway

UNIT – III

KANI`S METHOD:-

Analysis of continuous beams with and without settlement of supports -Single bay single storey portal frames with and without side sway.

LEARNING OUTCOMES:

After completion of this unit student will

- Develop kanis method expressions
- Analyze the structures with and without settlement of supports

UNI T – IV

INTRODUCTION OF FLEXIBILITY AND STIFFNESS METHODS:-

Flexibility methods- Introduction- Application to continuous beams including support settlements. Stiffness methods- Introduction-application to continuous beams including support settlements.

LEARNING OUTCOMES:

After completion of this unit student will

- Analyze continous beams with and without settlement of supports

UNIT – V

PLASTIC ANALYSIS:

Introduction – Idealized stress – Strain diagram – shape factors for various sections – Moment curvature relationship – ultimate moment – Plastic hinge – lower and upper bound theorems – ultimate strength of fixed and continuous beams.

LEARNING OUTCOMES:

After completion of this unit student will

- Learn the importance of shape factors and analyze the shape factors for various shapes
- Learn the moment curvarture relation ship
- analyze the ultimate strength of beams

TEXT BOOKS:

1. Analysis of structures by Vazrani&Ratwani – Khanna Publications.
2. Theory of structures by Ramamuratam, jain book depot , New Delhi.

REFERENCES :

1. Structural analysis by R.S.Khurmi, S.Chand Publications, New Delhi.
2. Basic Structural Analysis by K.U.Muthu*et al.*,I.K.International Publishing House Pvt.Ltd
3. Theory of Structures by Gupta S P, G S Pundit and R Gupta, Vol II, Tata McGrawHill Publications company Ltd.
4. D S Prakash Rao, **"Structural Analysis: A Unified Approach"**, Universities Press

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE54b- REMOTE SENSING AND GIS

(Professional Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- Introduce the basic principles of Remote Sensing and GIS techniques.
- Teach various types of satellite sensors and platforms
- Impart concepts of visual and digital image analyses
- Teach concepts of principles of spatial analysis
- Teach about the application of RS and GIS in Civil engineering

UNIT – I

Introduction to photogrammetric: Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph, Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand concepts of photogrammetry
- Estimate heights and distances.

UNIT – II

Remote sensing: Basic concepts and foundation of remote sensing – elements involved in remote sensing, electromagnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies, introduction to digital data analysis.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand advantages of remote sensing
- Demonstrate concepts of remote sensing.

UNIT – III

Geographic information system: Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, A theoretical framework for GIS. Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS, Vector GIS – File management, Spatial data – Layer based GIS, Feature based GIS mapping.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand concepts of GIS.
- Explain data collection and data interpretation
- Develop terrain characteristics using Mapping

UNIT – IV GIS spatial analysis: Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis. Integrated analysis of the spatial and attribute data.

Learning Outcomes: After completing this Unit, students will be able to

- Know applications of GIS and data interpretation.

UNIT – V Water resources applications: Land use/Land cover in water resources, Surface water mapping and inventory -Watershed management for sustainable development and Watershed characteristics - Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites for artificial Recharge structures - Inland water quality survey and management, water depth estimation and bathymetry.

Learning Outcomes:

After completing this Unit, students will be able to

- Know applications of RS & GIS in water resources applications.
- Study technological problems like reservoir sedimentation ground water identification

Course outcomes

At the end of the course the student will be able to

- comparing with ground, air and satellite based sensor platforms.
- Interpret the aerial photographs and satellite imageries.
- Create and input spatial data for GIS application.
- Apply RS and GIS concepts in water resources engineering.
- Applications of various satellite data.

TEXT BOOKS:

1 Remote Sensing and GIS by B.Bhatta, Oxford University Press,NewDelhi.
2 Advanced surveying : Total station GIS and remote sensing – SatheeshGopi – Pearson publication.

REFERENCES:

1. Fundamentals of remote sensing by gorge Joseph , Universities press,Hyderabad.
2. Concepts & Techniques of GIS by C.P.Lo Albert, K.W. Yonng, Prentice Hall(India) Publications.
3. Basics of Remote sensing & GIS by S.Kumar, LaxmiPublications.
4. Remote sensing and GIS by M.Anjireddy ,B.S.Pubiliications,NewDelhi.
5. Remote Sensing and its applications by LRA Narayana University Press1999.
6. GIS by Kang – tsungchang, TMH Publications &Co.,
7. Principals of Geo physical Information Systems – Peter A Burragh and Rachael Mc Donnell, Oxford Publishers2004

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE54c- CONSTRUCTION TECHNOLOGY & PROJECT MANAGEMENT

(Professional Elective-I)

L	T	P	C
3	0	0	3

Objective:

The objective of the course is to make the student to

- understand about fundamentals of construction management and techniques to be used to perform and complete the construction works Intime
- Describe the basic concepts and skills required for construction project management
- Apply the techniques of project planning and management in construction projects.
- Plan and Schedule a civil engineering project by using techniques like CPM,PERT.

UNIT – I

FUNDAMENTALS OF CONSTRUCTION TECHNOLOGY:

Definitions and Discussion – Construction Activities – Construction Processes - Construction Works – Construction Estimating – Construction Schedule – Productivity and Mechanized Construction – Site Layout – Deployment of Construction Equipment – choice of construction technology

PREFABRICATION IN CONSTRUCTION– Need for prefabrication – Principles – Materials – Modular Coordination-Standardization. - Advantages and Disadvantages

Learning outcomes:

Students will be able to

- Analyze the different construction stages
- Learn various activities in project implementation
- Knowledge on prefabrication in construction

UNIT – II

EARTH WORK

Classification of Soils – Project Site – Development – Setting Out – Groundwater Control methods – Trenchless (No-dig) Technology – Grading. Rock Excavation– Basic Mechanics of Breakage – Blasting Theory – Durability of Rocks – Kinds of Drilling – Selection of the Drilling Method and Equipment – Explosives – Blasting Patterns and Firing Sequence – Smooth Blasting – Environmental Effect of Blasting- Dredging-types of dredging- its importance.

Learning outcomes:

Students will be able to

- Learn dewatering techniques
- Knowledge on drilling and blasting and its suitability

UNIT - III

PROJECT MANAGEMENT AND BAR CHARTS AND MILESTONE CHARTS:

Introduction – Project planning – Scheduling – Controlling –decision -Project Life Cycle- - Role of decision in project management – Development of bar chart – Illustrative examples – Shortcomings of bar charts and remedial measures – Milestone charts.

ELEMENTS OF NETWORK AND DEVELOPMENT OF NETWORK:

Introduction – Event – Activity – Dummy – Network rules – Graphical guidelines for network – Common partial .situations in network – Numbering the events – Cycles Problems – Planning fornetwork construction – Modes of network construction – Steps in development of network – Work breakdown structure –Hierarchies – Illustrative examples – Problems

Learning outcomes:

Students will be able to

- Understand and application of Network techniques in construction
- Application of Management tools like Bar Chart, Gant Chart, CPM and PERT
- Learn about Elements of network
- Analyze Steps in developing a network

UNIT - IV

PERT : TIME COMPUTATIONS & NETWORK ANALYSIS

Introduction – Uncertainties : Use of PERT – Time estimates – Frequency distribution – Mean, variance and standard deviation – Probability distribution – Beta distribution – Expected time Problems -Earliest expected time – Formulation for TE - Latest allowable occurrence time – Formulation for TL - Combined tabular computations for TE and TL problem. Introduction - Slack – Critical path – Illustrative examples – Probability of meeting scheduled date Problems

UNIT – V

CPM**NETWORK ANALYSIS** : CPM : Networks – Activity time estimate – Earliest event time – Latest allowable occurrence time – Combined tabular computations for TE and TL - Start and finish times of activity – Float – Critical activities and critical path – Illustrative examples Problems.-Cost Time Optimization – Direct and Indirect project costs – Total costs – Cost Slopes – Crashing - Cost and Time Optimization.

Learning outcomes:

Students will be able to

- Understand the resource allocation and scheduling
- Analyzehow delay in activities effect the total estimated time of project

Course outcomes:

- Understand different construction techniques and practices.
- List out the requirements for substructure and superstructure in any construction project.
- Learn Network Techniques in construction management – Bar chart, Gant chart, CPM, PERT-
- Comprehending in Resource planning – planning for manpower, materials, equipment.

TEXTBOOKS:

1. Construction project management by JhaPearsonpubilications,NewDelhi.
2. Construction Technology by SubirK.Sarkar and SubhajitSaraswati – Oxford Higher Education-Univ.Press,Delhi.
3. Project Planning and Control with PERT and CPM by Dr.B.C.Punmia, K.K.Khandelwal, Lakshmi Publications NewDelhi.

REFERENCES:

1. Optimal design of water distribution networks P.R.Bhave, Narosa Publishing house 2003
2. Total Project management, the Indian context- by: P.K.JOY- Mac Millan Publishers India Limited.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE57- ENVIRONMENTAL ENGINEERING LAB

L	T	P	C
0	0	3	1.5

Course Objective:

The laboratory provides knowledge of estimating various parameters like pH, Chlorides, Sulphates, Nitratesin water. For effective water treatment, determination of optimum dosage and chloride demand are also included. The estimation status of Industrial effluents will also be taught in the laboratory by estimating BOD and COD ofeffluent.

LIST OF EXPERIMENTS:

1. Determination of pH andTurbidity.
2. Determination ofConductivity.
3. Determination and Estimation of total solids, total volatile solids and total fixedsolids.
4. Determination and Estimation of Total dissolved solids and Total suspendedsolids.
5. Determination ofAlkalinity/Acidity.
6. Determination ofChlorides.
7. Determination ofiron.
8. Determination ofNitrogen.
9. Determination of totalPhosphorous.
10. Determination of Optimum coagulant dose – Jartest.
11. Determination of Chlorinedemand.
12. Determination of DissolvedOxygen.
13. Determination ofB.O.D
14. Determination ofC.O.D
15. Presumptive coliformtest.

NOTE: At least 8 of the above experiments are to be conducted.

LIST OF EQUIPMENT:

1) pH meter,
2) Turbiditymeter,
3) Conductivitymeter,
4) Hot airoven,
5) Mufflefurnace,
6) Dissolved Oxygenmeter,
7) U – V visible spectrophotometer,
8) RefluxApparatus,
9) Jar TestApparatus,
10) BOD incubator.
11) COD Extractionapparatus

Course Outcomes:

At the end of the course, the student will be able to:

- Estimate various parameters of water
- Assess quality of waste water parameters

Text Books:

1. Chemistry for Environmental Engineering by Sawyer and Mc.Carty
2. Standard Methods for Analysis of water and Waste Water –APHA
3. Environmental Engineering Lab Manual by Dr.G.Kotaiah and Dr.N.KumaraSwamy,Charotar Publishers,Anand.

References:

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE58- GEOTECHNICAL ENGINEERING LAB

(Professional Elective-I)

L	T	P	C
0	0	3	1.5

OBJECTIVE:

To obtain the properties of soils by conducting experiments, it is necessary for students to understand the behavior of soil under various loads and conditions.

LIST OF EXPERIMENTS

1. Atterberg'sLimits.
2. Field density-core cutter and sand replacementmethod
3. Grain sizeanalysis
4. Specific gravity of soils by Density Bottle method &Pycnometermethod
5. Permeability of soil, constant and variable headtest
6. Compactiontest
7. CBR test
8. Consolidationtest
9. Unconfined compressiontest
10. Tri-axial Compressiontest (Demo)
11. Direct sheartest.
12. Vane sheartest

NOTE: At least EIGHT of the above experiments are to be conducted.

Course Outcomes:

At the end of the course, the student must be able to:

- Identify various soils based on their characteristics.
- Evaluate permeability and seepage of soils.
- Determine plasticity characteristics of various soils.
- Design consolidation process by predicting settlement of soils.

TEXT BOOKS:

1. Soil Testing Lab Manual by K.V.S. Appa Rao &V.C.C.Rao,University Science Press ,Laxmi Publication.
2. Soil Testing for Engineers by S.Mittal and J.P.Shukla, Kahna Publishers, NewDelhi.
3. Relevant ISCodes.

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE50- BIM FUNDAMENTALS FOR CIVIL ENGINEERS

(Skill Oriented course-III)

L	T	P	C
1	0	2	2

COURSE OBJECTIVES:

The course should enable the students to:

- Provide familiarity with current BIM technologies.
- Understand the shift from 2D representation to 3D simulation.
- Synthesize, link and maintain continuity of existing and designed BIM information and other vitalinformation into the model.
- Explore new project delivery systems and technologies for integrated practice‘.

List of Experiments

1. Introduction to BIM & AUTODESK REVIT
2. Basic Drawing and editing tools
3. Setting Up Levels and Grids
4. Modelling Walls
5. Working With Doors and Windows
6. Working With Curtain Walls
7. Working With Views
8. Adding Components
9. Modelling Floors
10. Modelling Ceilings & Roofs
11. Modelling Stairs And Railing

Text Books:

Chuck Eastman, Paul Teicholz, Rafael Sacks, Kathleen Liston —BIM HANDBOOK‖, Wiley, 2 ndEdition, 2011

COURSE LEARNING OUTCOMES (COs):

At the end of the course, the student will have the ability to:

1. Understand the basics of BIM and Autodesk Revit.
2. Learn about various drawing and editing tools available in Revit architecture.
3. Draw the setting up levels and grids in building using Revit software.
4. Draw a different types of modeling walls in building using Revit software
5. Draw the doors and windows in building using Revit software.
6. Draw curtain walls in building using Revit software.
7. Work with different types of view in a building using Revit software.
8. To draw the adding components, modifying components & working with elements in building using Revit software.
9. Draw the modeling floors in a building using Revit software.
10. Model ceilings and roofs using Revit software.

Model stairs and railing using Revit software

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech. V-Sem (R20)

FUZZY SET THEORY, ARITHMETIC AND LOGIC

(Open Elective -I)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing

- the basic knowledge to understand Fuzzy set theory and Arithmetic. and
- Logic, related to a real word problems of engineering, Science etc.

UNIT – 1: Classical (Crisp) Sets To Fuzzy Sets & Fuzzy Sets Versus Crisp Sets: **9 Hrs**

Classical (Crisp) Sets To Fuzzy Sets:

Introduction: Crisp Sets: An Overview, Fuzzy Sets: Basic Types, Fuzzy Sets: Basic Concepts.

Fuzzy Sets Versus Crisp Sets:

Alpha -Cuts :Additional Properties of alpha -Cuts, Representations of Fuzzy Sets, Extension Principle for Fuzzy Sets.

Learning Outcomes:

At the end of this unit, the student will be able to

• The basic concepts of Sets and Fuzzy sets	L2
• Analyze the Fuzzy Sets Versus Crisp Sets	L3

UNIT – II: Operations On Fuzzy Sets:

Types of Operations, Fuzzy Complements, Fuzzy Intersections: t-Norms.

Fuzzy Unions: t-Conorms ,Combinations of Operations, Aggregation Operations.

Learning Outcomes:

At the end of this unit, the student will be able to

• Do some operations on Fuzzy sets	L2
• Assess t-Norms Fuzzy Unions	L3

UNIT – III: Fuzzy Arithmetic & Fuzzy Relations :

Fuzzy Arithmetic :

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals, Arithmetic Operations on Fuzzy Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

Fuzzy Relations:

Crisp versus Fuzzy Relations, Projections and Cylindric Extensions, Binary Fuzzy Relations,

Binary Relations on a Single Set, Fuzzy Equivalence Relations, Fuzzy Compatibility Relations, Fuzzy Ordering Relations.

Learning Outcomes:

At the end of this unit, the student will be able to

• Perform arithmetic operations on Fuzzy numbers and equations.	L2
• Analyze Fuzzy Relations, Projections and Cylindric Extensions etc.	L3

UNIT – IV: Fuzzy Relation Equations & Possibility Theory:	
Fuzzy Relation Equations: General Discussion ,Problem Partitioning ,Solution Method. **Possibility Theory:** Fuzzy Measures, Evidence Theory, Possibility Theory, Fuzzy Sets and Possibilty Theory, Possibility Theory versus Probability Theory.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Solve Fuzzy relation equations.	L3
• Analyze Possibility Theory.	L4
UNIT – V: Fuzzy logic:	
Classical Logic: An Overview, Multi-valued Logics, Fuzzy Propositions, Fuzzy Quantifiers, Linguistic Hedges, Inference from Conditional Fuzzy Propositions, Inference from Conditional and Qualified Propositions, Inference from Quantified Propositions.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Understand the Fuzzy logic.	L1
• Analyze the Inferences from Conditional, Qualified, and Quantified Propositions.	L4
Text Books:	
1. Fuzzy Sets and Fuzzy Logic, Geoge J. Klir and Bo Yuan	
Reference Books:	
1. Fuzzy Mathematical Models in Engineering and Management Science, A. Kaufmann and M.M. Gupta	
2. Fuzzy Logic, Timothy J. Ross	
3. Fuzzy Set Theory, H.J. Zimmermann	
4. Introduction to Fuzzy Logic and Fuzzy Sets, J.J. Buckley and E. Eslami	
Course Outcomes:	
At the end of this Course the student will be able to	
• Understand the basic concepts of Fuzzy sets and logic.	**L1**
• Do some operations of Fuzzy sets.	**L2**
• Solve Fuzzy relation equations.	**L3**
• Analyze the Inferences from Conditional, Qualified, and Quantified Propositions.	**L4**
• analyze the real word problem through the technique of Fuzzy set theory and logic to have better insight of the real word problems.	**L5**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
III B.TECH – I SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY)

FUNCTIONAL NANOMATERIALS FOR ENGINEERS
(Common to all branches)

L	T	P	C
3	0	0	3

Course Objectives:

- Be able to describe the terminology and basics of smart materials and smart systems
- Be able to understand the classification and applications of smart materials.
- Be able to understand the use of appropriate materials for energy applications.
- Be able to identify appropriate techniques for understanding the mechanisms of nanosensors
- Be able to explain the concepts of self-assembling monolayers and their applications

UNIT-I: INTRODUCTION TO FUNCTIONAL /SMART NANOMATERIALS **9 Hrs**

Introduction:-Nanomaterials and their importance (in brief), Functional/ Smart Nanomaterials, – (Hydrogels, Carbon nanotubes) and their Functionalization techniques, Properties of Smart materials (Sensing materials, Actuation materials, Self-detection, Self-corrective, self-healing, Shock Absorbers)- Components of smart systems (Sensor :- Data Acquisition, Data Transmission; Command and control unit, Actuator:- Data Instructions, Action Devices)

Learning Outcomes:

At the end of this unit, the student will be able to

• **Understand** the basic properties and functionalization of smart nanomaterials	**L1**
• **Explain** the need of functional/smart nanomaterials for advanced tecghnology	**L2**
• **Identify** engineering applications of sensors	**L3**
• **Analyze** the sensing, control and detection mechanism in smart nanomaterials	**L4**
• **Illustrate** the components of smart systems	**L2**

UNIT-II: CLASSIFICATION AND APPLICATIONS **9 Hrs**

Introduction, Classification of smart materials (piezoelectric, electrostrictive, Magnetostrictive, Thermoresponsive and Electrochromic), Shape Memory Alloys and their working principle, Applications of smart materials in Aircrafts, Medicine, Robotics,Smart fabrics, Sporting goods and smart glass, Merits and de-merits of smart materials.

Learning Outcomes:

At the end of this unit, the student will be able to

• **Classify** smart materials based on electrical, magnetic and thermal characteristics	**L1**
• **Understand** the basic concepts and working principle of memory alloys	**L2**
• **Identifies** the Engineering applications of smart materials	**L2**
• **Apply** the concepts to Aircrafts, Medicine and Robotic fields	**L3**
• **Identify** the Merits and demerits of smart materials in engineering field	**L2**

Unit-III NANOSENSORS **9 Hrs**

Introduction, Principle of nanosensors, Types of nanosensors (Physicalnanosensors – *Pressure, Force, Mass, Displacement*, Optical nanosensors – *Proximity, Ambient light*, Chemical nanosensors- *Chemical composition, Molecular concentration*).Applications of nanosensors (Medicine, Aerospace, Communication, Structural Engineering).

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the working principle and concept of nanosensors	L1
• **Classify** the nanosensors based on their working principle and application	L2
• **Summarize** various types of nanosensors	L2
• **Explain** the applications of nanosensors in various fields	L2
• **Apply** the concept of nanosensors in Medicine, Aerospace, Communication, Structural Engineering fields	L3

UNIT-IV: SELF-ASSEMBLING MONO LAYERS	**9Hrs**
Introduction, principles of self-assembly, monolayers, Characteristics of Self assembled monolayers (SAMs), Types of SAMs, Factors influencing Monolayer order, Methods of preparation of SAMs(Langmuir- Boldgett film :Mechanism, Experimental arrangement, Assembly, Advantages and disadvantages of LB films) patterning of SAMs (Locally attract, Locally remove, Modify tail group).Applications (Self-cleaning and moisture repellent).	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the concept of self-assembling	**L1**
• **Understand** the significance of molecular layers	**L2**
• **Explain** the concept of Langmuir- Boldgett film preparation	**L2**
• **Explain** the important factors influencing Monolayer order	**L2**
• **Classify** the materials based on patterning of SAMs	**L2**
• **Apply** the concept of Self-cleaning and moisture repellent	**L3**

UNIT-V: NANOMATERIALS FOR ENERGY APPLICATIONS	**9Hrs**
Introduction, **Solar Cells** (Silicon Solar Cells, Thin film Solar Cells, Organic Solar Cells, Polymer solar cells) Working Principle, Efficiency estimation and advantages. **HydrogenFuel Cells** – Working Principle, Configuration, Assembly of fuel cell, Water **splitting** – H_2 Production, Photocatalytic process.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the concept of solar cell	**L1**
• **Classify** the solar cells based on manufacturing material	**L2**
• **Explain** the construction and working principle of solar cell	**L2**
• **Interpret** the efficiency and advantages in various solar cells	**L2**
• **Explain** the construction and working principle of hydrogen cells	**L2**
• **Identify** applications of water splitting for H_2 production	**L2**
• **Explain** the photocatalytic process	**L2**

Text Books:

1. YaserDahman, Nanotechnology and Functional Materials for Engineers-, Elsevier, 2012
2. E. Zschech,C. Whelan, T. Mikolajick, Materials for Information Technology: Devices, Interconnects and Packaging Springer-Verlag London Limited 2005.

Reference Books:

1. Gauenzi,P.,Smart Structures, Wiley, 2009.
2. MahmoodAliofkhazraei, Handbook of functional nanomaterials, Vol (1&2), Nova Publishers, 2014.

Course Outcomes:	
At the end of this Course the student will be able to	
• **Identify** the various functional/smart nanomaterials materials	**L1**
• **Classify** the smart nanomaterials based their applications and properties	**L2**
• **Apply** the various functional nanomaterials in various applications	**L3**
• **Classify** the solar cells based on manufacturing material	**L4**
• `**Interpret** the efficiency and advantages in various solar cells	**L5**



JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech – III-I-Sem	L	T	P	C
	3	0	0	3

Chemistry of Energy Materials (OE.1)
(common to all branches)

Course Objectives:

- To make the student understand basic electrochemical principles such as standard electrode potentials, emf and applications of electrochemical principles in the design of batteries.
- To understand the basic concepts of processing and limitations of fossil fuels and Fuel cells & their applications.
- To impart knowledge to the students about fundamental concepts of hydrogen storage in different materials and liquefaction method.
- Necessity of harnessing alternate energy resources such as solar energy and its basic concepts.
- To understand and apply the basics of calculations related to material and energy flow in the processes.

UNIT-I: **Electrochemical Systems** — 9 Hrs

a) Introduction to Energy- Materials, Chemistry, Engineering and Technology.
b) Electrochemical Systems: Galvanic cell, standard electrode potential, application of EMF, Electrode mechanism, Batteries-Lead-acid and Lithium ion batteries.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Solve the problems based on electrode potential (L3)
- Describe the Galvanic Cell (L2)
- Differentiate between Lead acid and Lithium ion batteries(L2)
- Illustrate the electrical double layer(L2)

UNIT-II:**Fuel Cells** — 7 Hrs

Basic design of fuel cell, Fuel cell working principle, Fuel cell efficiency Classification of fuel cells, Polymer electrolyte membrane (PEM) fuel cells, Solid-oxide fuel cells (SOFC), and their applications

Learning Outcomes:
At the end of this unit, the student will be able to:

- Classify the fuel cell(L2)
- Describe the working Principle of Fuel cell(L2)
- Explain the efficiency of the fuel cell (L2)
- Discuss about the Basic design of fuel cells(L3)

UNIT-III: **Hydrogen Storage**	9 Hrs
Hydrogen Storage, Chemical and Physical methods of hydrogen storage, Hydrogen Storage in metal hydrides, metal organic frame works (MOF) zinc-(3-aminotriazolato)-oxalate; MOF-74 (Zn_2 -(2,5-dihydroxy-1,4-benzenedicarboxylate), Carbon structures (Carbon nano tubes, fullerenes), metal oxide porous structures, hydrogen storage by high pressure methods-liquefaction method	
Learning Outcomes: After completing the course, the student will be able to: • Differentiate Chemical and Physical methods of hydrogen storage (L2) • Discuss the metal organic frame work(L3) • Illustrate the carbon and metal oxide porous structures (L2) • Describe the liquification methods(L2)	
UNIT-IV: **Solar Energy**	8 Hrs
Solar energy introduction and prospects, photovoltaic (PV) technology, concentrated solar power (CSP), Solar Fuels – Hydrogen: Ammonia& Hydrazine, Solar cells (Si-Te& Cd-Te), advantages and disadvantages	
Learning Outcomes: After completing the course, the student will be able to: • Apply the photo voltaic technology (L3) • Demonstrate about solar energy and prospects(L2) • Illustrate the Solar cells (L2). • Discuss about concentrated solar power(L3)	
UNIT-V: **Photochemical and Photo electrochemical Conversions**	7 Hrs
Photochemical cells and applications of photochemical reactions, photo electrochemical cell, advantages of photoelectro catalytic conversions.	
Learning Outcomes: • After completing the course, the student will be able to: • Differentiate between Photo and Photo electrochemical Conversions(L2) • Illustrate the photochemical cells(L2) • Identify the applications of photochemical reactions(L3) • Interpret advantages of photoelectron catalytic conversion(2)	
Text Books:	
1. Bahl and Bahl and Tuli, Essentials of Physical Chemistry, S. Chand Publications, New Delhi, 28th Edition, 2020. 2. US Department of Energy (EG&G technical services and corporation), Fuel Cell Hand Book 7th Edition, 2004.	
Reference Books: 1. Ira N. Levine, Physical chemistry 6th Edition, McGraw Hills Education, New Delhi, 2009. 2. Silver and Atkins, Inorganic Chemistry, , 7th Edition, Oxford University Press, 2018 3. Michael Hirscher, Hand book of Hydrogen Storage: New materials for future energy, storage, Wiley-VCH Verlag GmbH & Co. KGaA, 2010	

4. Klaus Jagar et.al., Solar energy fundamental, technology and systems, UIT-Cambridge publishers, 2016

Course Outcomes:

At the end of this Course the student will be able to

- Understand to perform simultaneous material and energy balances(L1)
- Lists about various electrochemical and energy systems(L1)
- Classify solid, liquid and gaseous fuels(L3)
- Analyze the energy demand of world, nation and available resources to fulfill the demand(L3)
- Evaluate the conventional energy resources and their effective utilization(L3)
- To be able to understand and perform the various characterization techniques of fuels(L1)
- Explain knowledge of modern energy conversion technologies(L2)
- To be able to identify available nonconventional (renewable) energy resources and techniques to utilize them effectively(L1)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE55A- BASICS OF CIVIL ENGINEERING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives:

- To study the basic concept of Civil Engineering and instruction buildings.
- To understand the concept of planning of buildings and drawing of single stored building.
- To study the Basic principles of surveying and instruments used.
- To study about the various materials used for the construction of Buildings.
- To understand the construction of Structural Elements in buildings.

UNIT-I:

Introduction to Civil Engineering Building planning : Introduction to types of buildings as per NBC; Selection of site for buildings. Components of a residential building and their functions. Introduction to industrial buildings – office / factory / software development office / power house /electronic equipment service centre

UNIT-II:

Site plan, Orientation of a building, Open space requirements, Position of doorsand windows, Size of rooms; Preparation of a scaled sketch of the plan of asingle storeyed residential building in a given site plan. Introduction to the various building area terms - Computation of plinth area/ built up area, Floor area / carpet area - for a simple single storeyed building; Setting out of a building.

UNIT-III

Surveying - Principles and objectives of surveying; Horizontal measurements – instruments used – tape, types of tapes; Ranging(direct ranging only) Theodolite and Total station-Principles

UNIT-IV:

Building materials

Bricks, cement blocks - Properties and specifications.

Cement – OPC, properties, grades; other types of cement and its uses (inbrief).

Cement mortar – constituents, preparation.

Concrete – PCC and RCC – grades.

Steel - Use of steel in building construction, types and market forms.

UNIT-V:

Building construction – Foundations; Bearing capacity of soil (definitiononly); Functions of foundations, Types - shallow and deep (sketches only).

Brick masonry – header and stretcher bond, English bonds – Elevation and plan (one brick thick walls only).

Roofs – functions, types, roofing materials (brief discussion only).

Floors – functions, types; flooring materials (brief discussion only).

Decorative finishes – Plastering – Purpose, procedure.

Paints and Painting – Purpose, types, preparation of surfaces for painting (brief discussion only).

Text Books:

- Rangwala, S. C., Essentials of Civil Engineering, Charotar Publishing House
- Rangwala, S. C. and Dalal, K. B., Engineering Materials, Charotar Publishing house
- Rangwala, S. C. and Dalal, K. B., Building Construction, Charotar Publishing house
- Dr. K. R. Arora, "Surveying Volume-1", Standard book house, New Delhi, 13th Edition, 2012. 2. S. K.
- Duggal, "SurveyingVolume-2", Tata McGraw-Hill Education Private Limited, India,New Delhi, 3rd Edition, 2009.

Course Outcomes:

At the end of this Course the student will be able to

- To learn the types of buildings and components of building.
- To get the knowledge of planning of single stored buildings.
- To understand Basic concepts of surveying and Basic uses of instruments in surveying.
- To know the materials used for the construction of Buildings.
- To get the knowledge about the construction methods of Buildings.

Annexure-I *R20*

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

BASICS OF NON-CONVENTIONAL ENERGY SOURCES

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Identify various sources of Energy and the need of Renewable Energy Systems
- Understand the concepts of Solar Radiation, Wind energy and its applications
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

UNIT – I: Solar Energy **10 Hrs**

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy thermal storage.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about solar thermal parameters
- To distinguish between flat plate and concentrated solar collectors
- To know about thermal storage requirements
- To know about measurement of solar radiation

UNIT – II: PV Energy Systems **10 Hrs**

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems..

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

UNIT – III: Wind Energy **10 Hrs**

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

UNIT – IV: Geothermal Energy **10 Hrs**

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India..

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Geothermal energy and its mechanism of production and its Applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

UNIT – V: Miscellaneous Energy Technologies **10 Hrs**

Ocean Energy: Tidal Energy-Principle of working, performance and limitations. Wave Energy-Principle of working, performance and limitations.

Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

Text Books:

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

Reference Books:

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd,2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria& Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

Course Outcomes:

At the end of this Course the student will be able to

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells



B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME55a-3D PRINTING

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize of additive manufacturing / rapid prototyping and its applications in various fields.
- Impart reverse engineering techniques.
- Explain different processes available in additive manufacturing.
- Bring awareness on mechanical properties of materials and geometric issues related to additive manufacturing applications.

UNIT – I: Introduction to 3D PRINTING Systems: **10 Hrs**

History and Development of 3D printing, Need of 3D Printing, Difference between 3D Printing and CNC, Classification of 3D Printing Processes: Based on Layering Techniques, Raw Materials and Energy Sources, 3D Printing Process Chain, Benefits and Applications of 3D Printing, Representation of 3D model in STL format, RP data formats: SLC, CLI, RPI, LEAF, IGES, CT, STEP, HP/GL.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the applications for additive manufacturing processes. **L3**
- Explain the process of additive manufacturing. **L2**
- Represent a 3D model in STL format and other RP data formats to store and retrieve the geometric data of the object. **L3**

UNIT – II: CAD & Reverse Engineering: **8 Hrs**

Basic Concept, Digitization techniques, Model Reconstruction, Data Processing for Additive Manufacturing Technology: CAD model preparation, Part Orientation and support generation, Model Slicing, Tool path Generation, Software's for Additive Manufacturing Technology: MIMICS, MAGICS. Reverse Engineering (RE) –Meaning, Use, RE – The Generic Process, Phase of RE Scanning, Contact Scanners, Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply various digitalization techniques. **L3**
- Explain the concept of reverse engineering and scanning tools. **L2**

UNIT – III: Solid and Liquid Based AM Systems: **8 Hrs**

Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications.

Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications.

Stereo lithography Apparatus (SLA): Principle, Process, Materials, Advantages, Limitations and Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of solid and liquid based AM systems. **L2**
- Identify the materials for solid and liquid based AM systems. **L3**

UNIT – IV: Powder Based AM Systems: **8 Hrs**

Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

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Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. **L2**
- Apply SLS, LENS and EBM 3D printing methods. **L3**

UNIT – V: Other Additive Manufacturing Systems: **8 Hrs**

Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballistic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain principles and limitation of 3D printing using BPM and SDM. **L2**
- Use BPM and SDM 3D printing methods. **L3**

Text Books:

1. Ian Gibson, David W. Rosen, Brent Stucker, Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, 1/e Springer, 2010.
2. Chua C.K., Leong K.F. and Lim C.S., Rapid Prototyping: Principles and Applications, 2/e World Scientific Publishers, 2003.
3. Liou W. Liou, Frank W., Liou, Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development, CRC Press, 2007.

Reference Books:

1. Pham D.T. and Dimov S.S., Rapid Manufacturing; The Technologies and Application of RPT and Rapid Tooling, Springer, London 2001.
2. Gebhardt A., Rapid prototyping, Hanser Gardener Publications, 2003.
3. Hilton P.D. and Jacobs P.F., Rapid Tooling: Technologies and Industrial Applications, CRC Press, 2005.
4. Rafiq Noorani, Rapid Prototyping: Principles and Applications in Manufacturing, John Wiley & Sons, 2006.

Course Outcomes:

At the end of this Course the student will be able to

- Demonstrate various additive manufacturing and rapid prototyping techniques applications. **L4**
- Describe different additive manufacturing processes. **L3**
- Apply methods in rapid prototyping. **L2**
- Use powder based AM system. **L3**
- Model 3D printing using SDM and BPM methods. **L6**

Online Learning Resources:

- https://www.hubs.com/knowledge-base/introduction-fdm-3d-printing/
- https://slideplayer.com/slide/6927137/
- https://www.mdpi.com/2073-4360/12/6/1334
- https://www.centropiaggio.unipi.it/sites/default/files/course/material/2013-11-29%20-%20FDM.pdf
- https://lecturenotes.in/subject/197
- https://www.cet.edu.in/noticefiles/258_Lecture%20Notes%20on%20RP-ilovepdf-compressed.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1517967201.pdf
- https://www.youtube.com/watch?v=NkC8TNts4B4

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME55b-SMART MATERIALS

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize the smart materials and its role in developing intelligent systems.
- Introduce the students with HBLS and LBHS smart materials.
- Expose the students in smart systems development and uses.
- Understand the working principle of smart actuators and smart sensors.

UNIT – I: Introduction to Smart Materials: **10 Hrs**

Introduction to Smart Materials: What is Intelligence? Artificial intelligence Vs. embedded Intelligence, Definition of smart material, need for smart materials, classifications of smart systems, components of a smart systems, smart system applications, the role of Smart Materials in developing Intelligent Systems and Adaptive Structures.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall what intelligence is. **L1**
- Define smart materials. **L1**
- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Illustrate the applications of smart systems. **L2**

UNIT – II: High bandwidth - Low strain generating (HBLS) Smart Materials: **8 Hrs**

High bandwidth - Low strain generating (HBLS) Smart Materials:

Piezoelectric Materials – constitutive relationship, electromechanical coupling coefficients, piezoelectric constants, piezoceramic materials, variation of coupling coefficients in hard and soft piezoceramics, polycrystalline vs single crystal piezoelectric materials, polyvinyldene fluoride, piezoelectric composites.

Magnetostrictive Materials – constitutive relationship, magneto-mechanical coupling coefficients, Joule Effect, Villari Effect, Matteuci Effect, Wiedemann effect, Giant magnetostriction in Terfenol-D, Terfenol-D particulate composites, Galfenol and Metglas materials.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the constitutive relationship of piezoelectric materials. **L2**
- Compare polycrystalline and single crystal piezeoelectric materials. **L2**
- Explain concepts of Joule effect, Villari effect, Matteuci effect, Wiedemann effect. **L2**
- Discus Galfenol and Metglas materials. **L6**

UNIT – III: Low bandwidth - High strain generating (LBHS) materials: **8 Hrs**

Low bandwidth - High strain generating (LBHS) materials: Shape Memory Alloys (SMA) – Introduction, Phenomenology, Influence of stress on characteristic temperatures, Modelling of shape memory effect. Vibration control through shape memory alloys. Design considerations, multiplexing embedded NiTiNOL actuators. Electro-active Polymers (EAP)- Introduction, Phenomenology, Influence of stress on characteristic temperatures.

Learning Outcomes:

At the end of this unit, the student will be able to

- List various types of LBHS smart materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain the concept of vibration control through shape memory alloys. **L2**
- Discus design considerations of shape memory alloy. **L6**

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UNIT – IV: Smart actuator: **8 Hrs**

Smart actuators:

Based on HBLS smart materials: Piezoelectric Actuators – Induced Strain actuation model, Unimorph and Bimorph Actuators, Actuators embedded in composite laminate, Impedance matching in actuator design, Feedback Control, Pulse Drive, Resonance Drive. Magnetostrictive Actuators – Magnetostrictive Mini Actuators, Thermal instabilities, Discretely distributed actuation, Manetostrictive Composites.

Based on LBHS Smart Materials - Shape Memory Alloy based actuators for Shape Control, Electro-active Polymers for Work-Volume Generation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recall working principle of actuators. **L1**
- Explain impedance matching in actuator design, feedback control, pulse drive and resonance. **L2**
- Describe the working principle of Piezoelectric Actuators & Magnetostrictive Actuators. **L2**
- Discus the concepts of actuators based on HBLS and LBHS. **L6**

UNIT – V: Smart sensors: **8 Hrs**

Smart sensors:

Sensors based on HBLS Smart Materials - Piezoelectric Sensors, Magnetostrictive Sensors, Techniques of Self Sensing MEMS Sensors.

Sensors based on LBHS Smart Materials - EAP based sensors, SMA based encoders, Optical Fibre based Sensing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Select the type of sensor required for smart systems. **L1**
- Explain techniques of self sensing MEMS sensors. **L2**
- discus EPA based and SMA based sensors. **L6**
- Explain optical based sensing system. **L2**

Text Books:

1. M.V. Gandhi, B.D. Thompson" Smart Materials and Structures" Springer Science & Business Media, 31.
2. A.V. Srinivasan, Smart Structures; Analysis and Design, Cambridge University Press, Cambridge; New York, 2001
3. K.Uchino, Kluwer, Piezoelectric Actuators and ultrasonic Motors Academic Publishers, Boston, 1997.

Reference Books:

1. Brian Culshaw, Smart Structures and Materials, Artech House, Boston,2000.
2. Gauenzi, P., Smart Structures, Wiley, 2009.
3. Cady, W. G., Piezoelectricity, Dover Publication.
4. A.J. Moulson and J.M-Herbert, Electro ceramics: Materials, Properties/ / Wiley/ 2/e.

Course Outcomes:

At the end of this Course the student will be able to

- Describe the role of smart materials in development of intelligent systems and adaptive structures. **L2**
- Compare polycrystalline and single crystal piezeoelectric materials. **L2**
- Identify the influence of stress on characteristic temperatures in SMA and EAP. **L3**
- Explain techniques of self sensing MEMS sensors. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/112104251
- http://wwwcourses.sens.buffalo.edu/mae538/LecNotes.html
- http://ssdl.iitd.ac.in/vssdl/smart.pdf
- https://www.stem.org.uk/resources/elibrary/resource/33044/smart-materials-1

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20AEC55a- FUNDAMENTALS OF ELECTRONICS AND COMMUNICATION ENGINEERING

(Open Elective-I)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To study the basic principle, construction and operation of semiconductor devices.
- To learn the real time applications of semiconductor devices.
- To introduce binary number systems, logic gates and digital logic circuits.
- To get an idea about the basic principles of communication systems and their applications.
- To learn the measurement of physical parameters using Sensors and Transducers.

UNIT I

Introduction to Electronics Engineering: Overview, scope and objective of studying Electronics Engineering. Introduction to semiconductor devices: Bond structure of semiconductors, intrinsic and extrinsic semiconductors; Basic principle and operation of semiconductor devices – diode, bipolar junction transistor, field effect transistors; Introduction to VLSI.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic principle, construction and operation of semiconductor devices.(L2)
- Learn about the diode, bipolar junction transistor and field effect transistors.(L1)

UNIT II

Applications of semiconductor devices: Basic concepts of rectifiers, voltage regulators, amplifiers and oscillators; Basic concepts of operational amplifier and their applications.

Learning Outcomes:

At the end of the unit, the student will be able to:

- To learn the real time applications of semiconductor devices.(L1)
- To understand the basic concepts of operational amplifier and their applications.(L2)

UNIT III

Introduction to digital systems: Binary number system, Boolean algebra, Logic gates, adders, one-bit memory, flip-flops (SR, JK), shift registers, Asynchronous counter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the binary number systems, Boolean algebra and working of logic gates.(L2)
- Know the working and applications of digital logic circuits.(L1)

UNIT IV

Introduction to Communication Systems: Elements of a communication system – transmitter and receiver; Signal types in communication; FDM and TDM; Processing of signals for transmission – basic concepts of amplitude and frequency modulation; Examples of telecommunication systems – telephone, radio, television, mobile communication and satellite communication.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Identify the basic elements of a communication system.(L2)
- Understand various examples of telecommunication systems.(L2)

UNIT V

Sensors and Transducers - Active and passive transducers: Measurement of displacement (Resistance, capacitance, inductance; LVDT) Force (strain gauges) Pressure (piezoelectric transducers) Temperature (resistance thermometers, thermocouples and thermistors), Velocity, Acceleration, Vibration, pH measurement Signal Conditioning Circuits.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the basic working principle and applications of different sensors and transducers.(L2)
- Measure physical parameters using different types of sensors and transducers.(L3)

TEXT BOOKS

1. Millman J, Halkias C.C andJit S, "Electronic Devices and Circuits", Tata McGraw-Hill, 2nd 2007 Edition.
2. Mano M.M., "Digital Design", Prentice-Hall, 3rd Edition. 2002
3. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation",DhanpatRai& Co. 3rd edition Delhi, 2010.
4. Kennedy G. and Davis B., "Electronic Communication Systems", Tata McGraw-Hill, 4th 2008 Edition.

REFERENCE BOOKS

1. Tomasi W., "Advanced Electronic Communication Systems", Pearson/Prentice-Hall, 6th 2004 Edition.
2. Boylstead R.L. andNashelsky L., "Electronic Devices and Circuit Theory", Pearson, 10th 2009 Edition.

Course outcomes:

At the end of this course, the students will be able to

- Understand the basic principle, construction and operation of semiconductor devices.(L2)
- Learn the real time applications of semiconductor devices.(L1)
- Comprehend the binary number systems, logic gates and digital logic circuits.(L1)
- Understand the basic principles of communication systems and their applications.(L2)
- Measure the physical parameters using Sensors and Transducers.(L3)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC55b- TRANSDUCERS AND SENSORS

(Open Elective-I)

L – T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To study about the characteristics of instrumentation system and transducers.
- To know the operation of different types of Temperature Transducers.
- To learn the operation of different types of Flow Transducers.
- To understand the working and operation of different types of Pressure Transducers.
- To gain the knowledge on working of Force and Sound Transducers.

UNIT I

Introduction: General Configuration and Functional Description of measuring instruments, Static and Dynamic Characteristics of Instrumentation System, Errors in Instrumentation System, Active and Passive Transducers and their Classification.

Motion Transducers: Resistive strain gauge, LVDT, RVDT, Capacitive transducers, Piezo-electric transducers, seismic displacement pick-ups, vibrometers and accelerometers.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the characteristics of instrumentation system and transducers.(L1)
- Measure motion using different motion transducers.(L3)

UNIT II

Temperature Transducers: Standards and calibration, fluid expansion and metal expansion type transducers - bimetallic strip, Thermometer, Thermistor, RTD, Thermocouple and their characteristics.

Hall effect transducers, Digital transducers, Proximity devices, Bio-sensors, Smart sensors, Piezo-electric sensors.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the working principle of temperature transducers.(L2)
- Study about different types of bio sensors and smart sensors.(L1)

UNIT III

Flow Transducers: Bernoulli's principle and continuity, Orifice plate, Nozzle plate, Venture tube, Rotameter, Anemometers, Electromagnetic flow meter, Impeller meter and Turbid flow meter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the Bernoulli's principle and continuity.(L2)
- Learn how to measure flow using different types of flow meters.(L1)

UNIT IV

Pressure Transducers: Standards and calibration, different types of manometers, elastic transducers, diaphragm bellows, bourdon tube, capacitive and resistive pressure transducers, high and low pressure measurement.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Work with different types of manometers.(L3)
- Use different types of pressure transducersto measure pressure.(L3)

UNIT V

Force and Sound Transducers: Proving ring, hydraulic and pneumatic load cell, dynamometer and gyroscopes. Sound level meter, sound characteristics, Microphone.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn how to measure force using force transducers.(L1)
- Understand the working and operation of sound transducers.(L2)

TEXT BOOKS

1. A.K. Sawhney, "A course in Electrical and Electronics Measurements and Instrumentation", DhanpatRai& Co, 3rd edition Delhi, 2010.
2. Rangan C.S, Sarma G.R and Mani V S V, "Instrumentation Devices and Systems", TATA McGraw Hill publications, 2007.

REFERENCE BOOKS

1. Doebelin. E.O, "Measurement Systems Application and Design", McGraw Hill International, New York, 2004.
2. Nakra B.CandChaudharyK.K , "Instrumentation Measurement and Analysis", Second Edition, Tata McGraw-Hill Publication Ltd.2006.

Course outcomes:

At the end of this course, the students will be able to

- Understand the characteristics of instrumentation system and transducers.(L2)
- Know the operation of different types of Temperature Transducers.(L1)
- Compare the operation of different types of Flow Transducers.(L2)
- Correlate the working and operation of different types of Pressure Transducers.(L4)
- Gain the knowledge on working of Force and Sound Transducers.(L1)

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS55A- Fundamentals of Internet of Things

(Open Elective-I)

L	T	P	C
3	0	0	3

Course objectives:

- To understand the fundamentals of Internet of Things.
- To build a small low cost embedded system using Arduino / Raspberry Pi or equivalent boards.
- To apply the concept of Internet of Things in the real world scenario.

UNIT I : Fundamentals of IoT

Introduction – Characteristics-Physical Design – IoT Protocols – Logical Design – Enabling technologies – IoT Levels – Six Levels of IoT - Domain Specific IoTs.

Learning Outcome:

At the end of this unit, students will able to

- Describe the IoT devices physical design and able to design IoT devices in various levels of IoT L1
- Explain the technologies enabling related to industry. L2

UNIT II: IOT and M2M

Software defined networks, network function virtualization, difference between SDN and NFV for IoT Basics of IoT System Management with NETCONF, YANG- NETCONF, YANG, SNMP, NETOPEER.

Learning Outcome:

At the end of this unit, students will able to

- Describe the Software defined networks and Network function virtualization with respect to the IoT systems. L2
- Explain the NETCONF protocol with YANG modeling language. L2

UNIT III: IoT Design Methodology

IoT Systems Management – IoT Design Methodology – Specifications Integration and Application Development.

Learning Outcome:

At the end of this unit, students will able to

- Describe the IoT devices complete design methodology with all spectifications. L2
- Explain the system Integration and application development and deployment.L3 L3

UNIT IV: Sensors and Connectivity

Sensors- Types of sensor nodes, Internet communications, IP addresses, MAC Address, TCP and UDP Ports, Application layer protocols

Learning Outcome:

At the end of this unit, students will able to

- Describe various sensors usage with respect to the IoT systems and differentiation between IP address and MAC address L3
- Explain the benefits of application layer protocols. L4

UNIT V: IOT Industry Applications

Cisco IoT system - IBM Watson IoT platform – Manufacturing - Converged Plant wide Ethernet Model (CPwE) – Power Utility Industry – Grid Blocks Reference Model - Smart and Connected Cities: Layered architecture, Smart Lighting, Smart Parking Architecture and Smart Traffic Control

Learning Outcome:

At the end of this unit, students will able to

- Describe the industry oriented IoT devices and its applications. L4

TEXT BOOKS:

2. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A Hands-on Approach", Universities Press, 2015.
3. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, —IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, Cisco Press, 2017

REFERENCES:

4. Manoel Carlos Ramon, "Intel® Galileo and Intel® Galileo Gen 2: API Features and Arduino Projects for Linux Programmers", Apress, 2014.
5. Marco Schwartz, "Internet of Things with the Arduino Yun", Pack Publishing, 2014.
6. *Simon Monk, "Programming the Raspberry Pi: Getting Started with Python"*, McGraw-Hill, *2013.*
7. CharalamposDoukas,"Building Internet of Things With the Arduino", Second Edition, 2012.
8. Dr.John Bates, "Thingalytics: Smart Big Data Analytics for the Internet of Things", Software AG Publisher, 2015.

Course Outcomes:

- Interpret the impact and challenges posed by IoT networks leading to new architectural models. L2
- Appraise the role of IoT protocols for efficient network communication. L3
- Illustrate different sensor technologies for sensing real world entities and identify the

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS55B-E-Marketing
(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about
I. Understand the legal and ethical issues in e-marketing.

II. Analyze online marketing and supply chain management.

III. Provides extensive theoretical and practical knowledge of online marketing.

IV. Develop marketing skills required for a continuously growing international business environment.

UNIT – I: E-BUSINESS OVERVIEW :
Traditional commerce vs. e-commerce, e-commerce and e-business categories of e-commerce development and growth of e-commerce advantages and disadvantages of e-commerce international nature of e-commerce..
Learning Outcomes:
At the end of this unit, the student will be able to
To realize basics of E-Marketing. **L1**

To introduce different E-Business Models . **L2**

UNIT – II: E-BUSINESS INFRASTRUCTURE :

E Commerce architectural framework, the internet and www-internet protocols, internet, intranet and extranets, internet connection options, security issues in e commerce environment, encryption techniques payment systems types of payments legal, ethical and tax issues in e-commerce.
Learning Outcomes:
At the end of this unit, the student will be able to
To understand the E-Marketing Plan. **L2**

To know about Online Expression . **L3**

UNIT – III: ONLINE MARKETING AND SUPPLY CHAIN MANAGEMENT
Online marketing, business models of e marketing, online advertisement, advertisement methods and strategies online retailing e-auctions.Supply chain management-procurement process and the supply chain types of procurement, multi-tier supply chains and trends in supply chain management.
Learning Outcomes:
At the end of this unit, the student will be able to
To know about the Data Drive Strategy . **L6**

Gain knowledge on Consumer Behavior Online **L3**

UNIT – IV: ONLINE SERVICES :

Online financial services, online banking and brokerage, online insurance services, online real estate services, travel services online, hospitality services online, recruitment services online, publishing services online entertainment, e-learning.

Learning Outcomes:

At the end of this unit, the student will be able to

To know about Pricing Strategies L4

To know about Channel Management and Power. L6

UNIT – V: MOBILE COMMERCE :

Definition of mobile commerce, mobile commerce framework, growth of mobile commerce benefits and limitations of mobile commerce mobile network infrastructure, information distribution for mobile networks multimedia content, publishing, mobile payment models, mobile commerce applications.

Learning Outcomes:

At the end of this unit, the student will be able to

To know how Browsing Behavior Model L4

To know about Ten rules for CRM Success. L2

Text Books:

1. Gary P. Schneider, "Ecommerce-Strategy, Technology and Implementation", Cengage Learning, India Edition

2. Kenneth C. Laudon, Carol GuercioTraver, "E-commerce–Business", Technology, Pearson, Low Price Edition.

3. Bharat Bhasker, "Electronic Commerce Framework, Technologies and Applications", 3rdn Edition.Tata McGraw, Hill.

Reference Books:

1. Efraim Turban, Tae Lee, David King and H. Micheal Chung, "Electronic Commerce, Managerial Perspective", Pearson Education Asia.

2. CSV Murthy, "E-commerce-Concepts, Models and Strategies", HPH.

3. . J. Christopher Westland and Theodore H K Clark, "Global Electronic Commerce ,Theory and Case Studies", Oxford Universities Press.

Course Outcomes:

At the end of this Course the student will be able to

- Analyse the confluence of marketing, operations, and human resources in real-time delivery. L3
- Explain emerging trends in digital marketing and critically assess the use of digital marketing tools by applying relevant marketing theories and frameworks. L3
- Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked. L5
- Investigate and evaluate issues in adapting to globalised markets that are constantly changing and increasingly networked. L2
- Demonstrate cognitive knowledge of the skills required in conducting online research and research on online markets, as well as in identifying, assessing and selecting digital market opportunities. L3

B.Tech III Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20ACS55C-Computer Architecture and Organization

(Open Elective-I)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To impart basic concepts of computer architecture and organization.
- To explain key skills of constructing cost-effective computer systems.
- To familiarize the basic CPU organization.
- To help students in understanding various memory devices.

UNIT – I: STRUCTURE OF COMPUTERS:

Computer types, Functional units, Basic operational concepts, VonNeumann Architecture, Bus Structures, Software, Performance, Multiprocessors and Multicomputer, Data representation, Fixed and Floating point, Error detection and correction codes.

COMPUTER ARITHMETIC: Addition and Subtraction, Multiplication and Division algorithms, Floating-point Arithmetic Operations, Decimal arithmetic operations.

Learning Outcomes:

At the end of this unit, the student will be able to

To realize basics of computer structure. L1

To know about the arithmetic operations. L2

UNIT – II: BASIC COMPUTER ORGANIZATION AND DESIGN:

Instruction codes, Computer Registers, Computer Instructions and Instruction cycle. Timing and Control, Memory-Reference Instructions, Input-Output and interrupt. Central processing unit: Stack organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Complex Instruction Set Computer (CISC) Reduced Instruction Set Computer (RISC), CISC vs RISC.

Learning Outcomes:

At the end of this unit, the student will be able to

To understand the organization of computer. L2

To know about design of the computer. L3

UNIT – III:REGISTER TRANSFER AND MICRO-OPERATIONS

REGISTER TRANSFER AND MICRO-OPERATIONS: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations, Arithmetic logic shift unit.

MICRO-PROGRAMMED CONTROL: Control Memory, Address Sequencing, Micro-Program example, Design of Control Unit.

Learning Outcomes:
At the end of this unit, the student will be able to
To know about the registers and its operations. **L6**

Gain knowledge on Micro operations. **L3**

UNIT – IV:MEMORY SYSTEM

MEMORY SYSTEM: Memory Hierarchy, Semiconductor Memories, RAM(Random Access Memory), Read Only Memory (ROM), Types of ROM, Cache Memory, Performance considerations, Virtual memory, Paging, Secondary Storage, RAID.

Learning Outcomes:
At the end of this unit, the student will be able to
To know about Semiconductor Memories **L4**

To know about the Cache Memory **L6**

UNIT – V: INPUT OUTPUT

INPUT OUTPUT: I/O interface, Programmed IO, Memory Mapped IO, Interrupt Driven IO, DMA.
MULTIPROCESSORS: Characteristics of multiprocessors, Interconnection structures, Inter Processor Arbitration, Inter processor Communication and Synchronization, Cache Coherence.

Learning Outcomes:
At the end of this unit, the student will be able to
To know about the Input/Output operations **L4**

To know about the multiprocessors. **L2**

Text Books:

1. M. Moris Mano (2006), Computer System Architecture, 3rd edition, Pearson/PHI, India.

Reference Books:

1. Carl Hamacher, Zvonks Vranesic, SafeaZaky (2002), Computer Organization, 5th edition, McGraw Hill, New Delhi, India.

2.William Stallings (2010), Computer Organization and Architecture- designing for performance, 8th edition, Prentice Hall, New Jersy

3.Anrew S. Tanenbaum (2006), Structured Computer Organization, 5th edition, Pearson Education Inc,

4.John P. Hayes (1998), Computer Architecture and Organization, 3rd edition, Tata McGrawHill

Course Outcomes:

At the end of this Course the student will be able to

- Identify various components of computer and their interconnection. **L3**
- Identify basic components and design of the CPU: the ALU and control unit. **L3**
- Compare and select various Memory devices as per requirement. **L5**
- Compare various types of IO mapping techniques. **L2**
- Critique the performance issues of cache memory and virtual memory. **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE61- DESIGN OF STEEL STRUCTURES

L	T	P	C
2	1	0	3

Course Objectives:

- To teach different types of Connections and relevant IS code provision.
- To impart with design procedures of beams and columns.
- To enable Design of truss elements
- To enable design of column bases

UNIT-I:

Materials – Making of iron and steel – types of structural steel – mechanical properties of steel – Concepts of plasticity – yield strength. Loads – load combinations - wind loads on roof trusses, behavior of steel, local buckling. Concept of limit State Design – Different Limit States as per IS 800 - 2007 – Design Strengths- deflection limits – serviceability – Section Classification - Bolted connections – Welded connections – Design Strength – Efficiency of joint – Prying action Types of Welded joints - Design of Tension members – Design Strength of members

Learning Outcomes:

At the end of this unit, the student will be able to

Understand bolted and welded connections

1. Estimate strength of welds
2. Design Welded and Bolted connections as per IS Codal provisions

UNIT-II:

Design of compression members – Buckling class – slenderness ratio / strength design – laced – battened columns –column splice.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand behavior of compression members
- Design and detail of compression members under different conditions adopting IS Code.

UNIT-III

Design of Beams – Plastic section modulus - Shape factor – Bending and shear strength laterally / supported beams design –Introduction to lateral torsion buckling and Laterally un-restrained beams - Built up sections – large plates Web buckling Crippling and Deflection of beams, Design of Purlin.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand behavior of simple and compound beams
- Visualize importance of curtailment of flange plates
- Design and detail of steel beams Laterally restrained and understand laterally un-restrained beams.

UNIT-IV:

Design of eccentric connections with brackets, Beam end connections – Web angle – Unstiffened and stiffened seated connections (bolted and Welded types) Design of truss joints

Learning Outcomes:

At the end of this unit, the student will be able to

3. Understand behavior of simple and compound beams
4. Visualize importance of curtailment of flange plates
5. Design and detail of steel beams under different conditions adopting IS Code.

UNIT-V:

Design of Column base , slab base and Gusset base-Grillage foundation..

Learning Outcomes:

At the end of this unit, the student will be able to

6. Identify different components of plate girder
7. Design and detail of components of plate girder confirming to IS Code
8. Understand the functioning of gantry girder for different types of loads

Note: The students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of Compound beams including curtailment of flangeplates. Plate 3 Detailing of Column including lacing and battens.

Plate 4 Detailing of Column bases – slab base and gusseted base

Plate 5 Detailing of steel roof trusses including particulars at joints.

Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.

Codes/Tables: IS-800 code books and Structural Steel Tables are to be permitted into the examination Hall.

I S Codes:

1) Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.

2) IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian standards.

3) Steel Tables.

FINAL EXAMINATION PATTERN: The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions on design out of which three are to be answered. Weight age for Part – A is 40% and Part- B is 60%.

Codes/Tables: IS Codes:

1) IS -800 – 2007
2) IS – 875 – PartIII
3) SteelTables.
4) Railway Design Standards Code. and steel tables to be permitted into the examinationhall.

Text Books:

1. Design of Steel Structures by K.S.SaiRam
2. Limit State Design of Steel Structures by S.K. Duggal
3. Design of Steel Structures by Bhavikatti. IK INT Publication House

Reference Books:

1. Structural Design and Drawing by N.KrishnaRaju, University Press,Hyderabad.
2. Structural Design in Steel by SarwarAlamRaz, New Age International Publishers, NewDelhi
3. Steel Structures by Subramanyam.N, Oxford University press, NewDelhi
4. Design of Steel Structures by Edwin Gaylord, Charles Gaylord,JamesStallmeyer,TataMc.Graw-Hill, NewDelhi.

Course Outcomes:

At the end of this Course the student will be able to

- Explain relevant IS codes
- Analysis and design of flexural members and detailing
- Design compression members of different types with connection detailing
- Design Plate Girder and Gantry Girder with connection detailing
- Develop drawings pertaining to different components of steel structures

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE62- HIGHWAY ENGINEERING

L	T	P	C
3	0	0	3

Course Objectives:

- To impart knowledge on highway development.
- To teach concepts of Geometric design and alignment.
- To throw light on different traffic surveys.
- To teach design of highway intersections
- To impart knowledge on highway materials and design of pavements

UNIT-I:

HIGHWAY DEVELOPMENT AND PLANNING:

Highway development in India – Necessity for Highway Planning-Jayakar Committee and its Recommendations - Different Road Development Plans- First, Second and Third Twenty Year Road Development Plans-Classification of Roads - Road Network Patterns – Highway Alignment- Factors affecting Alignment- Engineering Surveys.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand importance of highway development
- Classify highways based on hierarchy

UNIT-II:

HIGHWAY GEOMETRIC DESIGN:

Importance of Geometric Design- Design controls and Criteria- Highway Cross Section Elements-Surface Characteristics, Carriageway, Shoulders, Formation, Rightof way; Kerbs, foot paths, Medians-design specifications. Sight Distance Elements- Stopping sight Distance, Overtaking Sight Distance and intermediate Sight Distance- Design of Horizontal Alignment- Design of Super elevation and Extra widening- Design of Transition Curves-Design of Vertical alignment-Gradients- -Verticalcurves.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different aspects governing highway geometric design.
- Design vertical and horizontal alignment of highways

UNIT-III

TRAFFIC ENGINEERING:

Basic Parameters of Traffic-Volume, Speed and Density – Definitions and their interrelationship – Highway Capacity and Level of Service concept – Factors affecting Capacity and Level of Service - Traffic Volume Studies- Data Collection and Presentation-speed studies- Data Collection and Presentation–Road Accidents-Causes and Preventive measures- Accident Data Recording – Condition Diagram and Collision Diagrams- Road Traffic Signs – Types and Specifications – Road markings-Need for Road Markings-Types of Road Markings.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify need and methods of Traffic Surveys.
- Understand importance of parking and related surveys.
- Understand the role of engineering in road safety.

UNIT-IV:

INTERSECTION DESIGN:

Conflicts at Intersections- Channelization: Objectives –Traffic Islands and Design criteria- Types of At-Grade Intersections – Types of Grade Separated Intersections- Rotary Intersection – Concept of Rotary and Design Criteria- Advantages and Disadvantages of Rotary Intersection.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the objectives of channelization.
- Understand the types of intersections and their design features.

UNIT-V:

PAVEMENT DESIGN:

Types of Pavements – Difference Between Flexible And Rigid Pavements – Pavement Components – Sub Grade, Sub Base, Base And Wearing Course – Functions Of Pavement Components – Design Factors – Flexible Pavement Design by CBR Method, (As Per IRC 37-2002)–Design Of Rigid Pavements – Critical Load Positions - Westergaard's Stress Equations – Computing Radius Of Relative Stiffness And Equivalent Radius Of Resisting Section – Stresses In Rigid Pavements –Joints in C.C Pavements and Types.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand about the pavement and its components
- Understand the design of Rigid pavement and Flexible pavements.

Text Books:

1. Highway Engineering – S.K.Khanna&C.E.G.Justo, Nemchand& Bros., 7th edition(2000).
2. Transportation Engineering, Volume – I by C.Venkataramaiah, UniversitiesPress, Hyderabad.
3. Principles and Practice of Highway Engineering Design – L.R.Kadiyali and Lal-Khanna Publications.

Reference Books:

1. Traffic Engineering and Transportation Planning by L.R.Kadiyali and Lal- KhannaPublications.
2. Highway Engineering – Dr.S.K.Sharma, S.ChandPublishers

Course Outcomes:

At the end of this Course the student will be able to

- On completion of the course, the students will be able to:
- Understand the importance of highways in economic development of nation.
- Understand the history of road development in India and various road developmentplans.
- Identify the highway materials and tests related to them.
- Design horizontal and vertical alignment aspects.
- Understand the surveys required for highway planning and design.
- Differentiate between types of pavements and their design features.

Department of Civil Engineering R20

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE63- HYDROLOGY AND IRRIGATION ENGINEERING

L	T	P	C
3	0	0	3

Course Objectives:

- Engineering Hydrology and its applications like Runoff estimation
- Irrigation Engineering – Water utilization for Crop growth

UNIT-I:

INTRODUCTION TO HYDROLOGY: Engineering hydrology and its applications; Hydrologic cycle; precipitation- types and forms, rainfall measurement, types of rain gauges, computation of average rainfall over a basin, presentation and interpretation of rainfall data.

DESCRIPTIVE HYDROLOGY: Evaporation- factors affecting evaporation, measurement of evaporation; Infiltration- factors affecting infiltration, measurement of infiltration, infiltration indices;Evapotranspirtion.

UNIT-II:

HYDROGRAPH ANALYSIS AND RUN-OFF: Hydrograph; Unit Hydrograph- construction and limitations of Unit hydrograph, Application of the unit hydrograph to the construction of a flood hydrograph resulting from rainfall of unit duration; S-hydrograph.

Run off- Factors affecting run- off, Computation of run-off; Design Flood; Estimation of maximum rate of run-off; separation of base flow

UNIT-III

IRRIGATION: Introduction; Necessity and Importance of Irrigation; advantages and ill effects of Irrigation; types of Irrigation; methods of application of Irrigation water; quality for Irrigation water. Duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty.

WATER REQUIREMENT OF CROPS: Types of soils, Indian agricultural soils, preparation of land for Irrigation; soil fertility; Soil-water-plant relationship; vertical distribution of soil moisture; soil moisture tension; soil moisture stress; various soil moisture constants; Limiting soil moisture conditions; Depth and frequency of irrigation; Gross command area; Culturable command area; Culturable cultivated and uncultivated area; Kor depth and Kor period; crop seasons and crop rotation; Irrigation efficiencies; Determination of irrigation requirements of crops; Assessment of Irrigation water. Consumptive use of water-factors affecting consumptive use, direct measurement and determination by use of equations (theory only)

UNIT-IV:

CHANNELS – SILT THEORIES: Classification; Canal alignment; Inundation canals; Cross–section of an irrigation channel; Balancing depth; Borrow pit; Spoil bank; Land width; Silt theories–Kennedy's theory, Kennedy's method of channel design; Drawbacks in Kennedy's theory; Lacey's regime theory-Lacey's theory applied to channel design; Defects in Lacey's theory; Comparison of Kennedy's and Lacey's theory.

WATER LOGGING AND CANAL LINING: Water logging; Effects of water logging; Causes of water logging; Remedial measures; Saline and alkaline soils and their reclamation; Losses in canal; Lining of irrigation channels – necessity, advantages and disadvantages; Types of lining; Design of lined canal.

UNIT-V:

WELL HYDRAULICS

Steady and unsteady flow to a well in a confined and unconfined aquifer - Partially penetrating wells - Wells in a leaky confined aquifer - Multiple well systems - Wells near aquifer boundaries - Hydraulics of recharge wells.

GROUND WATER: Introduction; Aquifer; Aquiclude; Aquifuge; aquifer parameters- porosity, Specific yield, Specific retention; Divisions of sub–surface water; Water table; Types of aquifers; storage coefficient-coefficient of permeability and transmissibility

Text Books:

1. Irrigation and water power engineering by Punmia&Lal
2. Irrigation Engineering and Hydraulic structures by S. K. Garg; Khanna Publishers

Reference Books:

1. Engineering Hydrology by K.Subramanya
2. Engineering Hydrology by Jayarami Reddy
3. Irrigation and Water Resources & Water Power by P.N.Modi

Course Outcomes:

At the end of this Course the student will be able to

- To gain & apply the knowledge of water recourses for Civil Engineering.
- To obtained the knowledge of water cycle and its components.
- To apply & analysis of Hydrograph for hydrological data.
- To gain knowledge basic requirements of irrigation and irrigations channels.
- To apply the knowledge of silt theories for canals.
- To understands the knowledge of well hydraulics.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

MANAGEMENT SCIENCE

(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- Understand the role of entrepreneurship in economic development.
- Identify the general characteristics of entrepreneurs.

UNIT – 1

INTRODUCTION TO MANAGEMENT

Concepts of Management - Nature, importance and Functions of Management - Taylor's Scientific Management Theory, Fayol's Principles of Management, Maslow's Theory of Human Needs, Douglas McGregor's Theory X and Theory Y, Leadership Styles, Social responsibilities of Management.

DESIGNING ORGANIZATIONAL STRUCTURES

Basic concepts related to Organisation - Departmentation and Decentralization, Types of mechanistic and organic structures of organization (Line organization, Line and staff organization, functional organization, Committee organization, matrix organization, team structure) their merits, demerits and suitability.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the concept of management and organization.	**L1**
• Apply the concepts & principles of management in real life industry.	**L2**

UNIT – II

OPERATIONS MANAGEMENT:

Principles and Types of Plant Layout-Methods of production (Job, batch and Mass Production), Work Study. Statistical Quality Control: *c* chart, *p* chart, (simple Problems) Deming's contribution to quality.

MATERIALS MANAGEMENT: EOQ, Purchase Procedure and Stores Management. Inventory — functions. Types, inventory classification techniques.

Marketing: Functions of Marketing, Marketing Mix, and Marketing Strategies based on Product Life Cycle, Channels of distribution.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the core concepts of Management Science and Operations Management.	**L1**
• Evaluate Materials departments & Determine EOQ.	**L2**

UNIT – III

HUMAN RESOURCES MANAGEMENT (HRM):

Concepts of HRM, Personnel Management and Industrial Relations (PMIR), Basic functions of HR Manager: Manpower planning, Recruitment, Selection, Training and Development, Placement, Wage and Salary Administration, Promotion, Transfer, Separation, Performance Appraisal, Grievance Handling and Welfare Administration, Job Evaluation, Merit Rating and methods.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the concepts of HRM in Recruitment, Selection, Training & Development.	**L1**



• Apply Managerial and operative Functions.	L2

UNIT – IV

STRATEGIC MANAGEMENT:

Vision, Mission, Goals, Objectives, Policy, Strategy, Programmes, Elements of Corporate Planning Process, Environmental Scanning, Value Chain Analysis, SWOT Analysis, Steps in Strategy Formulation and Implementation, Generic Strategy alternatives.

PROJECT MANAGEMENT (PERT/CPM):

Network Analysis, Programme Evaluation and Review Technique (PERT), Critical Path Method (CPM), Identifying critical path, Probability of Completing the project within given time, Project Cost Analysis, Project Crashing. (Simple problems).

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand Mission, Objectives, Goals & strategies for an enterprise.	L1
• Evaluate PERT and CPM Techniques.	L2

UNIT – V

CONTEMPORARY MANAGEMENT PRACTICES:

Basic concepts of MIS, Materials Requirement Planning (MRP), Just-In-Time (JIT) System, Total Quality Management (TQM), Six sigma concept, Supply Chain Management, Enterprise Resource Planning (ERP), Performance Management, Business Process outsourcing (BPO), Business Process Re-engineering and Bench Marking, Balanced Score Card.

Learning Outcomes:

At the end of this unit, the student will be able to

• Analyze CRM, MRP, TQM.	L1
• Understand modern management techniques.	L2

Text Books:

1. **Management Science**,Aryasri: TMH, 2004.
2. **Management** ,Stoner, Freeman, Gilbert, 6th Ed, Pearson Education,New Delhi, 2004.

Reference Books:

1. **Marketing Mangement** , Kotler Philip & Keller Kevin Lane: 12/e, PHI,2005.
2. **Essentials of Management** ,Koontz & Weihrich:, 6/e, TMH, 2005.
3. **Management—Principles and Guidelines**, Thomas N.Duening & John M.Biztantra, 2003.
4. **Production and Operations Management**, Kanishka Bedi, , Oxford University Press, 2004.

Course Outcomes:

At the end of this Course the student will be able to

• Equipping engineers for a lifelong career addressing the critical technical and managerial needs of private and public organizations.	L1
• Exploring and developing analytic abilities, making better decisions, developing and executing strategies while also leading people who innovate.	L2
• Cultivating the technical skills as well as the behavioral challenges of running organizations and complex systems.	L3
• Emphasizing quantitative analytic skills and an entrepreneurial spirit	L4
• Have an introductory understanding of global entrepreneurship concepts.	L5

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

BUSINESS ENVIRONMENT
(Common to all Branches)

L	T	P	C
3	0	0	3

Course Objectives:

- To make the student understand about the business environment.
- To enable them in knowing the importance of fiscal and monitory policy.

UNIT – 1: BUSINESS ENVIRONMENT

Meaning – Various environments affecting business – Social Economic; Political and Legal; Culture; Competitive Demographic; Technological and International environments.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the concept of Business environment.	**L1**
• Explain various types of business environment.	**L2**

UNIT – II: FISCAL & MONETARY POLICY

FISCAL POLICY - Public Revenues - Public Expenditure - Public debt - Development activities financed by public expenditure - Evaluation of recent fiscal policy of Government of India - Highlights of Budget - **MONETARY POLICY** - Demand and Supply of Money – RBI - Objectives of monetary and credit policy - Recent trends - Role of Finance Commission.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the concept of public revenue and public Expenditure	**L1**
• Explain the functions of RBI and its role.	**L2**

UNIT – III: TRADE POLICY

INDIA'S TRADE POLICY - Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank - **BALANCE OF PAYMENTS** – Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the role of Indian international trade.	**L1**
• Analyze causes for Disequilibrium and correction measure.	**L2**

UNIT – IV: WORLD TRADE ORGANIZATION

WORLD TRADE ORGANIZATION - Nature and Scope - Organization and Structure - Role and functions of WTO in promoting world trade - Agreements in the Uruguay Round – TRIPS, TRIMS, and GATT - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the Dispute Settlement Mechanism.	L1
• Compare and contrast the Dumping and Anti-dumping Measures.	L2

UNIT – V: MARKETS

MONEY MARKETS AND CAPITAL MARKETS - Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.

Learning Outcomes:

At the end of this unit, the student will be able to

• Apply the knowledge in future investments.	L1
• Understand the role of SEBI in investor protection.	L2

Text Books:

1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall of India.
2. K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition.HPH2016.

Reference Books:

1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases,Prentice Hall of India, New Delhi, India.
3. Chari. S. N (2009), International Business, Wiley India.
4. E. Bhattacharya (2009), International Business, Excel Publications, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

• Apply the knowledge of Money markets in future investment.	L1
• Analyze India's Trade Policy.	L2
• Evaluate fiscal and monitory policy.	L3
• Develop a personal synthesis and approach for identifying business opportunities.	L4
• `Understand various types of business environment.	L5

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE66- DESIGN STUDIO LAB

L	T	P	C
0	0	3	1.5

Course Objectives:

- To introduce fundamentals of computer aided, Design and drawing in Civil Engineering.
- To enable the students Communicate designs graphically

SOFTWARE:

1. STAAD PRO or Equivalent

EXCERCISIES:

1. 2-D Frame Analysis andDesign
2. Steel Tabular Truss Analysis andDesign
3. 3-D Frame Analysis andDesign
4. Retaining Wall Analysis andDesign
5. Simple tower Analysis andDesign
6. One Way Slab Analysis &Design
7. Two Way Slab Analysis &Design
8. Column Analysis &Design

TEXT BOOK:

1. Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh

Course Outcomes:

At the end of this Course the student will be able to

- Design frames using Computer Aided Design and Drafting software's.
- Develop engineering project structural design using STAAD software

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE67- HIGHWAY ENGINEERING LAB

L	T	P	C
0	0	3	1.5

Course Objectives:

- To have knowledge on various highway materials like aggregate, bitumen, mechanical properties of the materials and their usage in the field.

Note: Minimum of eight experiments is to be executed

I. Tests onAggregates

1. Aggregate Crushing ValueTest
2. Los Angeles Abrasion Test
3. Aggregate Impact ValueTest
4. Aggregate shape Test (Flakiness &Elongation)
5. Specific Gravity of AggregateTest
6. Water Absorption of AggregateTest
7. SoundnessTest

II. Tests onBitumen

1. PenetrationTest
2. DuctilityTest
3. Softening PointTest
4. Specific GravityTest
5. ViscosityTest
6. Flash and Fire PointTest

III. Demo on BituminousMixes

1. Marshall Stability Test(Demo)

Course Outcomes:

At the end of this Course the student will be able to

- By performing the various tests in this laboratory the student will be able to know the physicalCharacteristics of aggregates and bitumen

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

SOFT SKILLS

(Common to all branches)

L	T	P	C
1	0	2	2

Course Objectives:

- To prepare to face global competition for employment and excellence in profession.
- To help the students understand and build interpersonal and interpersonal skills that will enable them to lead meaningful professional life.

UNIT – 1: SOFT SKILLS: INTRODUCTIUON

Soft Skills: Definition-Meaning--Importance- Why skill gap -Analysis--Personality Development vs. Soft Skills- Learning Methods.

Learning Outcomes:

At the end of this unit, the student will be able to

• Developing self-motivation, raised aspirations and belief in one's own abilities, defining and committing to achieving one's goals.	**L1**
• Learning to keep going when things don't go according to plan, coping with the unfamiliar, managing disappointment and dealing with conflict	**L2**

UNIT – II: PERSONAL SKILLS

Intra-Personal: Definition-Meaning-Importance-SWOT analysis- Goal Setting- Emotional Intelligence- Right thinking- Problem Solving-Time management.

Inter-Personal: Definition-Meaning-Importance-Communications skills- Team Work-Negotiation Skills-Leadership skills.

Learning Outcomes:

At the end of this unit, the student will be able to

• A commitment to ethics and integrity in academic and professional relationships, within the community and the environment.	**L1**
• Describe how good communication with other can influence our working relationships	**L2**

UNIT – III: VERBAL AND NON VERBAL SKILLS

Verbal Skills: Definition and Meaning-Importance-Improving Tips for Listening, Speaking, Reading- Writing Skills.

Non Verbal Skills: Definition and Meaning-Importance- Dress Code- Facial Expressions- Eye Contact- Proxemics- Haptics -Posture -Kinetics- Para Language.

Learning Outcomes:

At the end of this unit, the student will be able to

• Compares verbal and nonverbal communication	**L1**
• Understand the functions of nonverbal communication	**L2**

UNIT – IV: FINISHING SCHOOL

Before Interview: Bridging between Campus and Corporate- Preparation of Resume-Cover Letter- Statement of Purpose-E-mail writing-Corporate Etiquettes.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• Learner will be able to prepare his/ her own Resume and Cover letter.	L1
• Learner will understand the importance of etiquettes and learn the nuances of expected behaviour within a group, a social class and society at general	L2

UNIT – V: DURING INTERVIEW

Interview Skills: Importance-Purpose- Types of interviews –Preparation for interviews - Top Questions- Body Language in Interview Room-Do's and Don'ts s of interview.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• Learner will be able to face interview questions and effectively present his /her. skills	L1
• Learner will manage how to plan and organize personal and professional life.	L2

Reference Books:

1. Sherfield, M. Robert at al ***Cornerstone Developing Soft Skills***, 4th ed. Pearson Publication, New Delhi, 2014.
2. Alka Wadkar, ***Life Skills for Success***, Sage Publications India Private Limited; First edition (1 May 2016)
3. Sambaiah.M. ***Technical English***, Wiley publishers India. New Delhi. 2014.
4. Gangadhar Joshi, ***From Campus to Corporate***, *Sage Text*.
5. Alex.K, ***Soft Skills***, 3rd ed. S. Chand Publication, New Delhi, 2014.
6. Meenakshi Raman and Sangita Sharma, ***Technical Communication: Principle and Practice***, Oxford University Press. 2009.
7. Shalini Varma, ***Body Language for Your Success Mantra***, 4th ed, S. Chand Publication, New Delhi, 2014.
8. Stephen Covey, ***Seven Habits of Highly Effective People***, JMD Book, 2013.

Course Outcomes:	
At the end of this Course the student will be able to	
• The students will be able to assimilate and understood the meaning and importance of soft skills and learn how to develop them.	L1
• The students will understand the significance of soft skills in the working environment for professional excellence.	L2
• The students will be prepared to undergo the placement process with confidence and clarity.	L3
• The students will be ready to face any situation in life and equip themselves to handle them effectively.	L4
• The students will understand and learn the importance of etiquettes in both professional and personal life	L5

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
College of Engineering (Autonomous), Pulivendula - 516390, A.P, INDIA.

L	T	P	C
3	0	0	0

Constitution of India

Course Objectives:

1. To enable the student to understand the importance of constitution.
2. To understand philosophy of fundamental rights and duties.
3. To understand the structure of executive, legislature and judiciary.
4. To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and election commission of India.
5. To understand the central and state relation financial and administrative.

UNIT-I

Introduction to Indian Constitution: Constitution' meaning of the term, Indian Constitution - Sources and constitutional history, Features - Citizenship, Preamble, Fundamental Rights and Duties, Directive Principles of State Policy.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the concept of Indian constitution.
2. Apply the knowledge on directive principle of state policy.
3. Analyze the History, features of Indian constitution.
4. Evaluate Preamble Fundamental Rights and Duties.

UNIT-II

Democratic forms of Constitution, Union Government and its Administration Structure of the Indian Union: Centre- State relationship, President: Role, power and position, PM and Council of ministers, Cabinet and Central Secretariat, Lok Sabha, Rajya Sabha, The Supreme Court and High Court: Powers and Functions;

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the structure of Indian government.
2. Differentiate between the state and central government.
3. Explain the role of President and Prime Minister.
4. Know the Structure of supreme court and High court.

UNIT-III

Federalism, Political relations, Financial relations of State Government and its Administration Governor - Role and Position - CM and Council of ministers, State Secretariat: Organisation, Structure and Functions.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the structure of state government.
2. Analyze the role Governor and Chief Minister.
3. Explain the role of state Secretariat.
4. Differentiate between structure and functions of state secrateriate.

UNIT-IV

A. Local Administration - District's Administration Head - Role and Importance, Municipalities - Mayor and role of Elected Representative - CEO of Municipal Corporation PachayatiRaj: Functions PRI: Zila Panchayat, Elected officials and their roles, CEO Zila Panchayat: Block level Organizational Hierarchy - (Different departments), Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

Learning Outcomes:

At the end of this unit students will be able to:

1. Understand the local Administration.
2. Compare and contrast district administration role and importance.
3. Analyze the role of Myer and elected representatives of Municipalities.
4. Evaluate Zilla panchayat block level Organisation.

UNIT-V

Election Commission: Election Commission- Role of Chief Election Commissioner and Election Commissionerate , State Election Commission, Supreme Court, High Court.

Learning Outcomes:

At the end of this unit students will be able to:

1. Know the role of Election Commission apply knowledge.
2. Contrast and compare the role of Chief Election commissioner and Commissiononerate.
3. Analyze role of state election commission.
4. Evaluate various commissions of viz SC/ST/OBC and women.

REFERENCES:

1. Durga Das Basu, Introduction to the Constitution of India, Prentice – Hall of India Pvt. Ltd.. New Delhi.
2. Subash Kashyap, Indian Constitution, National Book Trust.
3. J.A. Siwach, Dynamics of Indian Government & Politics.
4. D.C. Gupta, Indian Government and Politics.
5. H.M.Sreevai, Constitutional Law of India, 4th edition in 3 volumes (Universal Law Publication.
6. J.C. Johari, Indian Government and Politics Hans.

Course Outcomes:

1. Understand historical background of the constitution making and its importance for building a democratic India.
2. Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
3. Understand the value of the fundamental rights and duties for becoming good citizen of India.
4. Analyze the decentralization of power between central, state and local self-government.
5. Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.
6. Know the sources, features and principles of Indian Constitution.
7. Learn about Union Government, State government and its administration.
8. Get acquainted with Local administration and Pachayati Raj.
9. Be aware of basic concepts and developments of Human Rights.
10. Gain knowledge on roles and functioning of Election Commission.

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE71A- HYDRAULIC STRUCTURES AND WATER POWER ENGINEERING

(Professional Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- *To study various head works canal structures and their design principles the subject also covers the river structures, their classifications, designs, etc.*

UNIT-I:

CANAL REGULATION WORKS: Canal falls: Necessity and location of falls; Types of falls; classification of falls; cistern design; roughening devices; design of sarada type fall. Canal regulators: off-take alignment; head regulators and cross-regulators; design of cross- regulator and distributary headregulator.

UNIT-II:

CROSS DRAINAGE WORKS: Introduction; types of cross drainage works; selection of suitable type of cross drainage work; classification of aqueducts and siphon aqueducts.

UNIT-III

RESERVOIR PLANNING: Introduction; Investigations for reservoir planning; Selection ofsitefor a reservoir; Zones of storage in a reservoir; Storage capacity and yield; Mass inflow curveand demand curve; Calculation of reservoir capacity for a specified yield from the mass inflowcurve; Determination of safe yield from a reservoir of a given capacity; Sediment flow instreams:Reservoir sedimentation; Life of reservoir; Reservoir sediment control; Flood routing;Methodsof flood routing-Graphical Method (Inflow – storage discharge curves method).

DAMS :GENERAL: Introduction; Classification according to use; classification according to material- Gravity dams, Arch dams, Buttress dams, Steel dams, Timber dams, Earth dams and rock fill dams-advantages and disadvantages; Physical factors governing selection of type of dam ; selection of site for a dam.

UNIT-IV:

GRAVITY DAMS: Introduction; Forces acting on a gravity dam; Combination of loading for design; Modes of failure: stability requirements; principal and shear stresses; Stability analysis; Elementary profile of a gravity dam; Practical profile of a gravity dam; Limiting height of a gravity dam- High and low gravity dams;.

EARTH DAMS: Introduction; Types of earth dams; Causes of failure of earth dams; suitable and available materials for Seepage control measures; Slope protection. Seepage through earth dam

UNIT-V:

SPILLWAYS: Introduction; Types of spillways; Profile of ogee spillway; Energy dissipation below spillways for relative positions of jump height curve and tail water curve; Stilling basins; Indian standards on criteria for design of hydraulic jump type stilling basins with horizontal aprons; Spillway crest gates-Types and description only.

Text Books:

1. Irrigation and Water Power Engineering by Dr. B.C.Punmia& Dr. Pande B.B. Lal;Laxmi Publications pvt. Ltd.
2. Irrigation Engineering and Hydraulic Structure by S. K. Garg; Khanna Publishers

Reference Books:

1. Irrigation and water resources engineering by G.L. Asawa, New Age International Publishers
2. Irrigation, Waterpower and Water Resources Engineering by K R Arora; Standard Publication,NewDelhi.
3. Water resources engineering by Satyanarayana Murthy. Challa, New Age International Publishers

Course Outcomes:

At the end of this Course the student will be able to

- Design various channelsystems
- Design head and cross regulatorstructures
- Identify various types of reservoir and their designaspects
- By the Establishes the understanding of cross drainage works and itsdesign
- Design different types of dams
- Design gravity dam and earthendam
- Design the canalsystems

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE71B- AIR POLLUTION AND CONTROL

(Professional Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- To teach the basics of air pollution
- To impart the behavior of air due to metrological influence
- To throw light on air quality management
- To teach the design of air pollution control methods

UNIT-I:

INTRODUCTION : Air Pollution – Definitions, Scope, Significance and Episodes, Air Pollutants – Classifications – Natural and Artificial – Primary and Secondary, point and Non- Point, Line and Areal Sources of air pollution- stationary and mobile sources.

EFFECTS OF AIR POLLUTION : Effects of Air pollutants on man, material and vegetation: Global effects of air pollution – Green House effect, Heat Islands, Acid Rains, Ozone Holesetc.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the basics of air pollutants.
- Estimate the impact of air pollution

UNIT-II:

THERMODYNAMIC OF AIR POLLUTION:

Thermodynamics and Kinetics of Air-pollution – Applications in the removal of gases like Sox, Nox, CO, HC etc., air-fuel ratio. Computation and Control of products of combustion.

PLUME BEHAVIOUR : Meteorology and plume Dispersion; properties of atmosphere; Heat, Pressure, Wind forces, Moisture and relative Humidity, Influence of Meteorological phenomena on Air Quality-wind rosediagrams.

Learning Outcomes:

At the end of this unit, the student will be able to

- Study properties of atmosphere
- Learn plume behavior in different environmental conditions
- Analyse and compute the parameters of air pollutants
- Evaluate procedures for control of pollution

UNIT-III

POLLUTANT DISPERSION MODELS : Lapse Rates, Pressure Systems, Winds and moisture plume behaviour and plume Rise Models; Gaussian Model for Plume Dispersion.

CONTROL OF PARTICULATES : Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of control, Equipment"s – Settling Chambers, Centrifugal separators, filters Dry and Wet scrubbers, Electrostatic precipitators.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the design principles of particulate control.
- Learn and design pollutant dispersion models

UNIT-IV:

CONTROL OF GASEOUS POLLUTANTS : General Methods of Control of No_x and So_x emissions – In-plant Control Measures, process changes, dry and wet methods of removal and recycling.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the design principles of gaseous control.
- Develop environmental friendly fuels and study their properties.

UNIT-V:

AIR QUALITY MANAGEMENT : Air Quality Management – Monitoring of SPM, SO; NO and CO Emission Standards

Learning Outcomes:

At the end of this unit, the student will be able to

- Study the air quality management.
- Visualize emissions and their permissible standards

Text Books:

1. Air Quality by Thodgodish, Levis Publishers, Special India Edition, NewDelhi
2. Air pollution By M.N.Rao and H.V.N.Rao – Tata Mc.Graw HillCompany.
3. Air pollution by Wark and Warner.- Harper & Row, NewYork.

Reference Books:

1. An introduction to Air pollution by R.K. Trivedy and P.K. Goel
2. Air Pollution and Control by K.V.S.G.Murali Krishna
3. Enivronmental meteorology by S.Padmanabhammurthy

Course Outcomes:

At the end of this Course the student will be able to

- Evaluating the ambient air quality based on the analysis of air pollutants
- Design particulate and gaseous control measures for an industry
- Judge the plume behavior in a prevailing environmental condition
- Estimate carbon credits for various day to day activities

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE71C- ADVANCED STRUCTURAL DESIGN

(Professional Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- *To make the student more conversant with the design principals of multistoried buildings, roof system, foundation and other important structures.*

UNIT-I:

Design of a flat slab(Interior panel only)

Learning Outcomes:

At the end of this unit, the student will be able to

- To know the components of interior slab panel
- To understand the design procedure and detailing of reinforcement of interior panel of the flat slab

UNIT-II:

Design of concrete bunkers of circular shape – (excluding staging) – Introduction tosilos

Learning Outcomes:

At the end of this unit, the student will be able to

- To know and understand the components of bunker
- To have a clear view of the design procedure and detailing of reinforcement of bunker

UNIT-III

Design of concrete chimney

Learning Outcomes:

At the end of this unit, the student will be able to

- To have a comprehensive understanding of various forces acting on the chimney.
- To design the concrete chimney.

UNIT-IV:

Design of circular and rectangular water tank resting on the ground

Learning Outcomes:

At the end of this unit, the student will be able to

9. To have a good understanding of design of water tanks resting on the ground.

UNIT-V:

Design of cantilever and counter forte retaining wall with horizontal backfill

Learning Outcomes:

At the end of this unit, the student will be able to

10. To know the applications of cantilever and counter forte retaining walls.
11. To perform the stability analysis of the retaining walls
12. To design and detailing of the cantilever and counter forte retaining walls

FINAL EXAMINATION PATTERN:

The question paper shall contain 2 questions of either or type covering all the syllabus where each question carries 35 marks out of 35 marks, 20 marks shall be for the design and 15 marks are for the drawing

Text Books:

1. Structural Design and drawing (RCC and steel) by KrishnamRaju, Universites .Press , NewDelhi
2. R.C.C Structures byDr. B. C. Punmia,Ashok Kumar Jain,Arun Kumar Jain, Laxmi Publications, NewDelhi
3. Advanced RCC by Varghese , PHI Publications, NewDelhi.
4. Design of RCC structures by M.L.Gambhir P.H.I. Publications, NewDelhi.

Reference Books:

1. R.C.C Designs by Sushilkumar , standard publishinghouse. Fundamentals of RCC by N.C.Sinha and S.K.Roy, S.Chand Publications

Course Outcomes:

At the end of this Course the student will be able to

- Design and detail the flatslabs
- Design and detail bunkers and silos
- Design and detail concrete chimney
- Design and detail water tanks resting on the ground
- Design and detail cantilever and counterforte retaining walls

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE72A- PRESTRESSED CONCRETE

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives:

- Analyze PSC beams with straight, concentric, eccentric, bent and parabolic tendons and design beams of rectangular and I sections for flexure.
- Design shear reinforcements, structural elements for shear, torsion and anchorage as per the provisions of BIS.
- Interpret the transmission mechanism of pre-stressing force by bond and compute deflection of beams under loads

UNIT-I:

INTRODUCTION:

Historic development – General principles of prestressingpre-tensioning and post tensioning – Advantages and limitations of prestressed concrete – Materials – High strength concrete and high tensile steel their characteristics.

METHODS OF PRESTRESSING:-

Methods and Systems of Prestressing; Pre-tensioning and post tensioning methods – Analysis of post tensioning - Different systems of prestressing like Hoyer System, Magnel System Freyssinet system and Gifford – UdallSystem.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand pre tensioning and post tensioning
- Identify different type of prestressing systems.

UNIT-II:

ANALYSIS & DESIGN OF SECTIONS FOR FLEXURE;-

Elastic analysis of concrete beams prestressed with straight, concentric, eccentric, bent and parabolic tendons.Allowable stress, Design criteria as per I.S.Code – Elastic design of simple rectangular and I-section for flexure – Kern – lines, cable profile.

DESIGN OF SECTION FOR SHEAR :

Shear and Principal Stresses – Design for Shear in beams.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analyze beams for flexure and shear
- Understand prestressing with different types of tendons on beams of varying shape
- Know the end block characteristics and its significance

UNIT-III

LOSSES OF PRESTRESS:-

Loss of prestress in pre-tensioned and post-tensioned members due to various causes like elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation of stress in steel, slip in anchorage ,bending of member and wobble frictional losses

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify different types of losses in prescreening
- Estimate losses of pre stress

UNIT-IV:

COMPOSITE SECTION:

IntroductionDifferent Types- Propped and Un-propped- stress distribution- – Analysis of stress – Differential shrinkage – General designs considerations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify different types of composite beams
- Analyze PSC composite beams.

UNIT-V:

DEFLECTIONS OF PRESTRESSED CONCRETE BEAMS:

Importance of control of deflections – factors influencing deflections – short term deflections of uncracked members prediction of long term deflections.

Learning Outcomes:

At the end of this unit, the student will be able to

- Distinguish between short term and long term deflections in PSC beams
- Estimate the short and long term deflections of PSC beam.

Text Books:

1. Prestressed Concrete by N. Krishna Raju; - Tata Mc.GrawHillPublications.
2. Prestressed Concrete by Ramamrutham,DhanpatraiPublications
3. Prestressed Concrete design Praveen Nagrajan, Pearson publications, 2013editions.

Reference Books:

1. Design of Prestressed concrete structures (Third Edition) by T.Y. Lin & Ned H.Burns, John Wiley &Sons.
2. Pre stressed concrete: A Fundamental Approach byE.G.Nawy 5^{th} edition , Pearson Publications

Course Outcomes:

At the end of this Course the student will be able to

- Distinguish between short term and long term deflections in PSC beams
- Estimate the short and long term deflections of PSC beam.

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE72B- DESIGN AND DRAWING OF IRRIGATION STRUCTURES

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives:

- Sloping glacis weir.
- Tank sluice with tower head
- Surplus weir.
- Trapezoidal notch fall.
- Canal regulator.

Design and drawing of the following irrigation structures.

1. Surplus weir.
2. Tank sluice with tower head
3. Trapezoidal Notch fall
4. Canal regulator.
5. Sloping glacis weir

Final Examination pattern: Any two questions of the above Five designs may be asked out of which the candidate has to answer one question. The duration of examination will be three hours.

Text Books:

1. Design of minor irrigation and canal structures by C.Satyanarayana Murthy, Wileyeastern Ltd.
2. Irrigation engineering and Hydraulic structures by S.K.Garg, Standard BookHouse.

Course Outcomes:

At the end of this Course the student will be able to

- Design and draw the plan and cross section of Sloping glacis weir.
- Design and draw the plan and cross section of Tank sluice with tower head
- Design and draw the plan and cross section of Surplus weir.
- Design and draw the plan and cross section of Trapezoidal notch fall.
- Design and draw the plan and cross section of Canal regulator

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE72C- GROUND IMPROVEMENT TECHNIQUES

(Professional Elective-IV)

L	T	P	C
3	0	0	3

Course Objectives:

- The knowledge on the problems posed by the problematic soils and the remedies to build the various structures in problematic soils.

UNIT-I:

DEWATERING: Methods of de-watering- sumps and interceptor ditches- single, multi stage well points - vacuum well points- Horizontal wells-foundation drains-blanket drains- criteria for selection of fill material around drains –Electro-osmosis.

GROUTING: Objectives of grouting- grouts and their properties- grouting methods- ascending, descending and stage grouting- hydraulic fracturing in soils and rocks- post grout test.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand methods of dewatering
- Study different types of dewatering and working criteria
- Understand methods of grouting
- Assess efficiency of grouting adopting different tests

UNIT-II:

DENSIFICATION METHODS IN GRANULAR SOILS:-

In – situ densification methods in granular Soils – Vibration at the ground surface, Impact at the Ground Surface, Vibration at depth, Impact at depth.

DENSIFICATION METHODS IN COHESIVE SOILS:–

In – situ densification methods in Cohesive soils – preloading or dewatering, Vertical drains – Sand Drains, Sand wick geodrains – Stone and lime columns – thermal methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand methods of in-situ densification
- Study different types of drains for soil densification

UNIT-III

STABILISATION: Methods of stabilization-mechanical-cement- lime-bituminous-chemical stabilization with calcium chloride,sodium silicate and gypsum

Learning Outcomes:

At the end of this unit, the student will be able to

- Study different methods of stabilization of soils
- Study utilization of industrial wastes to stabilize soils

UNIT-IV:

REINFORCED EARTH: Principles – Components of reinforced earth – factors governing design of 0reinforced earth walls – design principles of reinforced earth walls.

GEOSYNTHETICS : Geotextiles- Types, Functions and applications – geogrids and geomembranes – functions and applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand principles of reinforced earth in ground improvement
- Study procedures for verification of stability of slopes.
- Utilization of advanced materials for ground improvement

- Compare different types of synthetic based soil stabilization material and understand performance

UNIT-V:

EXPANSIVE SOILS: Problems of expansive soils – tests for identification – methods of determination of swell pressure. Improvement of expansive soils – Foundation techniques in expansive soils – under reamed piles.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand nature of expansive soils
- Study foundation techniques in expansive soils

Text Books:

1. Haussmann M.R. (1990), Engineering Principles of Ground Modification, McGraw- Hill InternationalEdition.
2. Dr.P.Purushotham Raj. Ground Improvement Techniques, Laxmi Publications. New Delhi / University science press, NewDelhi
3. NiharRanajanPatra. Ground Improvement Techniques, Vikas Publications, NewDelhi

Reference Books:

1. Moseley M.P. (1993) Ground Improvement, Blackie Academic and Professional,BocaTaton, Florida,USA.
2. Xanthakos P.P, Abramson, L.W and Brucwe, D.A (1994) Ground Control and Improvement, John Wiley andSons,
3. New York, USA.
4. Robert M. Koerner, Designing with Geosynthetics, Prentice Hall New Jercy,USA

Course Outcomes:

At the end of this Course the student will be able to

- Perceive the knowledge of various methods of ground improvement and their suitability to different field situations.
- Design a reinforced earth embankment and check its stability.
- Understand the functions of Geo-synthetics and their applications in Civil Engineering practice.
- Understand the concepts and applications of grouting

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE73A- RAILWAYS, AIRPORT AND HARBOUR ENGINEERING

(Professional Elective-V)

L	T	P	C
3	0	0	3

Course Objectives:

- Introduce different transportation systems and their importance and their role in development
- Understand standards and norms of National and International organisations which are framed for efficient functioning of existing transport systems
- Impart Knowledge regarding the functioning of various components like rails, sleepers, Tracks, Geometric curves, Runways, Taxiways Aprons Wear houses, Jetties etc
- Design elements like horizontal curves, vertical curves, super elevation etc
- Analyze how signal systems , visual aids and Markings etc help in safe working of transportation systems.

UNIT-I:

Railway Engineering:

Introduction – Permanent Way Components – Cross Section Of Permanent Way – Functions And Requirements Of Rails, Sleepers And Ballast – Types Of Gauges – Creep Of Rails – Theories Related To Creep – Coning Of Wheels – Adzing Of Sleepers – Rail Fastenings.

Learning Outcomes:

At the end of this unit, the student will be able to

13. Obtain Knowledge regarding different components of an railway track and its materials

14. Can differentiate various types of gauge networks

UNIT-II:

Geometric Design of Railway Track:

Gradients – Grade Compensation – Cant And Negative Super Elevation – Cant Deficiency – Degree Of Curves – Safe Speed On Railway Track – Points And Crossings – Layout And Functioning Of Left Hand Turn Out And Right Hand Turn Outs – Station Yards – Types of signals.

Learning Outcomes:

At the end of this unit, the student will be able to

- design railway network with proper alignment
- Will be able to overcome problems like super elevation, CANT, speeds on curves
- Can be possible to design points and crossings

UNIT-III

Airport Engineering:

Airport Site Selection – Factors Affecting Site Selection And Surveys- Runway Orientation – Wind Rose Diagram – Basic Runway Length – Correction For Runway Length – Terminal Area – Layout And Functions – Concepts Of Terminal Building – Simple Building , Linear Concept, Pier Concept And Satellite Concept – Typical Layouts .

Learning Outcomes:

At the end of this unit, the student will be able to

- how a runway orientation affected by wind rose diagram
- understand different terms present in an Airport
- understand wind intensities and directions for designing runway

UNIT-IV:

Geometric Design of Runways and Taxiways:

Aircraft Characteristics – Influence of Characteristics on Airport Planning and Design – Geometric Design Elements of Runway – Standards and Specifications. Functions of Taxiways –Geometric

Elements of Taxi ways and Standard Specifications – Runway and TaxiwayLighting.

Learning Outcomes:

At the end of this unit, the student will be able to

15. Design runway in a aerodrome

16. Understand functions of taxiway and design taxi way

UNIT-V:

Ports, Docks and Harbours:

Requirements of Ports And Harbors – Types Of Ports – Classification Of Harbors – Docks And Types Of Docks – Dry Docks, Wharves And Jetties – Breakwaters: Layouts Of Different Types Of Harbors And Docks – Dredging Operations – Navigation Aids.

Learning Outcomes:

At the end of this unit, the student will be able to

- differentiate between ports and harbours
- Differentiate types of break water structures to control water current
- Learn Different types of dredging operations

Text Books:

1. A Text Book Of Railway Engineering-S.C. Saxena And S. Arora, Dhanpatrai And Sons, New Delhi.
2. Transportation Engineering, Volume – II (Railways, Airports, Docks and Harbours, Bridges and Tunnels) by C. Venkataramaiah, Universities Press, Hyderabad.
3. Airport Planning And Design- S.K. Khanna And M.G Arora, NemchandBros.

Reference Books:

1. Satish Chandra AndAgarwal, M.M. (2007) "Railway Engineering" Oxford Higher Education, University Press NewDelhi.
2. Highway, Railway, Airport AndHarbour Engineering – K.P. Subramanian, ScitechPubilishers.

Course Outcomes:

At the end of this Course the student will be able to

- Gain knowledge regarding various specifications and standards set by organisations and official bodies.
- Differentiate the working of various transport systems and their working in different scenarios
- Understanding the functions of various components in Rail, Air, Water transport systems and their importance.
- Capable of carrying out surveys needed to be done while constructing Railways Airports and seaports
- Have a in depth knowledge on curve sections super elevations and many other design elements
- Explain the working of various design elements used in different Transport systems
- Calculate entities like maximum permissible loads on rails ,degree of curves, permissible speeds on various gauges etc
- Prepare master plans for Airports, harbour site considering natural phenomenon and different harbour railway airport elements

Department of Civil Engineering R20

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE73B- BRIDGE ENGINEERING

(Professional Elective-V)

L	T	P	C
3	0	0	3

Course Objectives:

- It deals with different types of loads on the bridges as per the I.R.C code provisions.
- It deals with the design procedures of bridges such as deck slab bridge, T – Beam Bridge, Plate girder bridge and Box culvert etc., based on the I.R.C provisions.
- It gives a good knowledge on different components like bridge bearing, piers and abutments of the bridges
- It gives good knowledge on design of bridge bearings based on the I.R.C provisions.
- It makes the student to design a bridge independently as per the I.R.C provisions

UNIT-I:

INTRODUCTION: Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.

BRIDGE BEARINGS : General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastomeric pad Bearing.

Learning Outcomes:

At the end of this unit, the student will be able to

17. Understand different types of I.R.C loads on the bridges.
18. Understand the different types of bridge bearings and their suitability.

UNIT-II:

DECK SLAB BRIDGE: Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicle only.

BOX CULVERT: General aspects. Design loads, Design of Box culvert subjected to IRC class AA tracked vehicle only.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the effective width method of analysis of bridge decks
- Know the design of the deck slab bridges
- Understand the different forces acting on the box culverts and its design.

UNIT-III

BEAM & SLAB BRIDGE (T-BEAM BRIDGE) General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the pigeauds method of analysis of deck slabs of T beam bridges
- Design the T beam bridges

UNIT-IV:

PLATE GIRDER BRIDGE: Introduction – elements of a plate girder and their design. Design procedure of Deck type welded plate girder – Bridge of single line B.G.

Learning Outcomes:

At the end of this unit, the student will be able to

19. Know the forces acting on the plate girder bridge
20. Understand the design of plate girder bridge

UNIT-V:

PIERS & ABUTMENTS: General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – forces acting on

abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design).

Learning Outcomes:

At the end of this unit, the student will be able to

21. Know the forces acting on the piers and abutments and their stability analysis

22. Know the different types of wings walls

Text Books:

1. Bridge Engineering by PonnuSwamy, TATA Mcgraw Hill Company, NewDelhi.
2. Design of Bridges by N.KrishnamRaju, Oxford & IBH, Publishing Company Pvt.ltd., Delhi.
3. Relevant – IRC & Railway bridgeCodes.

Reference Books:

1. Design of Steel structures, by B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, NewDelhi.
2. Design of Bridges Structure byD.J.Victor
3. Design of Steel structures byRamachandra.
4. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, NewDelhi.
5. Design of Bridges Structure by T.R.Jagadish&M.A.Jayaram Prentice Hall of India Pvt., Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- Understand different types of bridges and loads coming over the bridge as per the I.R.C codal provisions.
- Understand the design procedures of the bridges as per the I.R.C recommendations
- Understand the different forces acting on the piers and abutments and their stability analysis

Note: Relevant IRC & Railway Bridge Codes are to be permitted in the examination hall

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE73C- FOUNDATION ENGINEERING

(Professional Elective-V)

L	T	P	C
3	0	0	3

Course Objectives:

- To know the necessity of soil exploration.
- To design the shallow foundations.
- To know and necessity of deep foundations
- To perform the stability analysis of slopes.
- To know the principles and design of earth retaining walls
- To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically knowledge of the subject is essential..

UNIT-I:

SOIL EXPLORATION:

Need – Methods of soil exploration – Boring and Sampling methods – Field tests – Penetration Tests – Plate load test – Pressure meter – planning of Programme and preparation of soil investigation report.

Learning Outcomes:

At the end of this unit, the student will be able to

23. To learn about soil sampling (undisturbed and disturbed)

24. To determine the bearing capacity of shallow foundations

UNIT-II:

EARTH SLOPE STABILITY:

Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number- Stability of slopes of earth dams under different conditions.

Learning Outcomes:

At the end of this unit, the student will be able to

- To learn about the failure of slopes.
- To design of infinite and finite slopes using various methods.

UNIT-III

EARTH PRESSURE THEORIES:

Rankine's theory of earth pressure – earth pressures in layered soils – Coulomb's earth pressure theory – Rebhann's and Culmann's graphical method

RETAINING WALLS: Types of retaining walls – stability of retaining walls.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand the role earth pressure on the stability of retaining systems.

UNIT-IV:

SHALLOW FOUNDATIONS:

Types – choice of foundation – Location of depth – Safe Bearing Capacity – Terzaghi`s, Meyerhoff's and Skempton`s Methods

ALLOWABLE BEARING PRESSURE:

Safe bearing pressure based on N- value – allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures – Settlement Analysis

Learning Outcomes:

At the end of this unit, the student will be able to

25. To learn about various types of foundations

26. To calculate the bearing capacity and settlement of foundations

UNIT-V:

PILE FOUNDATION:

Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups in sands and clays – Settlement of pile groups.

WELL FOUNDATIONS:

Types – Different shapes of wells – Components of wells – functions and Design Criteria – Sinking of wells – Tilts and shifts.

Learning Outcomes:

At the end of this unit, the student will be able to

27. To understand the behaviour of the piles under different loading conditions.

28. To design the load carrying capacity of piles.

29. To understand the behaviour of well foundations.

Text Books:

1. Geotechnical Engineering by C.Venkataramaiah, New AgePubilications.
2. Soil Mechanics and Foundation Engineering by Arora, Standard Publishers andDistributors, Delhi
3. Soil Mechanics and Foundations by – by B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Laxmi, publications Pvt. Ltd., NewDelhi

Reference Books:

1. Das, B.M.,-(1999)Principles of Foundation Engineering–6^{th} edition (Indianedition) Thomson Engineering
2. Foundation Engineering by Varghese,P.C., Prentice Hall of India., NewDelhi.
3. Foundation Engineering by V.N.S.Murthy, CRC Press, NewDelhi.
4. Bowles, J.E., (1988) Foundation Analysis and Design – 4 thEdition, McGraw-HillPublishingcompany,Newyork
5. Geotechnical Engineering by Manoj Dutta & Gulati S.K – Tata Mc.GrawhillPublishersNew Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- To enable the student to analyse shallow and deep foundations when subjected to various types of loadings
- To enable the student to analyse slopes, retaining walls and well foundations

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE70- REMOTE SENSING & GIS LAB

(Skill Oriented Course-V)

L	T	P	C
1	0	2	2

LIST OF EXPERIMENTS:

1. Familiarization with GIS Software, Data Input
2. Geo Referencing and Projections
3. Digitization of Map/ Top sheet
4. Creation of Thematic Maps
5. Base Map Preparation
6. Data Conversion – Vector to Raster, Raster to Vector
7. Adding Attribute Data – Querying On Attribute Data
8. Vector Analysis
9. Raster Analysis
10. Map Composition
11. Developing Digital Elevation Model
12. Simple Applications of GIS in Water Resources Engineering & Transportation Engineering

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech. VI /VII-Sem (R20)

NUMERICAL TECHNIQUES

(Open Elective -II)

L	T	P	C
3	0	0	3

Course Objectives: This course aims at providing the student

- With the concepts and several methods of Numerical methods.
- To explore the solutions of ordinary differential equations, partial differential equations and integral equations.

UNIT – 1: Solution to System of Nonlinear Equations and Spline Functions: **9 Hrs**

Method of Iteration- Newton-Raphson method. Linear splines - Quadratic splines – Cubic splines: Minimizing property of Cubic splines – Error in the Cubic Spline ad its derivatives – Surface fitting by cubic splines. – Cubic B-Splines: Representation of B- Splines – Least squares solution – Applications of B-Splines.

Learning Outcomes:

At the end of this unit, the student will be able to

• Solve the algebraic and transcendental equations.	L2
• Solve the system of nonlinear equations and spline functions.	L4

UNIT – II: Numerical Linear Algebra:

Triangular matrices – LU decomposition of a matrix – vector and matrix norms. – Solutions of linear systems –Direct methods: Gauss elimination – necessary for pivoting – Gauss-Jordan method – modification of the Gauss method to compute the inverse – number of arithmetic operations – LU decomposition method – computational procedure for LU decomposition method – LU decomposition from Gauss elimination – solution of tridiagonal systems – III conditioned linear systems – Method for III- conditioned systems. – Solution of linear systems –Iterative methods.

Learning Outcomes:

At the end of this unit, the student will be able to

• Understand the concepts of numerical linear algebra.	**L1**
• Apply the concepts of numerical linear algebra.	**L3**

UNIT – III: Initial and Boundary value problems:

Predictor-Corrector methods: Adams-Moulton method – Milne's method. – Cubic Spline method – Simultaneous and higher order equations. – Boundary value problems: Finite difference method – Cubic Spline method – Galerkin's method.

Learning Outcomes:

At the end of this unit, the student will be able to

• Solve first order initial value problems.	L3
• Solve ssimultaneous and higher order equations and boundary value problems.	L4

UNIT – IV: Numerical solution of Laplace's equation and Poisson's equation:

Laplace's equation and Poisson's equation – Finite difference approximations to derivatives – solution of Laplace's equation and Poisson's equation: Jacobi's method – Gauss-Seidel method – Successive over

relaxation method – ADI method.

Learning Outcomes:

At the end of this unit, the student will be able to

• Solve Laplace's equation using finite difference technique.	L3
• Solve Poisson's equation through iterative methods.	L4

UNIT – V: One dimensional Heat equation & Wave equation:

Heat equation in one dimension: Finite difference approximations-Bender-Schmidt recurrence formula-Crank-Nicolson formula ; Iterative methods for the solution of equations - Gauss-Seidel iteration formula and One dimensional Wave equation.

Learning Outcomes:

At the end of this unit, the student will be able to

• Apply numerical methods for solving one dimensional heat equation.	L3
• Apply numerical methods for solving one dimensional wave equation.	L4

Text Books:

1. S. S. Sastry, Introductory Methods of Numerical Analysis(Fifth Edition 2012), PHI Learning Private Limited, New Delhi.

Reference Books:

1. M.K.Jain,S.R.K.Iyengar, R.K.Jain, Numerical Methods for Scientific and Engineering Computation (sixth edition),Nee Age International(P) Limited, Publishers, New Delhi.
2. K.E. Atkinson, An Introduction to Numerical Analysis, Wiley, 1989.S.D. Conte and C. De Boor, Elementary Numerical Analysis 302226 An Algorithmic Approach, McGraw-Hill, 1981.
3. K. Eriksson, D. Estep, P. Hansbo and C. Johnson, Computational Differential Equations, Cambridge Univ. Press, Cambridge, 1996.
4. G.H. Golub and J.M. Ortega, Scientific Computing and Differential Equations: An Introduction to Numerical Methods, Academic Press, 1992.
5. J. Stoer and R. Bulirsch, Introduction to Numerical Analysis, 2nd ed., Texts in Applied Mathematics, Vol. 12, Springer Verlag, New York, 1993.

Course Outcomes:

At the end of this Course the student will be able to

• Understand the need of numerical methods in solving engineering problems of various fields.	**L1**
• Learn various numerical techniques to solve initial and boundary value problems.	**L2**
• Apply various methods in solving Laplace's equation.	**L3**
• Emphasizes the numerical solutions of one dimensional heat and wave equations .	**L4**
• Analyze the problems in engineering and technology using various techniques of Numerical methods.`	**L5**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
III B.TECH – II SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY

MATERIALS CHARACTERIZATION TECHNIQUES
(Common to all branches)

L	T	P	C
3	0	0	3

Course Objectives:

- The latest analysis techniques and material structure and property correlation
- The most advanced imaging instruments for investigating the modern materials at the highest topographic resolution
- The commonly used analytical tools for characterizing modern materials at highest sensitivity
- The latest advancement in spectroscopy for getting structural and elemental analysis of Materials

UNIT – 1: Structure analysis by Powder X-Ray Diffraction **9 Hrs**

Introduction, Bragg's law of diffraction, Intensity of Diffracted beams –factors affecting Diffraction Intensities - structure of polycrystalline Aggregates, Determination of crystal structure, Crystallite size by Scherrer equation, Small angle X-ray scattering (SAXS) (in brief).

Learning Outcomes:

At the end of this unit, the student will be able to

• **Understand** the diffraction phenomenon in crystals	**L1**
• **Identify** the factors affecting diffraction pattern intensities	**L2**
• **Explain** the polycrystalline nature of the material	**L3**
• **Analyze** the crystal structure and crystallite size by various methods	**L4**
• **Illustrate** the Small angle X-ray scattering (SAXS)	**L2**

UNIT – II: Microscopy technique -1 –Scanning Electron Microscopy (SEM) **9 Hrs**

Introduction, Principle, Construction and working principle of Scanning Electron Microscope, Specimen preparation, Different types of modes used (Secondary Electron and Back scattered Electron), Energy Dispersive X-ray Analyzer (to provide elemental identification and quantitative compositional information), Advantages and limitations of SEM.

Learning Outcomes:

At the end of this unit, the student will be able to

• **Explain** the basic concepts and working principle of Scanning Electron Microscope	**L1**
• **Classify** the different types of Scanning Electron Microscope modes used	**L2**
• **Identifies** the specimen preparation for Scanning Electron Microscope	**L2**
• **Analyze** the morphology of the sample by using Scanning Electron Microscope	**L4**
• **Understand** the advantages and limitations of Scanning Electron Microscope	**L2**

UNIT – III: Microscopy Technique -2 - Transmission Electron Microscopy (TEM) **9Hrs**

Principle, Construction and Working principle, Resolving power and Magnification, Bright and dark fields, Diffraction and image formation, Specimen preparation, Selected Area Diffraction, Applications of Transmission Electron Microscopy,Difference between SEM and TEM, Advantages and Limitations of Transmission Electron Microscopy.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the basic principle and working principle of Transmission Electron Microscope	**L1**
• **Classify** the different types of Transmission Electron Microscope modes used	**L2**
• **Identifies** the specimen preparation for Transmission Electron Microscope	**L2**
• **Analyze** the morphology and crystal structure of the sample by using Transmission Electron Microscope	**L2**
• **Understand** the advantages and limitations of Transmission Electron Microscope	**L3**
UNIT – IV: Spectroscopy techniques	**9 Hrs**
Principle, Experimental arrangement, Analysis and Advantages of the spectroscopic techniques – (i) UV-Visible spectroscopy – quantitative analysis of elements and organic compounds, energy band gap determination – wood and Tauc and KubelkaMunk functions (ii) Raman Spectroscopy – Molecular analysis using vibrational modes (iv) X-ray photoelectron spectroscopy (XPS) for surface materials characterization and chemical analysis.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the principle and experimental arrangement of spectrometers	**L1**
• **Understand** the analysis and advantages of the spectroscopic techniques	**L2**
• **Explain** the concept of UV-Visible spectroscopy	**L2**
• **Explain** the principle and experimental arrangement of Raman Spectroscopy	**L2**
• **Explain** the principle and experimental arrangement of X-ray photoelectron spectroscopy (XPS)	**L2**
UNIT – V: Electrical & Magnetic Characterization techniques	
Electrical Properties analysis techniques (DC conductivity, AC conductivity) Activation Energy, Effect of Magnetic field on the electrical properties (Hall Effect). Magnetization measurement by induction method, Vibrating sample Magnetometer (VSM) and SQUID (Superconducting Quantum Interference Device)	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the various types of electrical properties analysis techniques	**L1**
• **Explain** the effect of magnetic field on the electrical properties	**L2**
• **Analyze** the magnetization by using induction method	**L2**
• **Explain** the construction and working principle of VSM	**L2**
• **Explain** the construction and working principle of SQUID	**L2**
Text Books:	
1. Material Characterization: Introduction to Microscopic and Spectroscopic Methods – Yang Leng – John Wiley & Sons (Asia) Pvt. Ltd. 2008	
2. Microstructural Characterization of Materials - David Brandon, Wayne D Kalpan, John Wiley & Sons Ltd., 2008.	
Reference Books:	
1. Fundamentals of Molecular Spectroscopy – IV Ed. – Colin Neville BanwellandElaine M. McCash, Tata McGraw-Hill, 2008.	
2. Elements of X-ray diffraction – Bernard Dennis Cullity & Stuart R Stocks, Prentice Hall , 2001 – Science.	

Course Outcomes:	
At the end of this Course the student will be able to	
• **Identify** the various characterization techniques	**L1**
• **Classify** the characterization techniques based on their applications and properties	**L2**
• Ilustates the various characterization techniques for materials characterization.	**L3**
• **Apply** suitability in Engineering Applications	**L4**



JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech – IV-I-Sem	L	T	P	C
	3	0	0	3

Polymers and their applications (OE.2)
(common to all branches)

Course Objectives:

- To understand the basic principles of polymers
- To synthesize the different polymeric materials and their characterization by various instrumental methods.
- To impart knowledge to the students about fundamental concepts of Hydro gels of polymer networks, surface phenomenon by micelles
- To enumerate the applications of polymers in engineering

UNIT-I: **Polymers-Basics and Characterization**	9 Hrs

Basic concepts: monomers, repeat units, degree of polymerization, linear, branched and network polymers, classification of polymers, Polymerization mechanisms: condensation, addition.Molecularweight concepts: determination bynumber, weight and viscosity average molecular weights, polydispersity and molecular weight distribution. Measurement of molecular weight: end group, viscosity, light scattering, osmotic and ultracentrifugation methods, analysis and testing of polymers, Characterization of polymers by XRD, DSC.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Classify the polymers (L3)
- Explain polymerization mechanism (L2)
- Differentiate addition, condensation polymerizations(L2)
- Describe measurement of molecular weight of polymer(L2)

UNIT-II: **Synthetic Polymers**	8 Hrs

Polymerization processes – Bulk, Solution, Suspension and Emulsion polymerization.Preparation and significance, classification of polymers based on physical properties, Thermoplastics, Thermosetting plastics, Fibers and elastomers, General Applications. Preparation of Polymers based on different types of monomers, Olefin polymers, Diene polymers, nylons, Urea - formaldehyde, phenol - formaldehyde and melamine Epoxy and Ion exchange resins.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Differentiate Bulk, solution, Suspension and emulsion polymerization(L2)
- Describe fibers and elastomers (L2)
- Identify the thermosetting and thermo polymers(L3)

UNIT-III: Natural Polymers & Modified cellulosics	8 Hrs

Natural Polymers: Chemical & Physical structure, properties, source, important chemical

modifications, applications of polymers such as cellulose, lignin, starch, rosin, shellac, latexes, vegetable oils and gums, proteins.Modified cellulosics: Cellulose esters and ethers such as Ethyl cellulose, CMC, HPMC, cellulose acetals, Liquid crystalline polymers; specialty plastics- PES, PAES, PEEK, PEA.

Learning Outcomes:

After completing the course, the student will be able to:

- Describe the properties and applications of polymers(L2)
- Interpret the properties of cellulose, lignin, starch, rosin, latex (L2)
- Discuss the special plastics of PES, PAES, PEEK (L3)
- Explain modified cellulosics(L2)

UNIT-IV: Hydrogels of Polymer networks and Drug delivery	8 Hrs

Definitions of Hydrogel, polymer networks, Types of polymer networks, Methods involved in hydrogel preparation, Classification, Properties of hydrogels, **Applications** of hydrogels in drug delivery.Introduction to drug systems including regulation, absorption and disposition, routes of administration and dosage forms. Advanced drug delivery systems and controlled release.

Learning Outcomes:

After completing the course, the student will be able to:

- Identify types of polymer networks(L3)
- Describe methods involve in hydrogel preparation(L2)
- Explain applications of hydrogels in drug delivery(L2)
- Demonstrate the advanced drug delivery systems and controlled release(L2)

UNIT-V: **Advanced Polymers for engineering applications**	7Hrs

Importance of advance polymers examples-polymers in sensors,conducting and synthetic metals, photonics, thermoplastics. Applications of Biodegradable polymers, Bio-PET, BIO-PEP, Polylactides

Learning Outcomes:

After completing the course, the student will be able to:

- Demonstrate conducting polymers (L3)
- Explain Biodegradable polymers (L2)
- Discuss applications of Biodegradable polymers, Bio-PET, BIO-PEP, Polylactides (L3)

Text Books:

1. Fred W.Billmayer, A Text book of Polymer science, 3rd Edition, Wiley India, 2007
2. K.J.Saunders, Organic polymer Chemistry, Chapman and Hall, 1973.

Reference Books:

1. B.Miller, Advanced Organic Chemistry, Prentice Hall, 2nd Edn, 2003
2. Ambikanandan Misra, Aliasgar Shahiwala, Applications of polymers in Drug delivery system, Elsevier Pub., 2020.
3. Gowarikar, Polymer Chemistry –New Age International Publications, 2019
4. Physical Chemistry , Samel Galsstone, Lan Caster Press, 1970.

Course Outcomes:

At the end of this Course the student will be able to

- Understand the state of art synthesis of Polymeric materials(L1)
- Understand the hydro gels preparation, properties and applications in drug delivery system (L2).
- Explain biodegradable polymers(L2)
- Discuss applications of Biodegradable polymers (L3)

B.Tech III Year II Sem & IV Year I Sem

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE65A- ENVIRONMENTAL IMPACT ASSESSMENT

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- This course is aimed at exposing the student to the concept of environmental impact assessment and methodologies used for the same.
- The student will also be imparted the knowledge about the various laws related to EIA and also methods of EIA audit.

UNIT-I:

INTRODUCTION:-

Basic concept of EIA : Initial environmental Examination, Elements of EIA, - factors affecting E-I-A Impact evaluation and analysis, preparation of Environmental Base map, Classification of environmental parameters.

UNIT-II:

EIA METHODOLOGIES:-

E I A Methodologies: introduction, Criteria for the selection of EIA Methodology, E I A methods, Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method, overlay methods and cost/benefit Analysis.

UNIT-III

IMPACT OF DEVELOPMENTAL ACTIVITIES AND LAND USE:-

Introduction and Methodology for the assessment of soil and ground water, Delineation of study area, Identification of actives. Procurement of relevant soil quality, Impact prediction, Assessment of Impact significance, Identification and Incorporation of mitigation measures. E I A in surface water, Air and Biological environment: Methodology for the assessment of Impacts on surface water environment, Air pollution sources, Generalized approach for assessment of Air pollution Impact.

UNIT-IV:

ASSEMENT OF IMPACT ON VEGETATION AND WILDLIFE :

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife, environmental Impact of Deforestation – Causes and effects of deforestation.

ENVIRONEMNTAL AUDIT :

Introduction - Environmental Audit & Environmental legislation objectives of Environmental Audit, Types of environmental Audit, Audit protocel, stages of Environmental Audit, onsite activities, evaluation of Audit data and preparation of Audit report.

UNIT-V:

ENVIRONEMENTAL ACTS (PROTECTION AND PREVENTION)

Post Audit activities, The Environmental protection Act, The water preventation Act, The Air (Prevention & Control of pollution Act.), Wild life Act.Case studies and preparation of Environmental Impact assessment statement for various Industries.

Text Books:

- Environmental Impact Assessment Methodologies, byY. Anjaneyulu, B.S. Publication, Sultan Bazar,Hyderabad.
- Environmental Science and Engineering, by J. Glynn and Gary W. Hein Ke – Prentice HallPublishers

Reference Books:

1. Environmental Science and Engineering, by Suresh K. Dhaneja – S.K.,Katari& Sons Publication., NewDelhi.
2. Environmental Pollution and Control, by Dr H.S. Bhatia – Galgotia Publication (P) Ltd, Delhi

Course Outcomes:

At the end of this Course the student will be able to

1. Understand the concept of Environmental impact
2. Understand the methodologies related to EIA
3. Appreciate various laws related to environmental protection
4. Prepare the environmental impact assessment statement and to evaluateit.

Annexure-II *R20*

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

ENERGY CONSERVATION & MANAGEMENT

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation Techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient Technologies.

UNIT – I: **09 Hrs**

Basic Principles of Energy Audit and management Energy audit – Definitions – Concept– Types of audit – Energy index – Cost index – Pie charts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various types of Energy Audit **L1**
- To know about various types of Energy conservation schemes and Energy Manager functions **L2**

UNIT – II: **09 Hrs**

Lighting Modification of existing systems – Replacement of existing systems – Priorities: Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Lighting systems and types of lamps. **L1**
- To evaluate illumination level Illumination of inclined surface to beam and Design of Energy efficient lighting systems. **L2**

UNIT – III: **09 Hrs**

Power Factor and energy instruments Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt–hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about various Methods of Power Factor improvement **L1**
- To know about various Energy Instruments **L3**

UNIT – IV: **09 Hrs**

Space Heating and Ventilation Ventilation – Air–Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat–Space heating methods – Ventilation and air–conditioning – Insulation–Cooling load – Electric water heating systems – Energy conservation methods

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about analysis of Heating and HVAC **L1**
- To know about Energy conservation methods **L2**

UNIT – V: **09 Hrs**

Economic Aspects and Analysis : Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts).Computation of Economic Aspects Calculation of simple payback method – Net present worth method – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment.

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic concept of Analysis of Economics and different methods **L1**
- To know about Computation of Economic Aspects Calculation **L2**

Text Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Elsevier publications. 2012
2. Energy efficient electric motors by John.C.Andreas, Marcel Dekker Inc Ltd-2nd edition,1995.

Reference Books:

1. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
2. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1stedition, 1998.
3. Energy management hand book by W.C.Turner, John wiley and sons.
4. Energy management and conservation –k v Sharma and pvenkata seshaiah-I K International Publishing House pvt.ltd, 2011.
5. http://www.energymanagertraining.com/download/Gazette_of_IndiaP art IISecI-37_25-08-2010.pdf

Course Outcomes:

At the end of this Course the student will be able to

- Explain energy efficiency, conservation and various technologies. **L1**
- Design energy efficient lighting systems. **L2**
- Calculate power factor of systems and propose suitable compensation techniques. **L3**
- Explain energy conservation in HVAC systems. **L4**
- Determination of the economic analysis **L5**



B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME65a-PROGRAMMING OF ROBOTS AND CONTROL

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Learn the fundamental concepts of industrial robotic technology.
- Apply the basic mathematics to calculate kinematic and dynamic forces in robot manipulator.
- Understand the robot controlling and programming methods.
- Describe concept of robot vision system.

UNIT – I: Fundamentals of Robots: **10 Hrs**

Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots.

Learning Outcomes:

At the end of this unit, the student will be able to

- outline the advantages, disadvantages and applications of robot. **L2**
- compare the types of robot manipulators based on applications. **L2**

UNIT – II: Robot Actuators And Feedback Components: **8 Hrs**

Actuators, Pneumatic, Hydraulic actuators, Electric & Stepper motors, comparison. Position sensors - potentiometers, resolvers, encoders - velocity sensors, Tactile sensors, Proximity sensors.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare the types of actuators used in robot manipulator. **L2**
- List out the various types of robots and feedback components. **L1**

UNIT – III: Robot Programming: **8 Hrs**

Methods of programming - requirements and features of programming languages, software packages, problems with programming languages - VAL, RAIL, AML, C, C++.

Learning Outcomes:

At the end of this unit, the student will be able to

- List out the various methods of robot programming **L1**
- Explain the requirements and features of programming **L2**

UNIT – IV: Control of Manipulators **8 Hrs**

Open-loop and close-loop control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID control Scheme, computer Torque control, force control of robotic manipulators, description of force-control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic concepts of robot controlling systems. **L2**
- Outline PD and PID control schemes. **L3**
- Use the force control strategies to determine the forces in robot. **L2**
- Explain the force control and torque control techniques. **L2**

UNIT – V: Robot Vision: **8 Hrs**

Introduction, architecture of robotic vision system, image processing, image acquisition camera, image enhancement, image segmentation, imaging transformation, Camera transformation and calibrations, industrial applications of robot vision.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the components of robot vision system. **L3**
- Explain the concept of image enhancement, segmentation and transformation. **L2**

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- List the various components of robot vision system. **L1**
- Illustrate the industrial applications of robot vision system. **L2**

Text Books:

1. Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey , Industrial Robotics — McGraw Hill, 1986.
2. R K Mittal and I J Nagrath, Robotics and control, Illustrated Edition, Tata McGraw Hill India 2003.
3. S.R.DEB

Reference Books:

1. Saeed B. Niku, Introduction to Robotics – Analysis, System, Applications, 2/e, John Wiley & Sons, 2010.
2. H. Asada and J.J.E. Slotine, Robot Analysis and Control, 1/e, Wiley- Inter science, 1986.
3. Robert J. Schillin, Fundamentals of Robotics: Analysis and control, Prentice-Hall Of India Pvt. Limited, 1996.
4. Mohsen shahinpoor, A robot Engineering text book, Harper & Row Publishers,1987.
5. John.J.Craig Addison, Introduction to Robotics: Mechanics and Control, Wesley, 1999.
6. K.S. FU, R.C. Gonzalez and C.S.G Lee, Robotics: Control, sensing, vision, and intelligence. Mc Graw Hill, 1987.
7. Richard D. Klafter, Thomas Robotic Engineering an integrated approach, PHI publications 1988.

Course Outcomes:

At the end of this Course the student will be able to

- Explain fundamentals of Robots. **L2**
- Apply kinematics and differential motions and velocities. **L3**
- Demonstrate control of manipulators. **L2**
- Understand robot vision. **L2**
- Develop robot cell design and programming. **L3**

Online Learning Resources:

- https://nptel.ac.in/courses/112105249
- https://onlinecourses.nptel.ac.in/noc20_de11/preview
- https://nptel.ac.in/courses/112104308
- https://nptel.ac.in/courses/112104288
- https://nptel.ac.in/courses/112101099
- https://www.iare.ac.in/sites/default/files/lecture_notes/ROBOTICS_LECURE_NOTES.pdf

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME65b-NON-CONVENTIONAL SOURCES OF ENERGY

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Familiarize with concept of various forms of renewable energy.
- Understand division aspects and utilization of renewable energy sources for both domestics and industrial applications.
- Expose the students in an environmental and cost economics of using renewable energy sources compared to fossil fuels.

UNIT – I: Introduction **10 Hrs**

Introduction to energy resources: Role and potential of new and renewable source, the solar energy option, Environmental impact of solar power, physics of the sun, the solar constant, extraterrestrial and terrestrial solar radiation, solar radiation on titled surface, instruments for measuring solar radiation and sun shine, solar radiation data.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic concepts of solar radiation and solar collectors **L2**
- develop sun path diagrams **L3**
- Explain environmental impact of solar power. **L2**
- Discuss the instruments for measuring solar radiation and sun shine. **L6**

UNIT – II: Solar Energy Collection & Storage **8 Hrs**

Solar Energy Collection: Flat plate and concentrating collectors, classification of concentrating collectors, orientation and thermal analysis, advanced collectors.

Solar Energy Storage and Applications :

Different methods, Sensible, latent heat and stratified storage, solar ponds. Solar Applications solar heating technique, solar distillation and drying, photovoltaic energy conversion.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify solar energy collectors. **L1**
- Describe orientation and thermal analysis of solar energy collectors. **L2**
- Explain photovoltaic energy conversion. **L2**
- Illustrate the various solar energy applications. **L2**

UNIT – III: Wind Energy & Bio-Mass **8 Hrs**

Wind Energy : Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Betz criteria

Bio-Mass: Principles of Bio-Conversion, Anaerobic/aerobic digestion, types of Bio-gas digesters, gas yield, combustion characteristics of bio-gas, utilization for cooking, I.C. Engine operation and economic aspects.

Learning Outcomes:

At the end of this unit, the student will be able to

- Compare vertical axis and horizontal axis windmills. **L3**
- Illustrate the performance characteristics of vertical axis and horizontal axis windmills. **L2**
- Discus the principles of Bio-conversion. **L6**
- Explain combustion characterises of bio-gas. **L2**

UNIT – IV: Geothermal Energy & Ocean Energy **8 Hrs**

Geothermal Energy: Resources, types of wells, methods of harnessing the energy, potential in India.

Ocean Energy: OTEC, Principles utilization, setting of OTEC plants, thermodynamic cycles. **Tidal and wave energy:** Potential and conversion techniques, mini-hydel power plants, and their economics.

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Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of geothermal and ocean energy. **L2**
- Discus OTEC and principles utilization. **L6**
- Explain mini-hydel power plants and their economics. **L2**

UNIT – V: Direct Energy Conversion **8 Hrs**

Need for DEC, Carnot cycle, limitations, principles of DEC. Thermo-electric generators, Seebeck, Peltier and Joule Thomson effects, Figure of merit, materials, applications, MHD generators, principles, dissociation and ionization, hall effect, magnetic flux, Fuel cells, principles, faraday's law's, thermodynamic aspects, selection of fuels and operating conditions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the working principle of MHD engine. **L2**
- Explain constructional details of various thermo-electric generators. **L2**
- Identify the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**

Text Books:

1. Tiwari and Ghosal, Renewable energy resources, Narosa Publishing House-2004.
2. G.D. Rai, Non-Conventional Energy Sources, Khanna Publications-1988.

Reference Books:

1. Twidell & Weir, Renewable Energy Sources, Routledge; 3/e, 2015.
2. Sukhatme S.P., Nayak.J.P, 'Solar Energy – Principle of Thermal Storage and collection", Tata McGraw Hill, 2008.
3. Sathyajith Mathew, Wind Energy Fundamentals, Resource Analysis and Economics, Springer Publications, 2006.
4. Wei Tong, Wind Power Generation and Wind Turbine Design, WIT Press, 2010.
5. Wind Power, Revised Edition: Renewable Energy for Home, Farm, and Business, Paul Gipe, Chelsea Green Publishing, 2004.
6. S.S. Rao, B.B. Parulekar, Energy Technology (Non Conventional, Renewable and Conventional), Khanna publications, 1994.

Course Outcomes:

At the end of this Course the student will be able to

- Outline the various economic, thermodynamic aspects of electron gas dynamic conversion system. **L3**
- Explain the basic concepts of solar radiation and solar collectors **L2**
- Discus OTEC and principles utilization. **L6**
- Describe orientation and thermal analysis of solar energy collectors. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/103103206
- https://nptel.ac.in/courses/108108078
- https://onlinecourses.nptel.ac.in/noc21_ph33/preview
- https://nptel.ac.in/courses/121106014
- https://mrcet.com/downloads/digital_notes/EEE/31082020/IV-I%20SOLAR%20&%20WIND%20ELECTRICAL%20SYSTEMS%20DIGITAL%20NOTES%201.pdf
- https://www.vssut.ac.in/lecture_notes/lecture1428910296.pdf

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC65a- INTRODUCTION TO MICROCONTROLLER AND APPLICATIONS

(Open Elective-II)

L–T – P - C
3 – 0 – 0 – 3

Course Objective:

- To understand the basic concepts and architecture of 8051.
- To learn various instructions and addressing modes used in 8051
- To be able to program 8051 Timers and implement serial communication for a given application.
- To learn interfacing of memory, I/O devices and the usage of Interrupts.
- To know the basic architecture and interfacing of ARM microcontroller.

UNIT I

Architecture of 8051: Introduction, Block diagram of 8051 Microcontroller, Functions of each block, Pin details of 8051, ALU,ROM, RAM, Memory Organization of 8051, Special function registers, Program Counter, PSW register, Stack, I/O Ports, Timer, Interrupt, Serial Port, Oscillator and Clock, Clock Cycle, Machine Cycle, Instruction cycle, Reset, Power on Reset.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the architecture of 8051 microcontroller.(L2)
- Learn the functions of each block of 8051 microcontroller.(L1)

UNIT II

Instruction Set of 8051: Instruction set of 8051, Classification of 8051 Instructions, Data transfer instructions, Arithmetic Instructions, Logical instructions, Branching instructions, Bit Manipulation Instructions

Assembler and Addressing Modes: Assembling and running an 8051 program, Structure of Assembly Language, Assembler directives, Different addressing modes of 8051. **I/O:** Bit addresses for I/O and RAM, I/O programming, I/O bit manipulation programming.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know different instructions available in the Instruction set of 8051.(L1)
- Learn and use different types of addressing modes of 8051 microcontroller.(L1)

UNIT III

Timer: Programming 8051 Timers, Timer registers, Different modes of Timer, Programming timer in different modes, Counter programming, Different modes of Counter, Sample programs.

Serial Communication: Basics of Serial communication, UART, RS 232 Protocol, 8051 interface to RS 232, 8051 UART Programming, SPI and I^2C implementation on 8051.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Write programs to use the 8051 Timers for a given application.(L6)
- Use different types of serial communication devices based on the application.(L3)

UNIT IV

Interrupt: 8051 Interrupts, Programming Timer Interrupts, Programming external hardware interrupts, Programming the serial communication interrupt, Interrupt priority in 8051.**IC 8255:** IC 8255, Block Diagram, Modes of 8255, Interfacing with 8051.

Interfacing Techniques: Interfacing external memory to 8051, Sensor interfacing, ADC interfacing, DAC interfacing, Keyboard interfacing, Seven segment LED Display Interfacing, Stepper Motor interfacing.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Interface memory and I/O devices for specific applications.(L4)
- Learn and apply Interrupts based on the application and usage.(L3)

UNIT V

ARM Cortex-M Microcontrollers: A Memory-centric System Model. Basics of Chip Design. The Arm Cortex-M Processor Architecture. Interconnects. The Advanced Microcontroller Bus Architecture (AMBA). Interfacing with the External World. Peripherals. Memory System. FPGA SoC Architecture.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn about the ARM based processor and its architecture.(L3)
- Interface ARM controllers for practical applications.(L3)

TEXT BOOKS

1. Muhammed Ali Mazidi, Janice GillispieMazidi andRolin D McKinlay, "The 8051 Microcontroller and Embedded Systems Using Assembly and C", 2nd Edition, Pearson Education, 2008.
2. Ajit pal, "Microcontrollers, Principles and Applications", – PHI Ltd., - 2011.

REFERENCE BOOKS

1. Ajay V Deshmukh, "Microcontrollers: Theory and Applications", TATA McGraw Hill publications, 2007.
2. Krishna Kanth, "Microprocessors and Microcontrollers", PHI Publications, 2010
3. Fundamentals of System-on-Chip Design on Arm Cortex-M Microcontrollers Paperback – 2 Aug. 2021by Rene Beuchat , Andrea Guerrieri , SahandKashani.

Course outcomes:

At the end of this course, the students will be able to

- Understand the basic concepts and architecture of 8051.(L2)
- Know the usage of various instructions and addressing modes in 8051(L1)
- Program 8051 Timers and implement serial communication for a given application.(L6)
- Interface memory, I/O devices and use Interrupts.(L4).
- Learn the basic architecture and interfacing of ARM microcontroller(L3).

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC65b- PRINCIPLES OF DIGITAL SIGNAL PROCESSING

(Open Elective-II)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To understand the frequency domain analysis of discrete time signals.
- To learn the properties of discrete fourierseries and fourier transforms.
- To design & analyze IIR digital filters from analog filters.
- To know various structures used in implementation of FIR digital filters.
- To grasp the importance and applications of Multirate Digital signal processing.

UNIT I

Introduction to Digital Signal Processing: Discrete time signals & sequences, Classification of Discrete time systems, stability of LTI systems, LTI system Properties. Solution of Linear constant coefficient difference equations, frequency domain representation of discrete time signals and systems. Review of Z-transforms.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze and process signals in the discrete domain.(L4)
- Determine time domain representations and frequency domain analysis of discrete-time signals and systems (L3)

UNIT II

Discrete Fourier Series and Fourier Transforms: Properties of discrete Fourier series, DFS representation of periodic sequences, Discrete Fourier transforms: Properties of DFT, linear filtering methods based on DFT, Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation in frequency FFT Algorithms, Inverse FFT.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the pproperties of discrete fourier series.(L2)
- Describe DFT using FFT algorithms.(L1)

UNIT III

Design of IIR Digital Filters and Realizations: Analog filter approximations – Butter worth and Chebyshev, Design of IIR Digital filters from analog filters, Design Examples, Analog and Digital frequency transformations. Basic structures of IIR systems, Transposed forms.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Design IIR digital filters from analog filters.(L6)
- Construct IIR digital filters with different realization techniques.(L6)

UNIT IV

Design of FIR Digital Filters and Realizations: Characteristics of FIR Digital Filters, frequency response. Design of FIR digital filters using window techniques and frequency sampling technique, comparison of IIR & FIR filters, basic structures of FIR systems.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Design FIR digital filters using window techniques.(L6)
- Construct the basic structures of FIR systems.(L6)

UNIT V

DSP Applications: Introduction to programmable DSPs, Multirate signal processing: Decimation, Interpolation, Sampling rate conversion by a rational factor; Adaptive filters: Introduction, Basic principles of Forward Linear Predictive filter and applications such as system identification, echo cancellation, equalization of channels, and beam forming using block diagram representation study only.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Apply Interpolation and Decimation with help of sampling and filtering.(L3)
- Understand the principle and applications of Forward Linear Predictive filter.(L2)

Text Books:

1. John G. Proakis andDimitris G. Manolakis, "Digital Signal Processing, Principles, Algorithmsand Applications", Pearson Education, 2007.
2. A.V.Oppenheim and R.W. Schaffer, "Discrete Time Signal Processing",PHI.
3. B.Venkataramani and M. Bhaskar, "Digital Signal Processors – Architecture, Programming and Applications", TATA McGraw Hill, 2002.

References:

1. Andreas Antoniou, "Digital Signal Processing", TATA McGraw Hill, 2006
2. MH Hayes, "Digital Signal Processing", Schaum's Outline series, TATA Mc-Graw Hill, 2007.
3. Robert J. Schilling and Sandra L. Harris, "Fundamentals of Digital Signal Processing using Matlab", Thomson, 2007.

Course outcomes:

At the end of this course, the students will be able to

- Articulate the frequency domain analysis of discrete time signals.(L3)
- Understand the properties of discrete fourierseries and fourier transforms.(L2)
- Design& analyze IIR digital filters from analog filters.(L6)
- Design various structures used in implementation of FIR digital filters.(L6)
- Summarize the importance and applications of Multirate Digital signal processing.(L2)

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS65A- MACHINE LEARNING APPLICATIONS

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To understand the basic theory underlying machine learning.

UNIT-I: INTRODUCTION

Introduction: An illustrative learning task, and a few approaches to it. What is known from algorithms? Theory, Experiment. Biology. Psychology. Overview of Machine learning, related areas and applications. Linear Regression, Multiple Regression, Logistic Regression, logistic functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT-II: DECISION TREE LEARNING

Decision Tree Learning: - Minimum Description Length Principle. Occam's razor. Learning with active queries Introduction to information theory, Decision Trees, Cross Validation and Over fitting. Neural Network Learning: Perceptions and gradient descent back propagation, multilayer networks and back propagation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT-III SAMPLE COMPLEXITY AND OVER FITTING

Sample Complexity and Over fitting: Errors in estimating means. Cross Validation and jackknifing VC dimension. Irrelevant features: Multiplicative rules for weight tuning. Support Vector Machines: functional and geometric margins.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT-IV: INSTANCE-BASED TECHNIQUES

Instance-based Techniques: Lazy vs. eager generalization. K nearest neighbor, case- based reasoning. Clustering and Unsupervised Learning: K-means clustering, Gaussian mixture density estimation, model selection

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT-V: Genetic Algorithms

Genetic Algorithms: Different search methods for induction - Explanation-based Learning: using prior knowledge to reduce sample complexity. Dimensionality reduction: feature selection, principal component analysis.



Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Tom Michel, Machine Learning, McGraw Hill, 1997
2. Trevor Has tie, Robert Tibshirani & Jerome Friedman. The Elements of Statically Learning, Springer Verlag, 2001.

Reference Books:

1. Machine Learning Methods in the Environmental Sciences, Neural Networks, William W Hsieh, Cambridge Univ Press.
2. Richard o. Duda, Peter E. Hart and David G. Stork, pattern classification, John Wiley & Sons Inc.,2001
3. Chris Bishop, Neural Networks for Pattern Recognition, Oxford University Press, 1995.

Course Outcomes:

At the end of this Course the student will be able to

- Student should be able to understand the basic concepts such as decision trees and neural networks.Ability to formulate machine learning techniques to respective problems. **L2**
- Apply machine learning algorithms to solve problems of moderate complexity. **L3**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS65B- OBJECT ORIENTED PROGRAMMING

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- Study the syntax, semantics and features of Java Programming Language
- Study the Object Oriented Programming Concepts of Java Programming language
- Learn the method of creating Multi-threaded programs and handle exceptions
- Learn Java features to create GUI applications & perform event handling

UNIT-I: INTRODUCTION

Introduction to Java: The key attributes of object oriented programming, simple program, The Java keywords, Identifiers, Data types and operators, Program control statements, Arrays, Strings, String Handling

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of computer graphics, different graphics systems and applications of computer graphics. **L2**
- Discuss various algorithms for scan conversion and filling of basic objects and their comparative analysis. **L3**

UNIT-II: CLASSES

Classes: Classes, Objects, Methods, Parameters, Constructors, Garbage Collection, Access modifiers, Pass Objects and arguments, Method and Constructor Overloading, Understanding static, Nested and inner classes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use of geometric transformations on graphics objects and their application in composite form. **L2**
- Extract scene with different clipping methods and its transformation to graphics display device. **L3**

UNIT-III INHERITANCE

Inheritance – Basics, Member Access, Usage of Super, Multi level hierarchy, Method overriding, Abstract class, Final keyword.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explore projections and visible surface detection techniques for display of 3D scene on 2D screen. **L3**
- Render projected objects to naturalize the scene in 2D view and use of illumination models for this **L4**

UNIT-IV: INTERFACES

Interfaces – Creating, Implementing, Using, Extending, and Nesting of interfaces.

Packages – Defining, Finding, Member Access, Importing

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of Multimedia basics, different graphics systems and applications of computer graphics. **L5**
- Discuss various multimedia datastructures. **L5**

UNIT-V: EXCEPTION HANDLING

Exception handling: Hierarchy, Fundamentals, Multiple catch clauses, subclass exceptions, Nesting

try blocks, Throwing an exception, Using Finally and Throws, Built-in exceptions, User-defined exceptions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basics of Multimedia Authoring systems **L4**
- Understand the how videos are placed **L5**

Text Books:

1. "Java Fundamentals - A Comprehensive Introduction", Herbert Schildt and Dale Skrien, Special Indian Edition, McGrawHill, 2013.
2. "Java The Complete Reference" Herbert Schildt, 8th Edition, 2011, Oracle press, TataMcGraw-Hill
3. "Java – How to Program", Paul Deitel, Harvey Deitel, PHI.

Reference Books:

1. "Programming with Java" T.V.Suresh Kumar, B.Eswara Reddy, P.Raghavan Pearson Edition.
2. "Core Java", Nageswar Rao, Wiley Publishers.
3. "Thinking in Java", Bruce Eckel, Pearson Education.
4. "A Programmers Guide to Java SCJP", Third Edition, Mughal, Rasmussen, Pearson.
5. "Head First Java", Kathy Sierra, Bert Bates, O'Reilly
6. "SCJP – Sun Certified Programmer for Java Study guide" – Kathy Sierra, Bert Bates, McGrawHill
7. "Java in Nutshell", David Flanagan, O'Reilly
8. "Core Java : Volume I – Fundamentals, Cay S. Horstmann, Gary Cornell, The Sun Micro Systems Press

Course Outcomes:

At the end of this Course the student will be able to

Introduction to computer graphics

- Gain knowledge of client-side scripting, validation of forms and AJAX programming **L3**
- Understand server-side scripting with PHP language **L4**
- Understand what XML is and how to parse and use XML Data with Java **L5**
- To introduce Server-side programming with Java Servlets and JSP **L6**

B.Tech III Year II Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS65C- WEB DESIGN

(Open Elective-II)

L	T	P	C
3	0	0	3

Course Objectives:

- To Learn the basic concepts in HTML, CSS, JavaScript
- To Understand the responsive design and development
- To learn the web project management and maintenance process
- To Design a Website with HTML, JS, CSS / CMS - Word press

UNIT-I: WEB DESIGN - HTML MARKUP FOR STRUCTURE

Working of Web - HTML Markup for Structure - Creating simple page - Marking up text - Adding Links - Adding Images - Table Markup - Forms - HTML5.

Learning Outcomes:

At the end of this unit, the student will be able to

- Argue the importance and role of software architecture in large-scale software systems. **L2**
- Design and motivate software architecture for large-scale software systems. **L3**

UNIT-II: CSS AND JAVASCRIPT

CSS - Formatting text - Colours and Background - Padding, Borders and Margins – Floating and positioning - Page Layout with CSS - Transition, Transforms and Animation – JavaScript - Using Java Script.

Learning Outcomes:

At the end of this unit, the student will be able to

- Design and motivate software architecture for large-scale software systems. **L3**
- Recognize major software architectural styles and frameworks. **L4**

UNIT-III RESPONSIVE WEB DESIGN

Sass for Responsive Web Design - Marking Content with HTML5 - Mobile-First or DesktopFirst - CSS Grids, CSS Frameworks, UI Kits, and Flexbox for RWD - Designing small UIs by Large Finger - Images and Videos in Responsive Web Design - Meaningful Typography for Responsive Web Design.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize major software architectural styles and frameworks. **L3**
- Describe a software architecture using various documentation approaches and architectural description languages. **L4**

UNIT-IV: WEB PROJECT MANAGEMENT

Project Life Cycle - Project Definition - Discovery and Requirements - Project Schedule and Budgeting - Running the project - Technical Documentation - Development, Communicaton, Documentation - QA and testing -Deployment - Support and operations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe a software architecture using various documentation approaches and architectural description languages. **L5**
- Generate architectural alternatives for a problem and selection among them. **L3**

UNIT-V: PROJECT CASE STUDY

Using HTML, CSS, JS or using Opensource CMS like Word press, design and develop a Website having Aesthetics, Advanced and Minimal UI Transitions based on the project - Host and manage the project live in any public hosting.

Learning Outcomes:

At the end of this unit, the student will be able to

- Use well-understood paradigms for designing new systems. **L3**
- Identify and assess the quality attributes of a system at the architectural level. **L4**

Text Books:

1. Jennifer Niederst Robbins, "Learning Web Design", O'REILLY 4th Edition
2. Ricardo Zea, "Mastering Responsive Web Design", PACKT Publishing, 2015
3. Justin Emond, Chris Steins, "Pro Web Project Management", Apress,2011

Reference Books:

1. Jon Duckett, "HTML and CSS: Design and Build Websites", John Wiley and Sons, edition 2014
2. Jon Duckett, Jack Moore, "JavaScript & JQuery: Interactive Front-End Web Development", John Wiley and Sons, edition 2014
3. Uttam K. Roy "Web Technologies" Oxford University Press, 13th impression, 2017 4. Word press - http://www.wpbeginner.com/category/wp-tutorials/

Course Outcomes:

At the end of this Course the student will be able to

- Recognize the method of using layered approach for design . **L2**
- Explain the functionality of each layer of a computer network. **L3**
- Apply the knowledge of layered approach for the design of computer network software. **L4**
- Analyze the performance of protocols of a computer network. **L4**
- Recommend the protocols for different applications. **L5**
- Propose new protocols for a computer networks. **L6**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech. VII-Sem (R20)

MATHEMATICAL MODELING

(Open Elective -III)

L	T	P	C
3	0	0	3

Course Objectives:

- To provide the basic knowledge to understand a Mathematical model.
- To formulate a Mathematical model related to a real world problems of engineering, biological science etc.

UNIT – 1: Mathematical Modeling & Mathematical modeling Through Ordinary differential equations of First Order :	**9 Hrs**

Mathematical Modeling : Need, Techniques, Classifications and Simple illustrations.

Mathematical modeling Through Ordinary differential equations of First Order :

Mathematical modeling Through differential equations; Linear growth and decay models; Non-Linear Growth and Decay models; Mathematical modeling in dynamics through ordinary differential equations of first order.

Learning Outcomes:

At the end of this unit, the student will be able to

• Learn various mathematical techniques in modeling a problem.	**L2**
• Learn modeling in dynamics through ordinary differential equations of first order.	**L3**

UNIT – II: Mathematical modeling Through System of Ordinary differential equations of First Order:

Mathematical modeling in population dynamics; Mathematical modeling of Epidemics through system of ordinary differential equations of first order; Compartment models through Systems of ordinary differential equations; Mathematical modeling in dynamics through systems of ordinary differential equations of first order.

Learning Outcomes:

At the end of this unit, the student will be able to

• Develop a modeling of Epidemics through system of ordinary differential equations of first order.	**L4**
• Analyze a modeling in dynamics through systems of ordinary differential equations of first order.	**L3**

UNIT – III: Mathematical modeling Through Ordinary differential equations of Second Order:

Mathematical modeling of Planetary motion ; Mathematical modeling of Circular motion and motion of satellites; Mathematical modeling through linear differential equations of second order.

Learning Outcomes:

At the end of this unit, the student will be able to

• Evaluate a mathematical modeling of Planetary motion.	**L5**
• Analyze a mathematical modeling of Circular motion and motion of satellites	**L3**

UNIT – IV: Mathematical modeling Through Difference equations :

Need for Mathematical modeling Through Difference equations and simple models; Basic theory of Linear difference equations with constant coefficients; Mathematical modeling Through Difference equations in population dynamics and genetics; Mathematical modeling Through Difference equations in

Probability theory.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Analyze mathematical modeling through difference equations in population dynamics and genetics.	**L4**
• Analyze mathematical modeling through difference equations in probability theory.	**L4**
UNIT – V: Mathematical modeling Through Functional, Integral, Delay- Differential and Differential-Difference Equations :	
Mathematical modeling Through Functional equations; Mathematical modeling Through Integral equations; Mathematical modeling Through Delay- Differential and Differential-Difference Equations.	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• Analyze a mathematical modeling through functional equations and integral equations.	**L4**
• Analyze a mathematical modeling Through Delay- Differential and Differential-Difference Equations	**L4**
Text Books:	
1. J. N. Kapoor. Mathematical Modeling , NEW AGE INTERNATIONAL PUBLISHERS.	
Reference Books:	
1. A. C. Fowler. Mathematical Models in Applied Sciences, Cambridge University Press.	
Course Outcomes:	
At the end of this Course the student will be able to	
• Understand the basic concepts in mathematical modeling.	**L1**
• Have better insight of the real word problems through mathematical modeling .	**L2**
• Apply various concepts of mathematics in modeling.	**L3**
• Analyze the real word problems through the techniques of modeling.	**L4**
• Evaluate the real word problems through mathematical modeling.	**L5**

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA
DEPARTMENT OF PHYSICS
IV B.TECH – I SEMESTER-R20 (Open elective-Interdisciplinary) –OE-ID.1(THEORY

SENSORS AND ACTUATORS FOR ENGINEERING APPLICATIONS

(Common to all branches)

L	T	P	C
3	0	0	3

Course Objectives:

1. To understand basics of sensors, actuators and their operating principles.
2. To educate the students on different types of microfabrication techniques for designing and developing sensors.
3. To explain working of various types of electrochemical sensors and actuators.
4. To provide an understanding on characteristic parameters to evaluate sensor performance.

UNIT – 1: Introduction to Sensors and Actuators — **9 Hrs**

Content of the Unit – I

Sensors: Types of sensors: temperature, pressure, strain, active and passive sensors, General characteristics of sensors (Principles only), Materials used and their fabrication process: Deposition: Chemical Vapor Deposition, Pattern: photolithography and Etching: Dry and Wet Etching.

Learning Outcomes:

At the end of this unit, the student will be able to

• **Classify** different types of Sensors and their characteristics	**L2**
• **Explain** about different fabrication process of Sensors	**L1**
• **Illustrate** Dry and wet etching	**L2**

UNIT – II: Temperature and Mechanical Sensors — **9 Hrs**

Temperature Sensors: Types of temperature sensors and their basic principle of working: Thermo-resistive sensors: Thermistors, Resistance temperature sensors, Silicon resistive sensors, Thermo-electric sensors: Thermocouples, PN junction temperature sensors

Mechanical Sensors: Types of Mechanical sensors and their basic principle of working: Force sensors,strain gauges, Pressure sensors: semiconductor, piezoresistive, capacitive, Variable reluctance pressure (VRP) sensors.

Learning Outcomes:

At the end of this unit, the student will be able to

• **Summarize** various types of Temperature sensors	**L2**
• **Explain** basic working principle of different types mechanical sensors	**L1**
• **Summarize** various types of Mechanical sensors	**L2**
• **Explain** the working principle of different types mechanical sensors	**L1**

UNIT – III: Optical, Acoustic and Chemical Sensors — **9 Hrs**

Content of the Unit – III

Optical Sensors: Basic principle and working of: Photodiodes, Phototransistors and Photo-resistors based sensors, Photomultipliers, Infrared sensors: thermal, PIR, thermopiles

Acoustic Sensors: Principle and working of Ultrasonic sensors, Piezo-electric resonators, Microphones.

Chemical Sensors: Principle and working of Electro-chemical, Thermo-chemical, Gas, pH, Humidity and moisture sensors.

Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the working and principle of various optical sensors	**L1**
• **Explain** the working principle of different Acoustic sensors	**L1**
• **Explain** the working and principle of various chemical sensors	**L1**
UNIT – IV: Magnetic, Electromagnetic and Radiation Sensors	**9 Hrs**
Inductive sensors (LVDT, RVDT, and Proximity), Hall Effect sensors, Magneto-resistive sensors, Magneto-strictive sensors, **Radiation Sensors**: Principle and working of Ionization detectors, Scintillation detectors, Geiger-Mueller counters, Semiconductor radiation detectors and Microwave sensors (resonant, reflection, transmission)	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Explain** the working principle of different magnetic and electromagnetic sensors	**L1**
• **Explain** the working principle of different radiation sensors	**L1**
• **Identifies** the applications Electronic sensors in various fields	**L1**
• **Identify** the various optical, solid state system components	**L1**
UNIT – V: Actuators Types, Principle, Magnetic, Electromagnetic actuators	**9 Hrs**
Introduction, Functional diagram of actuators, Types of actuators and their basic principle of working: Hydraulic, Pneumatic, Mechanical, Electrical, Magnetic, Electromagnetic, piezo-electric and piezo-resistive actuators, Simple applications of Actuators. Motors as actuators (linear, rotational, stepping motors),Magneto-strictive actuators, Voice coil actuators (speakers and speaker-like actuators).	
Learning Outcomes:	
At the end of this unit, the student will be able to	
• **Illustrates** the different types of Actuators	**L2**
• **Explains** the basic principle of working of Actuators	**L1**
• **Identifies** the applications of Actuators sensors	**L1**
Text Books:	
1. Sensors and Actuators – Clarence W. de Silva, CRC Press, 2nd Edition, 2015	
2. Sensors and Actuators, D.A.Hall and C.E.Millar, CRC Press, 1999	
Reference Books:	
1. Sensors and Transducers- D.Patranabhis, Prentice Hall of India (Pvt) Ltd. 2003	
2. Measurement, Instrumentation, and Sensors Handbook-John G.Webster, CRC press 1999	
3. Sensors – A Comprehensive Sensors- Henry Bolte, John Wiley.	
4. Handbook of modern sensors, Springer, Stefan Johann Rupitsch.	
5. Principles of Industrial Instrumentation By D. Patranabhis	
Course Outcomes:	
At the end of this Course the student will be able to	
➢ to identify the needs of sensors and actuators	**L1**
➢ to understand working principles of various sensors and actuators	**L2**
➢ to identify different type of sensors and actuators used in real life applications	**L1**
➢ to explore common methods for converting a physical parameter into an electrical quantity	**L3**
➢ to summaries use of sensors and actuators for different applications	**L2**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

B.Tech – IV-I-Sem	L	T	P	C
	3	0	0	3

Chemistry of Nanomaterials and applications (OE.3)
(common to all branches)

Course Objectives:

- To understand synthetic principles of Nanomaterials by various methods
- Characterize the synthetic nanomaterials by various instrumental methods
- To enumerate the applications of nanomaterials in engineering
- Understand the use of alternatives assessments that combine chemical, environmental health, regulatory, and business considerations to develop safer products.

UNIT-I: **Introduction to nanoscience**	7 Hrs

Introduction,importance of nanomaterials, nanoscience in nature, classification of nanostructured materials, properties and scope of nanoscience and applicationsof nanotechnology.

Learning Outcomes:
At the end of this unit, the student will be able to:

- Classify the nanostructure materials(L2)
- Describe scope of nano science and technology(L2)
- Explain different synthetic methods of nano materials(L2)
- Identify the synthetic methods of nanomaterial which is suitable for preparation of particular material(L3)

UNIT-II: **Synthesis of nanomaterials**	8Hrs

Bottom-Up approach:- Sol-gel synthesis, microemulsions or reverse micelles, co-precipitation method, solvothermal synthesis, hydrothermal synthesis.
Top-Down approach:- Arc discharge Plasma arc method, aerosol synthesis, ion sputtering, laser pyrolysis,laser ablation, chemical vapour deposition method, electrodeposition method, and high energy ball milling

Learning Outcomes:
At the end of this unit, the student will be able to:

- Describe the top down approach(L2)
- Explain aerosol synthesis and plasma arc technique(L2)
- Differentiate chemical vapour deposition method and electrodeposition method(L2)
- Discuss about high energy ball milling(L3)

UNIT-III: Characterization of nanomaterials	7 Hrs

Techniques for characterization:Dynamic light scattering for particle size determination, Diffraction technique, electron microscopy techniques, BET method for surface area analysis.

Learning Outcomes:
After completing the course, the student will be able to:

- Discuss different technique for characterization of nanomaterial(L3)

- Explain electron microscopy techniques for characterization of nanomaterial(L3)
- Describe BET method for surface area analysis (L2)
- Apply different spectroscopic techniques for characterization(L3)

UNIT-IV: Structural studies of nanomaterials	8 Hrs

Properties of nanomaterials: fullerenes, carbon nanotubes, core-shell nanoparticles. Nano-crystalline materials, magnetic nanoparticles and important properties in relation to nano-magnetic materials, thermoelectric materials, non-linear optical materials, liquid crystals

Learning Outcomes:

After completing the course, the student will be able to:

- Explain synthesis and properties and applications of nanaomaterials(L2)
- Discuss about fullerenes and carbon nanotubes(L3)
- Differentiate nanomagnetic materials and thermoelectric materials(L2)
- Describe liquid crystals(L2)

UNIT-V: **Applications of Nanomaterials**	7Hrs

Engineering, medicine. aerospace applications of nanomaterials. Technologies based on nano materials.

Learning Outcomes:

After completing the course, the student will be able to:

- Illustrate applications of nanaomaterials(L2)
- Discuss the magnetic applications of nanomaterials(L3)
- List the applications of non-linear optical materials(L1)
- Describe the applications fullerenes, carbon nanotubes(L2)

Text Books:

1. NANO: The Essentials: T Pradeep, MaGraw-Hill, 2007
2. Textbook of Nanoscience and nanotechnology: B S Murty, P Shankar, BaldevRai, BB Rath and James Murday, Univ. Press, 2012

Reference Books:

1. Ludovico Cademrtiri and Geoffrey A. Ozin& Geoffrey A. Ozin, Concepts of Nanochemistry; Wiley-VCH, 2011.
2. Guozhong Cao, Nanostructures & Nanomaterials; Synthesis, Properties & Applications:, Imperial College Press, 2007
3. C. N. R. Rao, Achim Muller, K.Cheetham, Nanomaterials Chemistry, , Wiley-VCH, 2007

Course Outcomes:

At the end of this Course the student will be able to

- Understand the state of art synthesis of nano materials(L1)
- Characterize nano materials using ion beam, scanning probe methodologies, position sensitive atom probe and spectroscopic ellipsometry(L2)
- Analyze nanoscale structure in metals, polymers and ceramics(L3)
- Analyze structure-property relationship in coarser scale structures(L3)

- Understand structures of carbon nano tubes(L1)

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACE75A- DISASTER MANAGEMENT AND MITIGATION

(OPEN ELECTIVE-III)

L	T	P	C
3	0	0	3

Course Objectives:

- The objectives of this are to give the basic knowledge of Environmental Hazards and disasters. The syllabus includes the basics of Endogenous and Exogenous hazard's and gives a suitable picture on the different types ofhazardas.

UNIT-I:

Environmental Hazards & Disasters: Meaning of Environmental hazards, Environmental Disasters and Environmental stress. Concept of Environmental Hazards, Environmental stress & Environmental Disasters. Different approaches & relation with human Ecology - Landscape Approach - Ecosystem Approach - Perception approach - Human ecology & its application in geographical researches.

UNIT-II:

Classification of hazards & Disasters: Natural hazards and Disasters - Man Made hazards & Disasters - Planetary Hazards/ Disasters - Extra Planetary Hazards/ disasters - Planetary Hazards- Endogenous Hazards - Exogenous Hazards

UNIT-III

Endogenous Hazards - Volcanic Eruption – Earthquakes – Landslides - Volcanic Hazards/ Disasters - Causes and distribution of Volcanoes - Hazardous effects of volcanic eruptions - Environmental impacts of volcanic eruptions - Earthquake Hazards/ disasters - Causes of Earthquakes - Distribution of earthquakes - Hazardous effects of - earthquakes - Earthquake Hazards in India - - Human adjustment, perception & mitigation of earthquake.

UNIT-IV:

Exogenous hazards/ disasters - Infrequent events- Cumulative atmospheric hazards/ disasters Infrequent events: Cyclones – Lightning – Hailstorms Cyclones: Tropical cyclones & Local storms - Destruction by tropical cyclones & local storms (causes, distribution human adjustment, perception & mitigation)Cumulative atmospheric hazards/ disasters : - Floods- Droughts- Cold waves- Heat waves. Floods:- Causes of floods- Flood hazards India- Flood control measures (Human adjustment, perception & mitigation).Droughts:- Impacts of droughts- Drought hazards in India- Drought control measures- Extra Palnetary Hazards/ Disasters- Man induced Hazards /Disasters- Physical hazards/ Disasters-Soil Erosion Soil Erosion:-- Mechanics & forms of Soil Erosion- Factors & causes of Soil Erosion- Conservation measures of Soil Erosion. Chemical hazards/ disasters:-- Release of toxic chemicals, nuclear explosion- Sedimentation processes. Sedimentation processes:- Global Sedimentation problems- Regional Sedimentation problems- Sedimentation & Environmental problems- Corrective measures of Erosion & Sedimentation-Biological hazards/ disasters:- Population Explosion.

UNIT-V:

Emerging approaches in Disaster Management- Three Stages

1. Pre- disaster stage(preparedness)-HVRA Atlas
2. Emergency Stage
3. Post Disaster stage-Rehabilitation

Text Books:

1. Disaster Management by Rajib Shah, Universities Press, India,2003
2. Disaster Mitigation: Experiences And Reflections by PardeepSahni
3. Natural Hazards & Disasters by Donald Hyndman & David Hyndman – Cengage Learning
4. National Disaster Management Authority-Guidelines

Reference Books:

1. Kates,B.I& White, G.F The Environment as Hazards, oxford, New York, 1978
2. R.B. Singh (Ed) Disaster Management, Rawat Publication, New Delhi, 2000
3. H.K. Gupta (Ed) Disaster Management, Universiters Press, India, 2003
4. R.B. Singh, Space Technology for Disaster Mitigation in India (INCED), University of Tokyo,1994
5. Dr.Satender,Disaster Management in Hills, Concept Publishing Co., New Delhi, 2003

Course Outcomes:

At the end of this Course the student will be able to

- Understand the nature, cause and effects of disasters
- Comprehend the importance of Disaster Management and the need of awareness
- Acquire knowledge on disaster preparedness, recovery remedial measures and personal precautions

Annexure-III *R20*

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

IOT APPLICATIONS IN ELECTRICAL ENGINEERING

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- To learn about a few applications of Internet of Things
- To distinguish between motion less and motion detectors as IOT applications
- To know about Micro Electro Mechanical Systems (MEMS) fundamentals in design and fabrication process
- To understand about applications of IOT in smart grid
- To introduce the new concept of Internet of Energy for various applications

UNIT – I: SENSORS **10 Hrs**

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance, temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidity and moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domain reflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactile sensors, Strain gauge, Piezoelectric

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about basic principles of sensors and their classification **L1**
- To learn about various motion less sensors **L2**

UNIT – II: Occupancy and Motion detectors **10 Hrs**

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement and level sensors, Potentiometric, Capacitive, Inductive, magnetic velocity and acceleration sensors, capacitive, Piezoresistive, piezoelectric cables, Flow sensors, Electromagnetic, Acoustic sensors - Resistive microphones, Piezoelectric, Photo resistors

Learning Outcomes:

At the end of this unit, the student will be able to

- To know about Capacitive occupancy **L1**
- To understand about Motion detectors **L2**

UNIT – III: MEMS **10 Hrs**

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation and fabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressure sensor, RF MEMS switches, Electric and Magnetic field sensors

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about the basic concept of MEMS **L1**
- To know about electrostatic actuation **L2**

UNIT – IV: IOT FOR SMART GRID **10 Hrs**

Driving factors, Generation level, Transmission level, Distribution level, Applications, Metering and monitoring applications, Standardization and interoperability, Smart home

Learning Outcomes:

At the end of this unit, the student will be able to

- To get exposure fundamental applications of IoT to Smart grid **L1**
- To learn about driving factors of IoT in Generation level **L2**

UNIT – V: IOE - Internet of Energy **10 Hrs**

Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation of IOE, Architecture, Energy routines, information sensing and processing issues, Energy internet as smart grid.

Learning Outcomes:

At the end of this unit, the student will be able to

- To get exposed the new concept of internet of energy **L1**
- To learn about architecture of IOE **L2**

Text Books:

1. Jon S. Wilson, Sensor Technology Hand book, Newnes Publisher, 2004
2. Tai Ran Hsu, MEMS and Microsystems: Design and manufacture, 1st Edition, Mc Grawhill Education, 2017
3. ErsanKabalci and YasinKabalci, From Smart grid to Internet of Energy, 1st Edition, Academic Press, 2019

Reference Books:

1. Raj Kumar Buyya and Amir VahidDastjerdi, Internet of Things: Principles and Paradigms, Kindle Edition, Morgan Kaufmann Publisher, 2016
2. Yen Kheng Tan and Mark Wong, Energy Harvesting Systems for IoT Applications: Generation, Storage and Power Management, 1st Edition, CRC Press, 2019
3. RMD SundaramShriram, K. Vasudevan and Abhishek S. Nagarajan, Internet of Things, Wiley, 2019

Course Outcomes:

At the end of this Course the student will be able to

- To get exposed to recent trends in few applications of IoT in Electrical Engineering **L1**
- To understand about usage of various types of motionless sensors **L2**
- To understand about usage of various types of motion detectors **L3**
- To get exposed to various applications of IoT in smart grid **L4**
- To get exposed to future working environment with Energy internet **L5**

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME75a-INTRODUCTION TO COMPOSITE MATERIALS

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Introduce composite materials and their applications.
- Build proper background for stress analysis in the design of composite structures.
- Familiarize various properties of composite materials.
- Focus on biodegradable composites.

UNIT – I: Introduction to composites: **10 Hrs**

Fundamentals of composites – Definition – classification– based on Matrix – based on structure – Advantages and applications of composites - Reinforcement – whiskers – glass fiber – carbon fiber - Aramid fiber – ceramic fiber – Properties and applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the fundamentals of composites. **L2**
- Classify the composites based on matrix and structure. **L2**
- Identify the practical applications of composites. **L3**
- Summarize the properties and advantages of reinforcement materials. **L2**

UNIT – II: Polymer matrix composites **8 Hrs**

Polymers - Polymer matrix materials – PMC processes - hand layup processes – spray up processes – resin transfer moulding – Pultrusion – Filament winding – Auto clave - Injection moulding – sheet moulding compound – properties and applications of PMCs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the properties of polymer matrix composites. **L2**
- Identify the polymer matrix composites. **L3**
- Explain various process used in making the polymer matrix composites. **L2**
- Discuss the auto clave based methods. **L6**

UNIT – III: Metal matrix composites: **8 Hrs**

Metals - types of metal matrix composites – Metallic Matrices. Processing of MMC – Liquid state processes – solid state processes – In-situ processes. Properties and applications of MMCs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Outline the various types of metal matrix composite. **L2**
- Explain liquid state processes and solid state processes in MMCs preparation. **L2**
- Demonstrate In-situ processes. **L2**
- Identify the properties and applications of MMCs. **L2**

UNIT – IV: Ceramic matrix composites: **8 Hrs**

Ceramic matrix materials – properties – processing of CMCs –Sintering - Hot pressing – Infiltration – Lanxide process – In-situ chemical reaction techniques – solgel polymer pyrolsis –SHS - Cold isostatic pressing (CIPing) – Hot isostatic pressing (HIPing). Properties and Applications of CCMs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize the various types of ceramic matrix materials. **L2**
- Explain the sintering, hot pressing, infiltration and lanxide process. **L3**
- Contrast between cold and hot isostatic pressing. **L2**
- Examine the properties and applications of CCMs. **L2**

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UNIT – V: Advances & Applications of composites: **8 Hrs**

Advantages and Limitations of carbon matrix composites – chemical vapour deposition of carbon on carbon fibre perform. Properties and applications of Carbon-carbon composites. Composites for aerospace applications. Bio degradability - introduction to bio composites, classification, processing and, applications of bio composites - Mechanical, Biomedical, automobile Engineering.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the advantages and disadvantages of carbon matrix. **L2**
- Identify composites for aerospace applications. **L3**
- Apply chemical vapour deposition of carbon on carbon fibre perform. **L3**
- Select the carbon - carbon composites. **L1**
- Classify various bio- degradable composites. **L3**

Text Books:

1. Chawla K.K, Composite materials, 2/e, Springer – Verlag, 1998.
2. Mathews F.L. and Rawlings R.D., Chapman and Hall, Composite Materials: Engineering and Science, 1/e, England, 1994.

Reference Books:

1. H K Shivanand, B V Babu Kiran, Composite Materials, ASIAN BOOKS, 2011.
2. A.B. Strong , Fundamentals of Composite Manufacturing, SME Publications, 1989.
3. S.C. Sharma, Composite materials, Narosa Publications, 2000.
4. Maureen Mitton, Hand Book of Bio plastics & Bio composites for Engineering applications, John Wiley publications, 2011.

Course Outcomes:

At the end of this Course the student will be able to

- Identify the practical applications of composites. **L3**
- Identify the polymer matrix composites. **L3**
- Classify of bio- degradable composites. **L2**
- Outline the various types of ceramic matrix materials. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/112104229
- https://nptel.ac.in/courses/112104168
- https://nptel.ac.in/courses/101104010
- https://nptel.ac.in/courses/105108124
- https://nptel.ac.in/courses/112104221

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B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AME75b-CUSTOMER RELATIONSHIP MANAGEMENT

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives: The objectives of the course are to make the students learn about

- Introduce basic concepts and principles of customer relationship management (CRM).
- Familiarize with appreciate the role and changing face of CRM as an IT enabled function.
- Describe concept of managing and sharing customer data.
- Explain the principles of CRM links in e-Business.
- Expose the students on Enterprise resource planning (ERP),supply chain management (SCM) and Supplier relationship management (SRM).

UNIT – I: CRM concepts **10 Hrs**

CRM concepts - Acquiring customers, - Customer loyalty and optimizing customer relationships - CRM defined - success factors, the three levels of Service/ Sales Profiling - Service Level Agreements (SLAs), creating and managing effective SLAs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concepts of customer relationship management. **L2**
- Define customer relationship management (CRM). **L1**
- Illustrate the service level agreements (SLAs). **L2**

UNIT – II: CRM in Marketing : **8 Hrs**

CRM in Marketing - One-to-one Relationship Marketing - Cross Selling & Up Selling - Customer Retention, Behaviour Prediction - Customer Profitability & Value Modeling - Channel Optimization - Event-based marketing. - CRM and Customer Service - The Call Centre, Call Scripting - Customer Satisfaction Measurement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of one-to-one relationship marketing. **L2**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Discus about customer profitability and value modeling. **L6**
- Illustrate the various methods for CRM and customer service. **L2**

UNIT – III: Sales Force Automation **8 Hrs**

Sales Force Automation - Sales Process, Activity, Contact- Lead and Knowledge Management - Field Force Automation. - CRM links in e-Business - E-Commerce and Customer Relationships on the Internet - Enterprise Resource Planning (ERP), - Supply Chain Management (SCM), - Supplier Relationship Management (SRM), - Partner relationship Management (PRM). - Case studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the concept of CRM links in e-Business. **L1**
- Discus E-commerce and customer relationship on the internet. **L6**
- Describe Enterprise resource planning (ERP), Supply chain management (SCM). **L2**
- Explain terms supplier relationship management and partner relationship management. **L2**

UNIT – IV: Analytical CRM **8 Hrs**

Analytical CRM - Managing and sharing customer data - Customer information databases - Ethics and legalities of data use - Data Warehousing and Data Mining concepts - Data analysis - Market Basket Analysis (MBA), Click stream Analysis, Personalization and Collaborative Filtering.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain how to manage and sharing the customer data. **L2**

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- List the various ethics and legalities of customer database use. **L1**
- Describe various data warehousing and data mining concepts **L3**
- Discus about market basket analysis (MBA). **L6**

UNIT – V: CRM Implementation **8 Hrs**

CRM Implementation - Defining success factors - Preparing a business plan requirements, justification and processes. - Choosing CRM tools - Defining functionalities - Homegrown versus out-sourced approaches - Managing customer relationships - conflict, complacency, Resetting the CRM strategy. Selling CRM internally - CRM development Team - Scoping and prioritizing - Development and delivery - Measurement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define success factors for implementing the customer relationship management. **L1**
- Define functionalities of CRM. **L1**
- Explain the functions of CRM development team. **L2**
- Compare Home grown and out-sourced approaches. **L2**

Text Books:

1. Alok Kumar Rai, Customer Relationship Management Concept & Cases, Prentice Hall Of India Private Limted, New Delhi. 2011.
2. S. Shanmugasundaram, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.

Reference Books:

1. Kaushik Mukherjee, Customer Relationship Management, Prentice Hall Of India Private Limted, New Delhi, 2008.
2. Jagdish Seth, Et Al, Customer Relationship Management.
3. V. Kumar & Werner J., Customer Relationship Management, Willey India, 2008.

Course Outcomes:

At the end of this Course the student will be able to

- Summarizes the how CRM works in industries. **L2**
- Discuss about market basket analysis (MBA). **L6**
- Develop the skills related to predict the behaviour and retention of the customer. **L6**
- Explain the concepts of customer relationship management. **L2**

Online Learning Resources:

- https://nptel.ac.in/courses/110105145
- https://onlinecourses.swayam2.ac.in/imb19_mg10/preview
- https://www.classcentral.com/course/swayam-customer-relationship-management-13977
- https://www.edx.org/course/customer-relationship-management

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JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC75a- FUNDAMENTALSTO IMAGE PROCESSING

(Open Elective-III)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To learn the fundamentals of Image Processing and learn the different types of image transforms.
- To study different types of filtering techniques for image enhancement.
- To understand various types of image segmentation and thresholding techniques.
- To gain knowledge on wavelets and multi resolution image processing techniques.
- To comprehend various types of image compression and colour image processing methods.

UNIT I

Digital Image Fundamentals: Fundamental steps of digital image processing, Components of Digital Image processing, image sampling and quantization, basic relationships between pixels – neighbourhood, adjacency, connectivity, distance measures. Applications of Digital Image Processing.

Image Transforms: Fourier Transform and its properties in one dimensional and Two dimensional, Discrete Fourier Transform, Discrete Cosine Transform, Discrete Sine transform, Walsh transform, Hadamard transform, Slant transform, KL Transforms and its properties.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the fundamentals of digital image processing.(L2)
- Analyze the image transforms in one and two dimensions.(L4)

UNIT II

Image Enhancements and Filtering: Gray level transformations, Histogram processing, histogram equalization, Enhancement of Frequency domain, Homomorphic filtering, Filtering in the frequency domain. Image Restoration: A Model of the Image Degradation \ Restoration Process, Noise Models, Inverse filtering, Minimum Mean Square Error (Weiner) Filtering, Constrained least squares filtering.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Analyze the filters in spatial and frequency domains. (L4)
- Understand the image restoration model and various types of noises in image restoration.(L2)

UNIT III

Image Segmentation: Detection of Discontinuities: Point detection, Line detection, Edge detection, Edge linking and boundary detection, Thresholding, Region based segmentation.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Learn the concept of image segmentation.(L1)
- Analyze various types of thresholding techniques.(L4)

UNIT IV

Wavelets and Multi-resolution image processing: Back ground, Image Pyramids, Sub band coding, The HaarTransform.Multi resolution Expansions: Series Expansions, Scaling Functions, Wavelet Functions, Wavelet Transform in One dimension: The wavelet series expansions, The Discrete wavelet transform, The Continuous Wavelet Transform, The Fast wavelet Transform, Wavelet transform in two dimensions, Wavelet Packets.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the wavelets in one dimension and two dimensions.(L2)
- Explain the multi-resolution expansions and fast wavelet transform.(L1)

UNIT V:

Image Compression: Redundancy, coding, inter-pixel and psycho-visual: Loss less compression Huffmann coding, predictive coding: Lossy Image compression- predictive and transform coding: Image compression standards.

Color Image Processing: Color Fundamentals, Color models-RGB, CMY, HSI; Pseudo color Image Processing, Basics of Full color Image Processing.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand the need for image compression and its types.(L2)
- Learn the color image processing and various types of color models. (L1)

TEXT BOOKS:

1. R.C. Gonzalez and R.E. Woods, "Digital Image Processing", Second Edition, Pearson Education, 2008.
2. Anil Kumar Jain, "Fundamentals of Digital Image Processing", Prentice Hall of India, 2nd edition 2004.

REFERENCES:

1. Rafael C. Gonzalez, Richard E woods and Steven L. Eddins, "Digital Image processing using MATLAB", Tata McGraw Hill, 2010.
2. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image processing", Tata McGraw Hill.
3. William K. Pratt, "Digital Image Processing", John Wiley, 3rd Edition, 2004.

Course outcomes:

At the end of this course, the students will be able to

- Understand the fundamentals of Image Processing and apply different types of image transforms. (L2)
- Correlate different types of filtering techniques for image enhancement. (L4)
- Understand various types of image segmentation and thresholding techniques.(L2)
- Gain knowledge on wavelets and multi resolution image processing techniques.(L1)
- Summarize different types of image compression and colour image processing methods.(L2)

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA

20AEC75b- BASICS OF VLSI DESIGN

(Open Elective-III)

L–T – P - C
3 – 0 – 0 – 3

Course Objectives:

- To give exposure to different steps involved in the fabrication of ICs and electrical properties of MOS devices.
- To know the design rules in drawing the layout of any logic circuit.
- To design different types of logic gates using CMOS inverter and analyze their transfer characteristics.
- To learn the concepts scaling and designing building blocks of data path of any system using gates.
- Understand the design and operation of basic programmable logic devices.

UNIT I

MOS Technology: Introduction to IC Technology. The IC Era, MOS and related VLSI Technology, Basic MOS Transistors, Enhancement and Depletion modes of transistor action, nMOS and CMOS Fabrication processes.

Basic Electrical Properties of MOS Circuits: I_{ds} versus V_{ds} Relationships, Aspects of MOS transistor Threshold Voltage, MOS transistor Transconductance and Output Conductance, nMOS Inverter, Determination of Pull-up to Pull-down Ratio for nMOS inverter driven by another nMOS inverter, CMOS Inverter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different steps involved in the fabrication of ICs and electrical properties of MOSdevices.(L2).
- Analyze the operation of NMOS, CMOS and BiCMOS inverters.(L4)

UNIT II

MOS Circuit Design Processes: MOS Layers, Stick Diagrams, Design Rules and Layout, General observations on the Design rules, 2μm Double Metal, Double Poly CMOS rules, Layout Diagrams-A Brief Introduction, Symbolic Diagrams-Translation to Mask Form.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Know the VLSI design flow and stick diagrams.(L1)
- Understand the design rules in drawing the layout of any logic circuit.(L2)

UNIT III

Basic Circuit Concepts: Sheet Resistance. Sheet Resistance concept applied to MOS transistors and Inverters, Area Capacitance of Layers, standard unit of capacitance, area Capacitance calculations, the Delay Unit, Inverter Delays, Driving large capacitive loads, Propagation Delays, Wiring Capacitances.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Understand different types of logics in gate level design.(L2)
- Learn and compare different performance parameters in gate level design.(L1)

UNIT IV

Scaling of MOS Circuits: Scaling models and scaling factors, Scaling factors for device parameters, Limitations of scaling.

Sub System Design and Layout: Switch logic, Gate logic, Examples of Structured Design, parity generator, multiplexers, grey to binary code converter.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Appreciate the importance, models and limitations of scaling.(L1)
- Explain the building blocks of data path of any system using gates.(L1)

UNIT V

Programmable Logic Devices: Read only memories, Programmable Logic Arrays (PLA), Programmable Array Logic (PAL), Complex programmable logic devices, Field programmable gate arrays.

Learning Outcomes:

At the end of the unit, the student will be able to:

- Explain different programmable logic devices.(L1)
- Compare the performance parameters and applications of different programmable logic devices.(L2)

TEXTBOOKS:

1. Kamran Eshraghian. Douglas, A. Pucknell and SholehEshraghian, "Essentials of LSI Circuits and Systems", Prentice Hall of India Private Limited, 2005 Edition.
2. Neil H.E.WESTE, David HarrisandAyan Banerjee, "CMOS VLSI Design A Circuits and systems perspective", Pearson Education, 2006 Third Edition

REFERENCES:

1. Richa Jain and Amrita Rai, "Principles of VLSI and CMOS Integrated Circuits", S.Chandand Company Limited. First edition.2012.
2. Wayne Wolf, "Modern VLSI Design", Pearson Education, 3rd Edition.

Course Outcomes:

At the end of this course, the students will be able to

- Understand different steps involved in the fabrication of ICs and electrical properties of MOS devices. (L2)
- Know the design rules in drawing the layout of any logic circuit.(L1)
- Compare different types of logic gates using CMOS inverter and their transfer characteristics.(L2)
- Learn the concepts to design building blocks of data path of any system using gates.(L1)
- Gain knowledge about basic programmable logic devices and testing of CMOS circuits.(L1)

B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS75A- APPLICATIONAS OF AI

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- Define Artificial Intelligence and establish the cultural background for study Understand various learning algorithms
- Explore the searching and optimization techniques for problem solving
- Provide basic knowledge on Natural Language Processing and Robotics

UNIT – I: Introduction

What is AI, Foundations of AI, History of AI, The State of Art. Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality, The Nature of Environments, The Structure of Agents.

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize the importance of Artificial Intelligence **L1**
- Identify how intelligent agent is related to its environment **L2**

UNIT – II: Solving Problems by searching:

Problem Solving Agents, Example problems, Searching for Solutions, Uninformed Search Strategies, Informed search strategies, Heuristic Functions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, Local Search in Continues Spaces, Searching with Nondeterministic Actions, Searching with partial observations, online search agents and unknown environments.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain how an agent can formulate an appropriate view of the problem it faces. **L2**
- Solve the problems by systematically generating new states **L2**

UNIT – III: Reinforcement Learning:

Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning; Policy Search, applications of RL 10 Page Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction..

Learning Outcomes:

At the end of this unit, the student will be able to

- Examine how an agent can learn from success and failure, reward and punishment. **L5**
- Develop programs that make queries to a database, extract information from texts, and retrieve relevant documents from a collection using Natural Language Processing. **L6**

UNIT-IV: Natural Language for Communication

Phrase structure grammars, Syntactic Analysis, Augmented Grammars and semantic Interpretation, Machine Translation, Speech Recognition Perception: Image Formation, Early Image Processing Operations, Object Recognition by appearance, Reconstructing the 3D World, Object Recognition from Structural information, Using Vision.

Learning Outcomes:

At the end of this unit, the student will be able to

- Develop programs that translate from one language to another, or recognize spoken words. **L6**
- Explain the techniques that provide robust object recognition in restricted context. **L2**

UNIT – V: Robotics:

Introduction, Robot Hardware, Robotic Perception, Planning to move, planning uncertain movements, Moving, Robotic software architectures, application domains Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components, Agent Architectures, Are we going in the right

direction, What if AI does succeed.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the role of Robot in various applications.
- List the main philosophical issues in AI.

Text Books:

1. Stuart J.Russell, Peter Norvig, "Artificial Intelligence A Modern Approach", 3rd Edition, Pearson Education, 2019.

Reference Books:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. Morgan Kaufmann, 1998.
2. Johnson, Benny G., Fred Phillips, and Linda G. Chase. "An intelligent tutoring system for the accounting cycle: Enhancing textbook homework with artificial intelligence." Journal of Accounting Education 27.1 (2009): 30-39.

Course Outcomes:

At the end of this Course the student will be able to

- Apply searching techniques for solving a problem **L3**
- Design Intelligent Agents **L6**
- Develop Natural Language Interface for Machines **L6**
- Design mini robots **L6**
- Summarize past, present and future of Artificial Intelligence **L5**



B.Tech IV Year I Semester

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACS75B- MOBILE APPLICATION DEVELOPMENT

(Open Elective-III)

L	T	P	C
3	0	0	3

Course Objectives:

- Android Application Development course is designed to quickly get you up to speed with writing apps for Android devices. The student will learn the basics of Android platform and get to understand the application lifecycle

UNIT – I:

Introduction Android Programming: What is Android, Activities, Linking Activities Using Intents, Fragments, Calling Built – in Applications using Intents, Displaying Notifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L2**
- demonstrate their skills of using Android software development tools **L2**

UNIT – II:

Android User Interface: Understanding the Components of a Screen, Adapting to Display Orientation, Managing Changes to Screen Orientation, Utilizing the Action Bar, Listening for UI Notifications.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to develop software with reasonable complexity on mobile platform **L3**
- demonstrate their ability to deploy software to mobile devices **L3**

UNIT – III:

Designing User Interface with Views: Basic Views, Picker Views, Using List Views to Display Long Lists.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to debug programs running on mobile devices **L4**
- demonstrate their ability to deploy software to mobile devices **L4**

UNIT-IV:

Displaying pictures and menus with views and Data Persistence: Views to Display pictures, menus with views, additional views, saving and loading user preferences, persisting data to files, creating and using databases.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their skills of using Android software development tools **L4**
- demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

UNIT – V:

Content Providers: Sharing data in android, using a content provider, creating your own content providers.

Messaging and Networking: SMS Messaging, Sending E-Mail, Networking

Location-Based Services: Displaying Maps, Getting Location Data.

Learning Outcomes:

At the end of this unit, the student will be able to

- demonstrate their ability to deploy software to mobile devices **L5**
- demonstrate their ability to debug programs running on mobile devices **L5**

Text Books:

1. Beginning Android 4 Application Development, Wei-Meng Lee, Wiley India
2. Beginning Swift Programming, Wei-Meng Lee, December 2014, ISBN: 978-1-119-00931-3

Reference Books:

1. Enterprise J2ME: Developing Mobile Java Applications, Michael Juntao Yuan, Pearson Education, 2004.
2. Android Application Development for Java programming by James C. Sheusi, Cengage Learning
3. Android A Programmers Guide by Jerome DiMargio, TMH.

Course Outcomes:

At the end of this Course the student will be able to

- demonstrate their understanding of the fundamentals of Android operating systems **L3**
- demonstrate their skills of using Android software development tools **L4**
- demonstrate their ability to develop software with reasonable complexity on mobile platform **L5**

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACEH01- SOLID AND HAZARDOUS WASTE MANAGEMENT

(Honors Degree)

L	T	P	C
3	1	0	4

Course Objectives:

- To provide comprehensive overview of solid, biomedical and hazardous waste management.
- To provide knowledge on solid waste management design aspects.
- To learn about the different methods of solid waste management.

UNIT-I:

Solid waste – sources and engineering classification, characterization, generation and quantification. Transport - collection systems, collection equipment, transfer stations, collection route optimization.

UNIT-II:

Treatment methods - various methods of refuse processing, recovery, recycle and reuse, composting – aerobic and anaerobic, incineration, pyrolysis and energy recovery,

UNIT-III

Disposal methods – Impacts of open dumping, site selection, sanitary land filling – design criteria and design examples, leachate and gas collection systems, leachate treatment.

UNIT-IV:

Biomedical Waste management – sources, treatment and disposal Hazardous Waste Management-Introduction, Sources, Classification, Physico-chemical, Chemical and Biological Treatment of hazardous waste, regulations.

UNIT-V:

Thermal treatment - Incineration and pyrolysis. Soil contamination and site remediation – bioremediation processes, monitoring of disposal sites.

Text Books:

1. Solid Waste Management -Bhide A.D. ,Indian National Scientific Documentation Centre, New Delhi, Edition 1983.
2. Solid Waste – Techobanoglous George; Kreith, Frank-McGraw Hill Publication, New Delhi 2002.
3. Environmental Studies – Manjunath D.L.- Pearson Education Publication, New Delhi.
4. Solid Waste Management- K. Sasikumar – PHI learning, New Delhi,2009.
5. Environmental Pollution – Khopkar S.M. –New Age International limited, Delhi 2007.
6. Environmental Studies – Basak Anindita - Pearson Publication, New Delhi 2009.
7. Environmental Pollution Control Engineering – Rao C.S. – New Age International 2006, New Delhi.

Course Outcomes:

At the end of this Course the student will be able to

- solid waste remedial measures and their importance.
- Undertake projects related to solid waste management.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACEH02- REPAIR & REHABILITATION OF STRUCTURES

(Honors Degree)

L	T	P	C
3	1	0	4

Course Objectives:

- To describe causes of distress in concrete structures and plan repair strategies.
- To explain issues on serviceability and durability of concrete.
- To throw light on various repair materials and their characteristics.
- To demonstrate repair techniques and protection measures.
- To illustrate suitable retrofitting schemes.

UNIT-I:

Introduction – Deterioration of Structures – Distress in Structures – Causes and Prevention. Mechanism of Damage – Types of Damage- case studies of failure –Loss Assessment

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand importance and requirement of maintenance
- Gain knowledge on quantification of repairs and documentation

UNIT-II:

Corrosion of Steel Reinforcement – Causes – Mechanism and Prevention. Damage of Structures due to Fire – Fire Rating of Structures – Phenomena ofDesiccation.-case studies of failure

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the corrosion and its effects on concrete
- Understand the damage of concrete from fire

UNIT-III

Inspection and Testing – Symptoms and Diagnosis of Distress – Damage assessment – NDT.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand how to diagnose distress from symptoms
- Understand how to diagnose distress through NDT

UNIT-IV:

Repair of Structure – Common Types of Repairs – Repair in Concrete Structures – Repairs in Under Water Structures – Guniting – Shot Create – Underpinning. Strengthening of Structures – Strengthening Methods – Retrofitting – Jacketing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain techniques for repair and rehabilitation
- Understand methods of corrosion protection and inhibition

UNIT-V:

Health Monitoring of Structures – Use of Sensors – Building Instrumentation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for health monitoring of structures

Text Books:

1. Concrete Technology by A.R. Santakumar, Oxford Universitypress
2. Maintenance and Repair of Civil Structures, B.L. Gupta and Amit Gupta,Standard Publications.

Reference Books:

1. Defects and Deterioration in Buildings, EF & N Spon,London

2. Non-Destructive Evaluation of Concrete Structures by Bungey – Surrey University Press
3. Concrete Repair and Maintenance Illustrated, RS Means Company Inc W.H. Ranso, (1981)
4. Building Failures : Diagnosis and Avoidance, EF & N Spon, London, B.A. Richardson, (1991).

Course Outcomes:

At the end of this Course the student will be able to

- Understand evaluation procedure and plan for repair
- Design suitable rehabilitation scheme for serviceability and durability.
- Choose suitable repair material for different magnitudes of distress.
- Apply efficient repair and retrofitting schemes.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACEH03- EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

(Honors Degree)

L	T	P	C
3	1	0	4

Course Objectives:

- To provide a coherent development to the students for the courses in sector of earthquake engineering
- To present the foundations of many basic engineering concepts related earthquake Engineering
- To give an experience in the implementation of engineering concepts which are applied in field of earthquake engineering
- To involve the application of scientific and technological principles of planning, analysis, design of buildings according to earthquake design philosophy.

UNIT-I:

Introduction to Structural Dynamics : – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Impulse Response function- Concept of response spectrum.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply Knowledge of mathematics, science and engineering by developing the equation of motion for vibratory systems and solving for the free and forced response.
- Calculate the earthquake design forces using appropriate methods as per IS 1893-2002 (Part-I).

UNIT-II:

Multi-Degree of Freedom (MDOF) Systems: - Formulation of equations of motion – Free vibration – Determination of natural frequencies of vibration and mode shapes – Orthogonal properties of normal modes – Mode superposition method of obtaining response.

Learning Outcomes:

At the end of this unit, the student will be able to

- To formulate analytical model of MDOF systems subjected to earthquake loading for a given time history and analyze using response spectrum methods.
- Design the structure using IS 13920 code provisions

UNIT-III

Earthquake Engineering : - Engineering Seismology – Earthquake phenomenon – Causes and effects of earthquakes – Faults – Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenter etc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Strong motion data - Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column andjoints

Learning Outcomes:

At the end of this unit, the student will be able to

- To explain the basic concepts in seismology and correlate to earthquake engineering.
- Plan a good structural configuration for seismic resistance and Apply the concept of Ductility and Base isolation in designing earthquake resistant structures.

UNIT-IV:

Earthquake Analysis : - Introduction – Rigid base excitation – Formulation of equations of motion for SDOF and MDOF Systems – Earthquake response analysis of single and multi- storyed buildings – Use of response spectra.-Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings – Earthquake design philosophy – Assumptions – Design by seismic coefficient and response

spectrum methods – Displacements and drift requirements – Provisions for torsion.

Learning Outcomes:

At the end of this unit, the student will be able to

- To apply the code procedures for seismic analysis, design and detailing of RC building frames.

UNIT-V:

Aseismic Planning : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non- parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity – Proximity of Adjacent Buildings.

Shear walls : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.

Learning Outcomes:

At the end of this unit, the student will be able to

- To explain and suggest a suitable seismic resistant measure for masonry load bearing structures.
- Intercept dynamic analysis result for design analysis and research purposes.
- Design and detailing of shear walls

Text Books:

1. Dynamics of Structures by A.K.Chopra – Pearson Education, Indian Branch,Delhi.
2. Dynamics of Structures – Clough &Penzien, McGraw Hill – InternationalEdition.
3. Earthquake Resistant Design of Structures by S.K.Duggal, Oxford University press, NewDelhi

Reference Books:

1. Structural Dynamics by Mario Paaz ,AcademicPubilishers.
2. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, NewDelhi
3. Earthquake Tips by C.V.R.Murty, I.I.T.Kanpur.
4. Earthquake Hazardous Mitijation by R.Ayothiraman and HemanthHazarika, I.K.International Publishing House Pvt.Ltd., NewDelhi.

Course Outcomes:

At the end of this Course the student will be able to

- The students will gain an experience in the implementation of Earthquake Engineering on engineering concepts which are applied in field Structural Engineering.
- The students will get a diverse knowledge of earthquake engineering practices applied to real life problems
- The students will learn to understand the theoretical and practical aspects of earthquake engineering along with the planning and design aspects

Codes/Tables:

IS Codes: IS:1893, IS:4326 and IS:13920 to be permitted into the examination

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

20ACEH04- ADVANCED FOUNDATION ENGINEERING

(Honors Degree)

L	T	P	C
3	1	0	4

Course Objectives:

- To impart how Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation.
- To teach special methods of computation of settlements and the corrections to be applied to settlements and to understand the advanced concepts of design of pile foundations.
- To throw light shallow and deep foundation designs.
- To teach the difference between isolated and combined footings, the determination of bearing capacity and proportioning of footings.

UNIT-I:

SHALLOWFOUNDATIONS:

General Requirements Of Foundations. Types Of Shallow Foundations And The Factors Governing The Selection Of A Type Of Shallow Foundation. Bearing Capacity Of Shallow Foundations By Terzaghi"s Theory And Meyerhof"s Theory (Derivation Of ExpressionsAndSolution To Problems Based On These Theories). Local Shear And General Shear Failure And Their Identification. Bearing Capacity Of Isolated Footing Subjected To Eccentric And Inclined Loads. Bearing Capacity Of Isolated Footing Resting On Stratified Soils-Button"sTheory And Siva ReddyAnalysis.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the Meyerhof's general bearing capacity equations are important over Terzaghi's bearing capacity equation

UNIT-II:

Earth Retaining Structures : Retaining walls: Uses, types, stability and design principles of retaining walls, backfill drainage, settlement and tilting.

Earth dams- Stability analysis: Classification, seepage control in embankments and foundations, seepage analysis, stability analysis: upstream and down stream for steady seepage, rapid draw down, end of construction, method of slices and Bishop's method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain need and importance of earth retaining structures
- Design of earth retaining structures according to stability concepts.

UNIT-III

DEEPFOUNDATIONS:

Pile foundations-types of pile foundations. Estimation of bearing capacity of pile foundation by dynamic and static formulae. Bearing capacity and settlement analysis of pile groups. Negative skin Friction, Pile load tests. Well foundations – elements of well foundation. Forces acting a on a well foundation. Depth and bearing capacity of well foundation. Design of individual components of well foundation (only forces acting and principles of design). Problems associated with wellsinking.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain conditions for adopting pile foundations and well foundations
- Design well foundations

UNIT-IV:

SHEET PILE WALLS:

Cantilever sheet piles and anchored bulkheads, Earth Pressure diagram, Determination of depth of

embedment in sands and clays-Timbering of Trenches – Earth Pressure Diagrams – Forces in struts.

DESIGN OF UNDER REAMED PILES FOUNDATIONS:

Under reamed piles-principle of functioning of under reamed pile-Analysis and structural design of under reamed pile.

Learning Outcomes:

At the end of this unit, the student will be able to

- Analysis of under reamed piles and their action on soils.

UNIT-V:

FOUNDATIONS IN PROBLEMATIC SOILS :

Foundations in black cotton soils- basic foundation problems associated with black cotton soils. Lime column techniques – Principles and execution. Use of Cohesive Non Swelling (CNS) layer below shallow foundations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the problems associated with black cotton soils for foundation
- Understand the principles and execution of lime column techniques

Text Books:

1. Analysis and Design of Foundations and Retaining Structures- Shamsher Prakash, GopalRanjan and SwamiSaran.
2. Soil Mechanics and Foundation Engineering by Purushtoma Raj, PearsonPubilications3.GeotechnicalEngg. – C.Venkatramaiah. New age International Pvt . Ltd, (2002).

Reference Books:

1. Analysis and Design of Foundations –E.W.Bowles.
2. Foundation engineering by Brije.M.Das, Cengagepubilications,NewDelhi.
3. Foundations Design and Construction –Tomlinson.

Course Outcomes:

At the end of this Course the student will be able to

- Compute the safe bearing capacity of footings subjected to vertical and inclined loads.
- Understand the advanced methods of settlement computations and proportion foundation footings.
- Judging the methods of computing the pull-out capacity and negative skin friction of piles and compute the settlements of pile groups in clays.
- Evaluate the problems posed by expansive soils and the different foundation practices devised.

JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS)::PULIVENDULA

PAVEMENT MAINTENANCE AND MANAGEMENT

(Honors Degree)

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Course Objectives:

- Being able to recognize and use current common pavement design procedures.
- Understanding common design and construction features important to the performance of both asphalt and concrete pavements.
- The ability to design and recognize specification and construction activities that can improve the performance of pavements.
- Evaluating the condition of pavements through surface condition surveys, smoothness, friction, load/deflection and other evaluation techniques.
- Understanding the basic components of pavement management systems and how they can be used to optimize funding expenditures.
- Communicating and promoting good road design and construction practices.

UNIT-I:

Pavement management system: Components of PMS and their activities; Major steps in implementing PMS; Inputs; Design, Construction and Maintenance; Rehabilitation and Feedback systems; Examples of HDM and RTIM packages; Highway financing; Fund generation; Evaluating alternate strategies and Decision criteria ; Pavement Maintenance Management Components of Maintenance Management and Related Activities – Network and Project Level Analysis; Prioritization Techniques and Formulation of Maintenance Strategies.

UNIT-II:

Pavement Inventories, Quality Control and Evaluation: Serviceability Concepts ;Visual Rating;Pavement Serviceability Index; Roughness Measurements ;Distress Modes – Cracking Rutting Etc; Pavement Deflection – Different Methods and BBD, Skid Resistance, Roughness, Safety – Aspects; Inventory System. Causes of Deterioration, Traffic and Environmental Factors, Pavement Performance Modeling Approaches and Methods of Maintaining WBM, Bitumen and Cement Concrete Roads, Quality Assurance; Quality Control – ISO 9000, Sampling Techniques – Tolerances and Controls related to Profile and Compaction

UNIT-III

Construction of Base,Subbase, Shoulders and Drain Roadway and Drain Excavation, Excavation and Blasting, Embankment Construction, Construction of Gravel Base, Cement Stabilised SubBases, WBM Bases, Wet Mix Construction; Crushed Cement Bases, Shoulder Construction; Drainage Surface, Turfing Sand Drains; Sand Wicks; Rope Drains, Geo- Textile Drainage; Preloading Techniques

UNIT-IV:

Bituminous Construction and Maintenance:Preparation and Laying of Tack Coat; Bituminous Macadam,Penetration Macadam, Built up Spray Grout, Open Graded Premix, Mix Seal, Semi-Dense Asphalt Concrete-Interface Treatments and Overlay Construction, IRC Specifications,

UNIT-V:

Cement Concrete pavement Construction and Maintenance:Cement Concrete Pavement Analysis – Construction of Cement Roads, Manual and Mechanical Methods, Joints in Concrete and Reinforced Concrete Pavement and Overlay Construction.

Reference Books:

1. Haas and Hudson , W. R. Pavement management systems –McGraw Hill publications
2. Sargious, M. A. – Pavements and surfacing for highways and airports – Applied Science Publishers ltd
3. Bridge and Pavement maintenance- Transportation Research Record no.800, TRB

4. Shahin M. Y, 1994- Pavement management for airports, roads and parking lots
5. Bent Thagesan, 1996- Highway and Traffic engineering for developing countries
6. MORTH – Specifications

Course Outcomes:

At the end of this Course the student will be able to

- Select appropriate earth moving and compaction equipment depending upon the Requirement
- Prepare quality assurance and quality control plans in an attempt to construct Better Performing pavements
- Evaluate the pavements based on the functional and structural characteristics
- Understand constructions of non bituminous & bituminous & cement concrete Pavements for flexible & rigid pavements.

S.No	Title	Web link	Offering Institution	Duration
1.	Modern Construction Materials	https://onlinecourses.nptel.ac.in/noc22_ce13/preview	IIT Madras	12
2.	Design of Masonry Structures	https://nptel.ac.in/courses/105106197	IIT Madras	12
3.	Integrated Waste Management for a Smart City	https://nptel.ac.in/courses/105105160	IIT Kharagpur	12
4.	Earthquake Geology: A tool for Seismic Hazard Assessment	https://nptel.ac.in/courses/105104200	IIT Kanpur	12
5.	Structural Geology	https://nptel.ac.in/courses/105104191	IIT Kanpur	12
6	Optimization methods for Civil Engineering	https://nptel.ac.in/courses/105103210	IIT Guwahati	12
7	Rock Mechanics and tunnelling	https://nptel.ac.in/courses/105105212	IIT Kharagpur	