JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR

Course Structure and Syllabi for Pre Ph.D
Computer Science & Engineering (2009-10)

PART - I
Choose any **one** subject of the following

S. No	PAPER	PAPER CODE
1	**Software Engineering**	**09PH05101**
2	**Mathematical Foundations for Computer Science**	**09PH05102**
3	**Database Management Systems**	**09PH05103**
4	**Data Structures and Algorithms**	**09PH05104**
5	**Computer Organization and Architecture**	**09PH05105**

PART - II
Choose any **one** subject of the following

S. No	PAPER	PAPER CODE
1	**Advanced Computer Networks**	**09PH05201**
2	**Distributed Computing**	**09PH05202**
3	**Mobile and Ad hoc Networks**	**09PH05203**
4	**Information Security**	**09PH05204**
5	**Principles of Engineering Optimization**	**09PH05205**
6	**Data Warehousing and Data Mining**	**09PH05206**
7	**Advanced Software Architectures**	**09PH05207**
8	**Model Driven Software Engineering**	**09PH05208**
9	**Software Testing**	**09PH05209**
10	**Software Reliability**	**09PH05210**
11	**Reverse Engineering**	**09PH05211**
12	**Soft Computing**	**09PH05212**
13	**Speech Recognition**	**09PH05213**
14	**Digital Image Processing**	**09PH05214**
15	**Artificial Intelligence**	**09PH05215**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Pre-Ph.D - Computer Science & Engineering

(09PH05101) SOFTWARE ENGINEERING

UNIT-I

Software and Software Engineering

The Nature of Software, Software Characteristics, The Unique Nature of Webapps, Software Engineering, The Software Process, Software Engineering Practice, Software Myths.

Software Paradigms

Prespective Process Models, Specialized Process Models.

UNIT- II

Unified Process Model

The Unified Process, Personal and Team Process Models, Process Technology, Product and Process.

Agile Development

What is Agility? Agility and The Cost of Change, What is an Agile Process? Extreme Programming (Xp), Other Agile Process Models, A Tool Set For The Agile Process.

UNIT-III

Critical Systems

A Simple Safety-Critical System, System Dependability, Availability and Reliability, Safety, Security.

Critical Systems Specification

Risk-Driven Specification, Safety Specification, Security Specification Software Reliability Specification.

Formal Specification

Formal Specification in the Software Process, Sub-System Interface Specification, Behavioural Specification.

UNIT- IV

Software Reuse

The Reuse Landscape, Design Patterns, Generator-Based Reuse, Application Frameworks, Application System Reuse.

Component-Based Software Engineering

Components and Component Models, The Cbse Process, Component Composition.

UNIT-V

Software Testing

System Testing, Component Testing, Test Case Design, Test Automation.

Software Evolution

Program Evolution Dynamics, Software Maintenance, Evolution Processes, Legacy System Evolution.

UNIT-VI

Aspect Oriented Software Engineering: The Separation of Concerns, Aspects, Join Points and Pointcuts, Software Engineering with Aspect, Using AOSD to Streamline Complex Systems Development without Sacrificing Flexibility or Scalability.

Service Oriented Software Engineering: Service-Based Concepts, Modeling and Documentation, Service Discovery and Composition, Service-Oriented Architecture, Services as Reusable Components, Software Development with Services.

UNIT-VII

Quality Management

Process and Product Quality, Quality Assurance and Standards, Quality Planning, Quality Control, Software Measurement and Metrics.

Process Improvement

Process and Product Quality, Process Classification, Process Measurement, Process Analysis and Modeling, Process Change, The Cmmi Process Improvement Framework.

UNIT-VIII

Verification and Validation

Planning Verification and Validation, Software Inspections, Automated Static Analysis, Verification and Formal Methods.

Security Engineering

Security Concepts, Security Risk Management, Design For Security, System Survivability.

Text Books:

1. Software Engineering, by Ian Sommerville, Addison-Wesley, 8th Edition, 2006.
2. Software Engineering, A Practitioner's Approach, by Roger S. Pressman, 7th Edition, 2009.

References:

1. **Using UML: Software Engineering with Objects and Components**, by Perdita Stevens, Rob Pooley, Addison-Wesley, 2nd edition, 2006.
2. **The Mythical Man-Month : Essays on Software Engineering**, by Frederick P., Jr.Brooks, Frederick P. Brooks Jr, Addison-Wesley, 1995.
3. **The Future of Software Engineering, edited** by Anthony Finkelstein, ACM Press, 2000.

4. **Aspect-Oriented Software Development**, by Robert E. Filman, Tzilla Elrad, Siobha Jn Clarke, Mehmet Aksit, Addison-Wesley, 1st edition, 2004.

5. **Service-Oriented Software System Engineering by** Challenges and Practices, by Zoran Stojanovic, Ajantha Dahanayake, IGI Global, 2005.

6**. Software Reuse**, by I. Jacobson, M. Griss, and P. Jonsson, ACM Press, 1997.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Pre-Ph.D - Computer Science & Engineering
(09PH05102) MATHEMATICAL FOUNDATIONS FOR COMPUTER SCIENCE

UNIT I
Mathematical logic—Statements and Notation, Connectives, Normal Forms, The Theory of Inference for the Statements Calculus, The Predicate calculus, Interference Theory of the Predicate Calculus.

UNIT II
Set theory—Basic Concepts of Set Theory, Representation of Discrete Structures, Relations and Ordering, Functions, Recursion.

UNIT III
Lattices and Boolean algebra—Lattices as partially ordered sets, Boolean Algebra, Boolean Functions, Representation and Minimization of Boolean Functions.

UNIT IV
Recurrence Relations—Introduction, Recurrence Relations , Linear Recurrence Relations with Constant Coefficients, Homogeneous Solutions, Particular Solutions, Total Solutions, Solution by the Method of Generating Functions.

UNIT V
Algebraic Structures – General Properties, Semigroups and Monoids, Groups.

UNIT VI
Introduction to Probability& Statistics— Modern Statistics, Statistics and engineering, Pareto Diagram and Dot Diagrams, Frequency Distributions ,Graphs of Frequency Distributions, Stem-and-leaf Displays, Descriptive Measures, Quartiles and Percentiles, Sample spaces and events, counting, probability, the axioms of probability, some elementary theorems, conditional probability, Bayes theorem.

UNIT VII
Probability Distributions and Densities—,Random variables, The Binominal Distribution, The Hyper geometric Distribution, The Mean and the Variance of a probability Distribution, Chebyshev's Theorem,The Poisson Approximation to the binominal Distribution, Poisson Processes, The Geometric Distribution, The Multinomial Distribution, Continuous Random Variables, The Normal Distribution, The Normal Approximation to the Binomial Distribution, Other Probability Densities, The Uniform Distribution, The Log-Normal Distribution, The Gamma Distribution, The Beta Distribution, the Weibull Distribution, Joint Distributions.

UNIT VIII

Graphs and Trees – Multigraphs and weighted graphs, paths and circuits, shortest paths in weighted graphs, eulerian paths and circuits, Hamiltonian paths and circuits, planar graphs, trees, rooted trees, path lengths in rooted trees, prefix codes, binary search trees, spanning trees and cut-sets, minimum spanning trees.

Text Books:

1. J.P. Tremblay and R. Manohar, "Discrete mathematical structures with applications to computer science", Tata McGraw-Hill publications
2. C. L. Liu, " Elements of Discrete Mathematics", McGraw-Hill publications
3. Richard A. Johnson, C.B. Gupta, "Probability and Statistics for Engineers", Pearson Education

References:

1. **"Discrete mathematical for Computer Scientists & Mathematics" by** J.L. Molt, A. Kandel, T.P. Baker, Prentice Hall of India
2. **"Logic and Discrete Mathematics" by** Winfried Karl Grassmann, Jean-Paul Tremblay, Pearson Education
3. **"Discrete Mathematics" by** Lipschutz, Lipson, Schaum's Outlines, Tata McGrawHill publications
4. **"Discrete mathematical Structures" by** Kolman,Busby,Ross, Prentice Hall of India
5. **"Discrete mathematics" by** Johnsonbaugh Pearson Education
6. **"Discrete mathematics" by** JK Sharma, Macmillan Publications
7. **"Discrete Mathematics and Combinatorics" by** T. Sengadir, Pearson Education

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Pre-Ph.D - Computer Science & Engineering

(09PH05103) DATABASE MANAGEMENT SYSTEMS

UNIT I

Introduction to Database systems, Data Models, Instances and schemas, Database models, relational hierarchical and network-data independence-DDL and DM, Database manager, data administrator, database users, overall system architecture.

UNIT II

Database design: Introduction to E-R concepts, Details of E-R modeling, Additional E-R concepts, Normalization- Functional dependencies, Lossless and use of decompositions, Normal forms, Schema refinement, multivalued dependencies.

UNIT III

Relational model-structure of relational databases, the relational algebra,Tuple relational calculus, & Domain relational calulus,SQL,Domain constraints, referential integrity, functional dependencies, Assertions and triggers.

UNIT IV

Query optimization and evaluation: Introduction to Query processing, Selection operation, Projection operation, Join operation, Set operation and Aggregate operation, Relation Query Optimization, Translating SQL quries, estimating the cost, Relation algebra Equivalence.

UNIT V

Crash Recovery: Failure classification, Log based recovery, Shadow paging, Check pointing, Media recovery.

UNIT VI

Concurrency control: Concepts of transactions and Schedules, Lock Based Concurrency Control, Lock Management, Specialized Locking techniques, Concurrency Control without Locking, Crash recovery, Schedules testing for serializability , Time-stamp based Protocols, Validation Techniques, Multiversion Schemes.

UNIT VII

Integrity Constraints, Creating views, Security-Grant statement in SQL, System Catalogs and Schemas, Introduction to Distributed databases and Object Oriented Databases.

UNIT VIII

Federated Databases: Distribution – Heterogeneity – Autonomy – Interoperability – Architecture of Heterogeneous Distributed Databases – Global Schema Integration Federated Database Systems – Multidatabase Language Approach.

References:

1. **Data Base Management Systems by** Raghu Rama Krishnan.TMH.1998.
2. **Database System Concepts by** Henfry F Korth and Abraham Silberschatz Edition MGH.
3. **Database System Concepts** by Silberschatz,Henfry F Korth, 4th Edition ,MGH.
4. **Management of Heterogeneous and Autonomous Database Systems by** Ahmed K Elmagarmid, Marek Rusinkiewicz, Amit Sheth.
5. **Database Management and Design by** G.W.Hansen and J.V.Hansen, PHI, 1999.
6. **Database Management Systems by** Alexis Leon, Mathews Leon, LeonVikas.

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Pre-Ph.D - Computer Science & Engineering
(09PH05104) DATA STRUCTURES AND ALGORITHMS

UNIT 1

Abstract Data Types – Data Structures -- singly linked lists, doubly linked lists, circular list, representing stacks and queues using arrays and linked lists, infix to post fix conversion, postfix expression evaluation. Priority Queues – Realizing a Priority Queue using Heaps, Definition, insertion, Deletion.

UNIT II

Dictionaries, linear list representation, operations insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing.

UNIT III

Trees -- Search Trees -- Binary Search Trees, Operations- Searching, Insertion and Deletion, AVL Trees, Definition, Height of an AVL Tree, Operations – Insertion, Deletion and Searching. Red Black and Splay Trees, B-Trees, insertion, deletion and searching.

Graphs – Directed and undirected graphs – Graph representation techniques – adjacency matrix and adjacency list.

UNIT IV

Algorithm – definition, performance analysis- time complexity and space complexity – various notations used to describe the time complexity like Big-oh, omega, theta, etc.

Sorting algorithms – bubble sorting, insertion sorting, selection sorting, bin-sorting -- time complexity. Analysis of recursive programs – solving recurrence relations.

UNIT V

Divide-and-conquer technique – binary search – Quick sort, Merge sort, Strassen's matrix multiplication – Convex Hull – The QuickHull algorithm—Graham's Scan.

Greedy technique – Knapsack problem – Minimum cost spanning tree algorithms -- Job sequencing with deadlines – Single source shortest path problem – Digkstra's algorithm.

UNIT VI

Dynamic Programming – Matrix chain multiplication -- optimal binary search trees – 0/1 knapsack – The travelling sales person problem. – All pairs shortest paths -- single source shortest paths.

UNIT VII

Backtracking – The eight queens problem – graph coloring— sum of subsets problem, Hamiltonian cycles.

Branch and bound – 0/1 knapsack problem – travelling sales person.

UNIT VIII

NP-Hard and NP-complete problems – Cook's theorem – NP Hard Graph problems – Clique Decision problem – Chromatic number decision problem.

References:

1. **Data Structures and Algorithms using C++** by Ananda Rao Akepogu, Radhika Raju Palagiri, Pearson education.
2. **Data Structures and Algorithms by** Alfred V. Aho, John E. Hopcroft, Jeffery D. Ullman, Pearson education.
3. **Data structures, Algorithms and Applications in C++ by** S.Sahni, University Press (India)
Pvt.Ltd, Universities Press Orient Longman Pvt. Ltd.
4. **Fundamentals of Computer Algorithms by** Ellis Horowitz, Satraj Sahni and Rajasekharam,
Galgotia publications pvt. Ltd.
5. **Algorithm Design: Foundations**, by Analysis and Internet examples, M.T.Goodrich and R.Tomassia,John wiley and sons.
6. **Introduction to Algorithms by** T.H.Cormen,C.E.Leiserson, R.L.Rivest,and C.Stein,PHI Pvt.
Ltd./ Pearson Education.

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Pre-Ph.D - Computer Science & Engineering
(09PH05105) COMPUTER ORGANIZATION AND ARCHITECTURE

UNIT I

Data Representation—Data Types, Complements, Fixed and Floating Point Representation, Binary Codes, Alpha Numeric Codes, IEEE Std for Floating Point Number. Computer Arithmetic—Introduction, Addition and Subtraction, Simple Multiplication Algorithms.

UNIT II

Basic Computer Organization and Design—Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory References Instructions, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

Programming Basic Computer—Introduction, Machine Language, Assembly Language, Memory Locations Addressability, Big-Endien and Little-Endien Assignments, Addressing Modes, The Assembler , Program Loops, Programming and Arithmetic and Logic Operations, Stacks and Queues, Subroutines – Nesting and Processor Stack, Parameter Passing, Input Output Programming.

UNIT III

Micro Programmed Control—Microinstructions, Microprogram Sequencing, Wide Branch Addressing, Prefetching Microinstructions, Control Memory, Address Sequencing, Microprogramming Example, Design of Control Unit, Hardwired Control.

UNIT IV

Central Processing Unit—Introduction, General Register Organization, Stack Organization, Instruction formats, Data Transfer and Manipulation, Progress Control, Fundamentals of Reduced Instruction Set Computer(RISC).

UNIT V

Input Output Organization—Peripheral Devices, Input Output Interface, Asynchronous Data Transfer, Modes of Transfer, Interrupts and Exceptions, Priority Interrupt, Direct Memory Access(DMA), Input Output Processor(IOP), Parallel and Serial Communication,Std I/O Interfaces-PCI, SCSI, USB Buses.

UNIT VI

Pipeline and Vector Processing—Parallel Processing,Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISC Pipeline, Vector Processing, Array Processors

UNIT VII

Memory Organization—Memory Hierarchy, Speed , Size and Cost, Main Memory, RAM and ROM Memories, Auxiliary Memory, Associative Memory, Cache Memory- Mapping Functions, Replacement Algorithms, Virtual Memory- Address Translations.

UNIT VIII

Large Computer Systems—forms of Parallel Processing, Array Processors, The Structure of General –Purpose Multiprocessors, Interconnection Networks, Memory Organization in Multiprocessors, Program Parallelism and Shared Variables, Multicomputer, Programmer's View of Shared Memory , Performance Considerations.

References:

1. **Computer System Architecture**, M.Morris Mano 3rd edition, Person Education,Inc.,1993
2. **Zvonko Vranesic and Safwat Zaky** by Carl Hamacher Computer Organization, Fifth edition,
McGraw-Hill International Edition, 2002.
3, **Fundamental s of Computers** by V.Rajaraman 3rd Edition, Prentice-hall of India Pvt Ltd (2004-08-15).

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Pre-Ph.D - Computer Science & Engineering

(09PH05201) ADVANCED COMPUTER NETWORKS

UNIT-I

Network Tools and Techniques

Protocol Layering, System Design, Multiple Access Switching, Scheduling, Naming, Addressing, Routing, Error Control; Flow Control, Traffic Management-Data Link Layer Protocols.

UNIT-II

Internet

Concept, History, Network Layer, Transport Protocol UDP, TCP, Ipv4, Ipv6.

UNIT-III

Local Area Networks

Topologies, Access Techniques, LAN, 802.11G wireless LANs.

UNIT-IV

Application Layer

DNS – FTP – Email – HTTP – Telnet – RTP – RTSP.

UNIT-V

Network Management

SNMP V1 Network Management – Organization and Information Models – Communication and Functional Models – SNMP v2 Management.

UNIT-VI

Socket Introduction, TCP Sockets, TCP Client Server, Socket Options, UDP Sockets Name And Address Conversion, IPv4/IPv6 Interoperability – Socket Programming.

UNIT-VII

Routing Sockets, Broadcasting, Multicasting, Threads, IP Options, Raw Sockets.

UNIT-VIII

Interprocess Communication, Posix IPC , System V IPC, Pipes ,FIFO, Posix Message Queen, System V Semaphore, RPC in Sun Systems. Unix Programming Using IPe.

References:

1. Computer Networks, A.S. Tenenbaum, PHI, 4th ed, ISBN 81-7808-785-5
2. Peterson Davie, "Computer Networks - A System Approach", 3rd Edition, Harcourt Asia Pvt. Ltd., 2003.
3. Mani Subramanian, "Network Management Principle and Practice", 1st Edition, Pearson Education, 2004.

4. **Computer Networking A top down approach featuring the Internet** by J.F.Kurose, K.W Rose, Pearson, ISBN 81-7808-247-0.
5.. **An Engineering approach to computer networks by** S. Keshav, Addition Wesley, ISBN 981-235-986-9.
6. **Local Area Networks by** G.E. Keiser, McGrew Hill, ISBN 0-07-033561-3.
7. **UNIX network programming by** Vol I (Networking APIs: Sockets and XTI),W. Richord Stevens, PHI, ISBN 81-203-206101.
8. **UNIX network programming by** Vol II,(Interprocess communication) Richards Slenens, PHI, ISBN 81-203-2062-X.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR
Pre-Ph.D - Computer Science & Engineering
(09PH05202) DISTRIBUTED COMPUTING

UNIT I

Fundamentals

Characterization of Distributed Systems – Examples – Resource Sharing and the Web – Challenges – System Models – Architectural and Fundamental Models – Networking and Internetworking – Types of Networks – Network Principles – Internet Protocols – Case Studies.

UNIT II

Processes and Distributed Objects

Interprocess Communication – External Data Representation and Marshalling – Client–Server Communication – Group Communication – Case Study – Distributed Objects and Remote Invocation – Communication between Distributed Objects – Remote Procedure Call – Events and Notifications – Distributed Shared Memory Concepts.

UNIT III

Synchronization

Clock Synchronization – Logical Clocks – Lamport's Clock – Vector Clock - Mutual Exclusion – Global positioning of Nodes – Election Algorithms.

UNIT IV

Consistency and Replication

Consistency and Replication – Data-Centric Consistency Model – Client-Centric Consistency Model – Replica Management – Consistency Protocols.

UNIT V

Distributed Object Paradigm(CORBA)

Basic Architecture, CORBA Object Interface, Inter-ORB Protocols, Object Servers and Object Clients, CORBA Object References, CORBA Naming Service and the Interoperable Naming Service, CORBA Object Services, Object Adapters, Java IDL, an example CORBA Application.

UNIT VI

Distributed Multimedia Systems – Characteristics of Multimedia Data, QOS of Service Management, Resource Management, Stream Adaptation

Distributed Coordination-based systems – Introduction to Coordination Models, TIB, JINI - Software Agents, Agent Technology, Mobile Agents.

UNIT VII

Cluster Computing

Parallel Computing Overview, Cluster Computing – Introduction, Cluster Architecture, Parallel Programming Models and Paradigms, Applications of Clusters.

UNIT VIII

Grid Computing

Definition of Grid, Grid Types – Computational Grid, Data Grid, Grid Benefits and Applications, Drawbacks of Grid Computing, Grid Components, Grid Architecture and its Relation to Various Distributed Technologies.

References:

1. Distributed Computing, Principles and Applications, M.L.Liu, Pearson Education.
2. Distributed Systems, Principles and Paradigms, A.S.Tanenbaum and M.V.Steen , Pearson Education.
3. Client/Server Programming with Java and CORBA, second edition, R.Orfali & Dan Harkey, John Wiley & sons.
4. Grid Computing, J.Joseph & C.Fellenstein, Pearson education.
5. High Performance Cluster Computing, Rajkumar Buyya, Pearson education.
6. **A Networking Approach to Grid Computing by** D.Minoli, Wiley & sons.
7. **A Practical Guide to Technology and Applications** by Grid Computing A.Abbas, Firewall Media.
8. **Java Network Programming by** E.R.Harold, 2nd edition, O'Reilly, SPD.
9. **Distributed Systems, Concepts and Design by** 3rd edition, G.Coulouris, J.Dollimore and Tim Kindbirg, Pearson Education.
10. **Java Programming with CORBA by** 3rd edition, Brose, Vogel, Duddy, Wiley Dreamtech.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR
Pre Ph.D (Computer Science and Engineering)

(09PH05203) MOBILE AND ADHOC NETWORKS

UNIT I
Fundamentals
Medium Access Control – Motivation for Specialized MAC – SDMA – FDMA – TDMA – CDMA – Comparison of Access Mechanisms – Telecommunications GSM – DECT – TETRA – UMTS – IMT – 200 – Satellite Systems Basics – Routing – Localization – Handover – Broadcast Systems Overview – Cyclic Repetition of Data – Digital Audio Broadcasting – Digital Video Broadcasting.

UNIT II
Wireless Networks
Wireless LAN Infrared Vs Radio Transmission – Infrastructure Networks– Ad hoc Networks – IEEE 802.11 – HIPERLAN – Bluetooth – Wireless ATM Working Group– Services – Reference Model – Functions – Radio Access Layer – Handover – Location Management – Addressing Mobile Quality of Service – Access Point Control Protocol.

UNIT III
Mobile Network Layer
Mobile IP Goals – Assumptions and Requirement – Entities – IP Packet Delivery – Agent Advertisement and Discovery – Registration – Tunneling and Encapsulation – Optimization – Reverse Tunneling – IPv6 – DHCP – Ad hoc Networks.

UNIT IV
Mobile Transport Layer
Traditional TCP – Indirect TCP – Snooping TCP – Mobile TCP – Fast Retransmit/ Fast Recovery – Transmission/ Timeout Freezing – Selective Retransmission – Transaction Oriented TCP.

UNIT V
Ad Hoc Networks - Fundamentals
Introduction – Fundamentals of Wireless Communication Technology – The Electromagnetic Spectrum – Radio Propagation Mechanisms – Characteristics of the Wireless Channel – IEEE 802.11a–b Standard – Origin of Ad hoc Packet Radio Networks – Technical Challenges – Architecture of PRNETs – Components of Packet Radios – Ad hoc Wireless Networks – What is an Ad Hoc Network? Heterogeneity in Mobile Devices – Wireless Sensor Networks – Traffic Profiles – Types of Ad hoc Mobile Communications – Types of Mobile Host Movements – Challenges Facing Ad hoc Mobile Networks – Ad hoc wireless Internet.

UNIT VI
Ad Hoc Routing Protocols
Introduction – Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks – Classifications of Routing Protocols – Table–Driven Routing Protocols – Destination Sequenced Distance Vector (DSDV) – Wireless Routing Protocol (WRP) – Cluster Switch

Gateway Routing (CSGR) – Source–Initiated On–Demand Approaches – Ad hoc On–Demand Distance Vector Routing (AODV) – Dynamic Source Routing (DSR) –Temporally Ordered Routing Algorithm (TORA) – Signal Stability Routing (SSR) –Location–Aided Routing (LAR) – Power–Aware Routing (PAR) – Zone Routing Protocol (ZRP).

UNIT VII

Multicastrouting In Adhoc Networks

Introduction – Issues in Designing a Multicast Routing Protocol – Operation of Multicast Routing Protocols – An Architecture Reference Model for Multicast Routing Protocols – Classifications of Multicast Routing Protocols – Tree–Based Multicast Routing Protocols– Mesh–Based Multicast Routing Protocols – Summary of Tree and Mesh based Protocols – Energy–Efficient Multicasting – Multicasting with Quality of Service Guarantees – Application – Dependent Multicast Routing – Comparisons of Multicast Routing Protocols.

UNIT VIII

Adhoc Networks - Transport Layer– Security Protocols

Introduction – Issues in Designing a Transport Layer Protocol for Ad hoc Wireless Networks – Design Goals of a Transport Layer Protocol for Ad hoc Wireless Networks –Classification of Transport Layer Solutions – TCP over Ad hoc Wireless Networks – Other Transport Layer Protocols for Ad hoc Wireless Networks – Security in Ad Hoc Wireless Networks – Network Security Requirements – Issues and Challenges in Security Provisioning – Network Security Attacks – Key Management – Secure Routing in Ad hoc Wireless Networks.

References

1. **"Wireless Communication and Networks" by** William Stallings Pearson Education, 2003.
2. **"WAP: Wireless Application Protocol" by** Singhal,Pearson Education, 2003.
3. **"Principles of Mobile Computing" by** Lother Merk, Martin S. Nicklaus and Thomas Stober 2nd Edition, Springer, 2003.
4. **"Mobile Communication Design Fundamentals" by** William C. Y. Lee, John Wiley, 1993.
5. **"Ad Hoc Mobile Wireless Networks Protocols and Systems" by** C. K. Toh, Prentice Hall, PTR, 2001.
6. **"Ad Hoc Networking" by** Charles E. Perkins Addison Wesley, 2000
7. **"Mobile Communication" by** J.Schiller Addison Wesley, 2000.
8. **"Ad Hoc Wireless Networks Architectures and Protocols" by** C. Siva Ram Murthy and B. S. Manoj, Prentice Hall, PTR, 2004.

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ANANTAPUR
Pre-Ph.D - Computer Science & Engineering

(09PH05204) INFORMATION SECURITY

UNIT I

Security Goals, Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs.

UNIT II

Mathematical Tools for Cryptography: Introduction to number theory, prime & relative numbers, modular arthimetic, Fermat's and Euler's theorems, testing for primality, Chinese remainder theorem, Discrete logarithms.

UNIT III

Conventional Encryption Principles & Algorithms(DES, AES, RC4), Block Cipher Modes of Operation, Location of Encryption Devices, Key Distribution.

UNIT IV

Public key cryptography principles, public key cryptography algorithms(RSA, RABIN, ELGAMAL, Diffie-Hellman, ECC), Key Distribution.

UNIT V

Approaches of Message Authentication, Secure Hash Functions(SHA-512, WHIRLPOOL) and HMAC, Digital Signatures: Comparison, Process- Need for Keys, Signing the Digest, Services, Attacks on Digital Signatures, Kerberos, X.509 Directory Authentication Service.

UNIT VI

Network Management, Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3
OS Security, OS Security Functions, Separation, Memory Protection, Access Control, Trusted Operating System: MAC, DAC, Trusted path, Trusted Computing Base.

UNIT VII

Viruses and related threats, Anatomy of Virus, Virus Counter Measures

Software Flaws: Buffer Overflow, Incomplete Mediation, Race Conditions, Malware: Brain, Morris Worm, Code Red, Malware Detection.

UNIT VIII

Firewalls, Design principles, Types of Firewalls, Firewall Architectures, Trusted Systems.

References:

1. **Cryptography and network Security by** Fourth edition, Stallings, PHI/Pearson
2. **Cryptography & Network Security** by Behrouz A. Forouzan, TMH 2007.
3. **Network Security: The complete reference by** Robert Bragg, Mark Rhodes, TMH
4. **Computer Security Basics** by Rick Lehtinen, Deborah Russell & G.T.Gangemi Sr., SPD O'REILLY 2006.
5. **Modern Cryptography** by Wenbo Mao, Pearson Education 2007.
6. **Network Security Essentials (Applications and Standards)** by William Stallings, Pearson Education.
7. **Information Security Principles & Practice** by Mark Stamp, WILEY INDIA 2006.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR
Pre-Ph.D - Computer Science & Engineering

(09PH05205) PRINCIPLES OF ENGINEERING OPTIMIZATION

UNIT I

Introduction and Classical Optimization Techniques: Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems.

UNIT II

Classical Optimization Techniques : Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions.

UNIT III

Linear Programming: Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm.

UNIT IV

Transportation Problem: Finding initial basic feasible solution by north – west corner rule, least cost method and Vogel's approximation method – testing for optimality of balanced transportation problems.

UNIT V

Unconstrained Nonlinear Programming: One – dimensional minimization methods: Classification, Fibonacci method and Quadratic interpolation method.

UNIT VI

Unconstrained Optimization Techniques: Univariate method, Powell's method and steepest descent method.

UNIT VII

Constrained Nonlinear Programming: Characteristics of a constrained problem, Classification, Basic approach of Penalty Function method; Basic approaches of Interior and Exterior penalty function methods. Introduction to convex Programming Problem.

UNIT – VIII

Dynamic Programming: Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution.

References:

1. **Optimization Methods in Operations Research and systems Analysis"** – by K.V. Mital and C. Mohan, New Age International (P) Limited, Publishers.
2. **Operations Research by** Dr. S.D.Sharma.
3. **Operations Research** by An Introduction, H.A. Taha, PHI Pvt. Ltd., 6th edition
4. **Linear Programming by** G. Hadley
5. **Engineering optimization: Theory and practice by** S. S.Rao, New Age International (P) Limited.
6. **Introductory Operations Research** by H.S. Kasene & K.D. Kumar, Springer(India), Pvt. LTd.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR
Pre-Ph.D - Computer Science & Engineering

(09PH05206)DATA WAREHOUSING AND MINING

UNIT I

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Data Mining Task Primitives, Integration of a Data Mining System with a Database or a Data Warehouse System, Major issues in Data Mining.

Data Preprocessing: Need for Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

UNIT II

Data Warehouse and OLAP Technology for Data Mining: Data Warehouse, Multidimensional Data Model, Data Warehouse Architecture, Data Warehouse Implementation, Further Development of Data Cube Technology, From Data Warehousing to Data Mining.

Data Cube Computation and Data Generalization: Efficient Methods for Data Cube Computation, Further Development of Data Cube and OLAP Technology, Attribute-Oriented Induction.

UNIT III

Mining Frequent Patterns, Associations and Correlations: Basic Concepts, Efficient and Scalable Frequent Itemset Mining Methods, Mining various kinds of Association Rules, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

UNIT IV

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Rule-Based Classification, Classification by Backpropagation, Support Vector Machines, Associative Classification, Lazy Learners, Other Classification Methods, Prediction, Accuracy and Error measures, Evaluating the accuracy of a Classifier or a Predictor, Ensemble Methods.

Unit V

Cluster Analysis Introduction : Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Clustering High-Dimensional Data, Constraint-Based Cluster Analysis, Outlier Analysis.

UNIT VI

Mining Streams, Time Series and Sequence Data: Mining Data Streams, Mining Time-Series Data, Mining Sequence Patterns in Transactional Databases, Mining Sequence Patterns in Biological Data, Graph Mining, Social Network Analysis and Multirelational Data Mining.

UNIT VII

Mining Object, Spatial, Multimedia, Text and Web Data: Multidimensional Analysis and Descriptive Mining of Complex Data Objects, Spatial Data Mining, Multimedia Data Mining, Text Mining, Mining the World Wide Web.

UNIT VIII

Applications and Trends in Data Mining: Data Mining Applications, Data Mining System Products and Research Prototypes, Additional Themes on Data Mining and Social Impacts of Data Mining.

References:

1. **Data Warehousing in the Real World** by Sam Aanhory & Dennis Murray Pearson Edn Asia.
2. **Data Warehousing Fundamentals** by Paulraj Ponnaiah Wiley student Edition
3. **The Data Warehouse Life cycle Tool kit** by Ralph Kimball Wiley student edition
4. **Building the Data Warehouse** By William H Inmon, John Wiley & Sons Inc, 2005
5. **Data Mining Introductory and advanced topics** by Margaret H Dunham, Pearson education.
6. **Data Mining Techniques** by Arun K Pujari, University Press.
7. **Data Mining – Concepts and Techniques** by Jiawei Han & Micheline Kamber, Morgan Kaufmann Publishers, Elsevier,2nd Edition, 2006.
8. **Introduction to Data Mining** by Pang-Ning Tan, Michael Steinbach and Vipin Kumar, Pearson education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR
Pre-Ph.D - Computer Science & Engineering
(09PH05207) ADVANCED SOFTWARE ARCHITECTURE

UNIT I

Envisioning Architecture and Creating Architecture

The Architecture Business Cycle, What is Software Architecture, Architectural Patterns, Reference Models, Reference Architectures, Architectural Structures and Views.

Quality Attributes, Achieving Qualities, Architectural Styles and Patterns, Designing The Architecture, Documenting Software Architectures, Reconstructing Software Architecture.

UNIT II

Analyzing Architectures

Architecture Evaluation, Architecture Design Decision Making, ATAM, CBAM. Software Product Lines, Building Systems from off The Shelf Components, Software Architecture in Future.

UNIT III

Patterns I

Pattern Description, Organizing Catalogs, Role in Solving Design Problems.

Abstract Factory, Builder, Factory Method, Prototype, Singleton, Adapter, Bridge, Composite, Façade, Flyweight, Proxy.

UNIT IV

Patterns II

Chain of Responsibility, Command, Interpreter, Iterator, Mediator, Memento, Observer, State, Strategy. Template Method, Visitor.

UNIT V

Web Services Fundamentals

Introducing SOA- Fundamentals of SOA , The Evolution of SOA – An SOA Timeline, The Continuing Evolution of SOA,The Roots of SOA ,Web Services and Primitive SOA-The Web Services Frame Work, Services, Service Descriptions, Messaging. Web Services and Contemporary SOA - Message Exchange Patterns, Service Activity Coordination, Atomic Transactions, Business Activities, Orchestration, Choreography, Addressing, Reliable Messaging, Correlation, Metadata Exchange, Notification and Eventing.

UNIT VI

Principles of Service-Orientation

Service – Orientation and the Enterprise, Anatomy of SOA, Common Principles of Service – Orientation, Interrelation between Principles of Service-Orientation, Service Orientation and Object Orientation. Overview of Various Service Layers Service Layer Abstraction, Application Service Layer, Business Service Layer, Orchestration Service Layer, Agnostic Services, Service Layer Configuration Scenarios.

Unit VII

Building SOA (Planning and Analysis)

SOA Delivery Strategies-SOA Delivery Lifecycle Phases, The Top-Down Strategy, The Bottom-Up Strategy, The Agile Strategy. Service Oriented Analysis -Introduction to Service Oriented Analysis, Benefits of a Business Centric SOA, Deriving Business Services. Service Modelling, Service Modeling Guidelines, Classifying Service Model Logic, Contrasting Service Modeling Approaches.

Unit VIII

Building SOA (Technology and Design)

Introduction to Service-Oriented Design,WSDL Related XML Schema Language Basics,WSDL Language Basics, Service Interface Design Tools. SOA Composing Steps, Considerations for Choosing Service Layers, Considerations for Positioning Core SOA Standards, Considerations for Choosing SOA Extensions. Service Design Overview, Entity-Centric Business Service Design, Application Service Design, Task-Centric Business Service Design, Service Design Guidelines. Service Oriented Design - Business Process Design-WS-BPEL Language Basics,WS- Coordination Overview, Service Oriented Business Process Design. Fundamentals WS-* Extensions-WS-Addressing Language Basics,WS-Reliable Messaging Language Basics,WS-Policy Language Basics,WS-Metadataexchange Language Basics,WS-Security Language Basics.

References:

1. Software Architecture in Practice, second edition, Len Bass, Paul Clements and Rick Kazman, Pearson Education,2003.
2. Design Patterns: Elements of Reusable Object-Oriented Software, Erich Gamma, Richard Helm, Ralph Johnson and John Vlissides, Pearson Education,1995.
3. Service-Oriented Architecture-Concepts, Technology, and Design, Thomas Erl, Pearson Education.
4. Understanding SOA with Web Services, Eric Newcomer, Greg Lomow, Pearson Education.
5. **Beyond Software architecture** by Luke Hohmann, Addison wesley, 2003.
   Software architecture by David M. Dikel, David Kane and James R. Wilson, Prentice Hall PTR,2001
6. **Pattern Oriented Software Architecture** by F.Buschmann&others, John Wiley Sons.
7. **Head First Design patterns by** Eric Freeman & Elisabeth Freeman, O'REILLY, 2007.
8. **Design Patterns in Java by** Steven John Metsker & William C. Wake, Pearson education, 2006
9. **J2EE Patterns by** Deepak Alur, John Crupi & Dan Malks, Pearson education, 2003.
10. **Design Patterns in C# by** Steven John metsker, Pearson education, 2004.
11. **Software Design by** David Budgen, second edition, Pearson education,2003

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ANANTAPUR

Pre-Ph.D - Computer Science & Engineering

(09PH05208)Model Driven Software Engineering

UNIT I

Introduction

MDSD – Basic Ideas and Terminology - Case Study: A Typical Web Application – Application Development – Architecture Development - Concept Formation – Model Driven Architecture – Architecture Centric MDSD – Software Factories – Model Integrated Computing - Classification.

UNIT II

Uml

4 x 1 Views of UML – Use Case Models – Behavioral Models – Dynamic Models – Deployment Models – Various Profilers.

UNIT II

Domain Architectures

What is Metamodeling? – Metalevels Vs Levels of Abstraction – MOF and UML – Extending UML – UML Profiles – Metamodeling and OCL - Tool Supported Model Validation – Metamodeling and Behaviour – Pitfalls in Metamodeling. MDSD-Capable Target Architectures – Software Architecture in the Context of MDSD – Sound Architecture – Building Blocks for Software Architecture – Architecture Reference Model – Balancing – Architecture Conformance – MDSD and CBD – SOA and BPM.

UNIT III

Building Domain Architectures

DSL Construction – General Transformation Architecture – Technical Aspects of Building Transformations – Use of Interpreters - Code Generation Techniques - Code Generation Why? – Categorization – Generation techniques.

UNIT IV

Model Transformation Techniques

M2M Language Requirements - Model Transformation with QVT - MDSD Tools: Roles, Architecture, Selection Criteria, and Pointers - The MDA Standard.

UNIT V

Processes And Engineering

MDSD Process Building Blocks and Best Practices – Two Track Iterative Development – Target Architecture Development Process – Product Line Engineering.

UNIT VI

Model Based Testing

Testing – Test Types – Test in Model Driven Application Development – Testing the Domain Architecture – Versioning – Project and Dependencies – Structure of Application Projects –

Version Management and Build Process for Mixed Files – Modeling in a Team and Versioning of Partial Models.

UNIT VII
Case Studies
Case Study: Embedded Component Infrastructures - Case Study: An Enterprise System.

UNIT VIII
Management
Decision Support - Organizational Aspects - Adoption Strategies for MDSD.

References:

1. **Model-Driven Software Development: Technology, Engineering, Management, Markus Völter by** Thomas Stahl, Jorn Bettin, Arno Haase, Simon Helsen, Krzysztof Czarnecki.
2. **Model-Driven Software Development by** Sami Beydeda, Matthias, Volker Gruhn,

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
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Pre Ph.D (Computer Science and Engineering)

(09PH05209)SOFTWARE TESTING

UNIT I
Fundamentals
What Is Software Verification and Validation? - Verification and Validation Techniques – V-Model of Testing – Software Testing - Purpose of Testing - Taxonomy of Bugs - Defect And Failure Analysis – Types of Testing Techniques – Black Box – White Box – Gray Box Testing Test Adequacy and Coverage.

UNIT II
Functional Testing
Functional testing - Boundary Value Testing - Equivalence class testing - Decision table based testing - Evaluation of the testing - Assessed exercise: Specify and design test cases.

UNIT III
Structural Testing
Path testing - Data and Control Flow Testing – Graph Based Testing - Evaluation of the testing and summary

UNIT IV
Regression Testing
Need for Regression Testing – Impact Analysis – Regression Test Selection Techniques - Code and Model Based Techniques – Test Case Optimization Techniques.

UNIT V
Other Types Of Testing
GUI Testing – Domain Based Testing – Performance Testing – Stress Testing – Load Testing – Monkey Testing – Acceptance Testing – Alpha, Beta, Gamma Testing – Software Acceptance Plan.

UNIT VI
Metrics
Importance of Metrics in Testing - Effectiveness of Testing – Defect Density – Defect Leakage Ratio – Residual Defect Density – Test Team Efficiency – Test Case Efficiency – Various Test Reports.

UNIT VII
Testing Tools
Features of Testing Tools – Guidelines for Selecting Tools – Static Testing Tools – Dynamic Testing Tools – Advantages and Disadvantages of Testing Tools – When to use Test Tools? – Process of Procurement of Tools.

UNIT VIII

Test Management

Defect Management – Defect Classification – Defect Life Cycle – Defect Management Process – Reporting Defect – Defect Analysis – Fish Bone Techniques – Risk Analysis – Risk Based Testing – Test Plan – Test Strategy – Test Estimation – Code Reviews.

References:

1. **"Software Testing – Principles, Techniques and Tools" by** M G Limaye, Tata McGraw Hill, 2009.
2. **"Software Testing Techniques" by** Boris Beizer 2nd Edition, Dream tech press, 2003.

3 **"Software Testing in the Real World - Improving the Process" by** Edward Kit, Pearson Education, 2004.

4 **"Effective methods for software testing" by** William E. Perry, 2nd Edition, John Wiley, 2000.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR

Pre Ph.D (Computer Science and Engineering)

(09PH05210) SOFTWARE RELIABILITY

UNIT I

Introduction

The Need for Reliable Software, Software Reliability Engineering Concepts, Basic Definitions, Software Practitioners Biggest Problem, Software Reliability Engineering Approach, Software Reliability Engineering Process, Defining The Product.

UNIT II

The Operational Profile

Reliability Concepts, Software Reliability and Hardware Reliability, Developing Operational Profiles, Applying Operational Profiles, Learning Operations and Run Concepts.

UNIT III

Software Reliability Concepts

Defining Failure for The Product, Common Measure for All Associated Systems, Setting System Failure Intensity Objectives, Determining Develop Software Failure Intensity Objectives, Software Reliability Strategies, Failures, Faults and Errors, Availability, System and Component Reliabilities and Failure Intensities, Predicting Basic Failure Intensity.

UNIT IV

Software Reliability Modeling Survey

Introduction, Historical Perspective and Implementation, Exponential Failure Time Class of Models, Weibull and Gamma Failure Time Class of Models, Infinite Failure Category Models, Bayesian Models, Model Relationship, Software Reliability Prediction in Early Phases of The Life Cycle.

UNIT V

Software Metrics for Reliability Assessment

Introduction, Static Program Complexity, Dynamic Program Complexity, Software Complexity and Software Quality, Software Reliability Modeling.

UNIT VI

Software Testing and Reliability

Introduction, Overview of Software Testing, Operational Profiles, Time/Structure Based Software Reliability Estimation.

UNIT VII

Best Practice of SRE

Benefits and Approaches of SRE, SRE During Requirements Phase, SRE During Implementation Phase, SRE During Maintenance Phase.

Neural Networks for Software Reliability

Introduction, Neural Networks, Neural Networks for Software Reliability, Software Reliability Growth Modeling.

UNIT VIII

Fault -Tolerant Software Reliability Engineering-Introduction, Present Status, Principles and Terminology, Basic Techniques, Advanced Techniques, Reliability Modeling, Reliability in The Presence of Interversion Failure Correlation, Development and Testing of Multiversion Fault-Tolerant Software, Cost of Fault-Tolerant Software.

References:

1. **Handbook of Software Reliability Engineering Edited** by Michael R. Lyu, published by IEEE Computer Society Press and McGraw-Hill Book Company.
2. **Software Reliability Engineering** by John D. Musa, second edition Tata McGraw-Hill.
3. **Practical Reliability Engineering by** Patric D. T. O connor 4th Edition, John Wesley & Sons, 2003.
4. **Fault tolerance principles and Practice** by Anderson and PA Lee, PHI, 1981.
5. **Theory and Techniques by** Fault tolerant computing Pradhan D K (Ed.): Vol 1 and Vol 2, Prentice hall, 1986.

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ANANTAPUR

Pre Ph.D (Computer Science and Engineering)

(09PH05211)REVERSE ENGINEERING

UNIT I

Foundations

What is Reverse Engineering, Software Reverse Engineering, Reverse Applications, Low Level Software, The Reversing Process, The Tools, is Reversing Legal, Code Samples & Tools.

Object Flow Graph

Abstract Language, Object Flow Graph, Containers, Flow Propagation Algorithm, Object Sensitivity, The Elib Program.

UNIT II

Low Level Software

High Level Perspectives, Low Level Perspectives, Assembly Language, A Primer on Compilers and Compilation, Execution Environments.

UNIT III

Reverse Tools

Different Reversing Approaches, Disassemblers, Debuggers, Decompilers, System Monitoring Tools, Patching Tools, Miscellaneous Reversing Tools.

UNIT IV

Beyond the Documentation

Reversing and Interoperability, Laying The Ground Rules, Locating Undocumented APIs, Case Study.

UNIT V

Class Diagram

Class Diagram Recovery, Declared Vs Actual Types, Containers, The Elib Program.

Object Diagram

The Object Diagram, Object Sensitivity, Dynamic Analysis, The Elib Program.

UNIT VI

Interaction Diagram

Interaction Diagram, Interaction Diagram, Intreraction Diagram Recovery, Dynamic Analysis, The Elib Program.

State Diagram

State Diagram, Abstract Interpretation, State Diagram Recovery, The Elib Program.

UNIT VII

Package Diagram

Package Diagram Recovery, Clustering, Concept Analysis, The Elib Program, Tool Architecture, The Elib Program, Perspectives.

UNIT VIII

Reversing Malware

Types of malware, Sticky software, Future malware, Uses of malware, Malware vulnerability, Polymorphism, Metamorphism, Establishing a secure environment.

Antireversing Techniques

Why anti reversing?, Basic approaches to anti reversing, Eliminating symbolic information, Code encryption, Active anti debugger techniques, Confusing disassemblers, Code obfuscation, Control flow transformations, Data transformations.

References:

1. **Reverse Engineering of Object Oriented Code Paolo Tonella by** Alessandra Potrich.
2. **Reversing: Secrets of Reverse Engineering by** Eldad Eilam.

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Pre Ph.D (Computer Science and Engineering)

(09PH05212) SOFT COMPUTING

UNIT I

Introduction to intelligent systems and soft computing

Introduction, Intelligent Systems, Knowledge-Based Systems, Knowledge Representation and Processing, Soft Computing.

UNIT II

Fundamentals of Fuzzy Logic Systems

Introduction, Background, Fuzzy Sets, Fuzzy Logic Operations, Generalized Fuzzy Operations, Implication (If-Then), Some Definitions, Fuzziness and Fuzzy Resolution, Fuzzy Relations, Composition and Inference, Considerations of Fuzzy Decision-Making.

UNIT III

Fuzzy Logic Control

Introduction, Background, Basic of Fuzzy Control, Defuzzification, Fuzzification, Fuzzy Control Surface, Extensions of Mamdani Fuzzy Control.

Fuzzy Control Architectures

Fuzzy Control Architectures, Properties of Fuzzy Control, Robustness and Stability.

UNIT IV

Optimization

Derivative-Based Optimization – Descent Methods – The Method of Steepest Descent – Classical Newton's Method – Step Size Determination – Derivative-Free Optimization – Genetic Algorithms – Simulated Annealing – Random Search – Downhill Simplex Search.

UNIT V

Fundamentals of Artificial Neural Networks

Introduction, Learning and Acquisition of Knowledge, Features of Artificial Neural Networks, Fundamentals of Connectionist Modeling.

Major Classes of Neural Networks

Introduction, The Multilayer Perceptron.

UNIT VI

Neuro-Fuzzy Systems

Introduction, Background, Architectures of Neuron-Fuzzy Systems, Construction of Neuron-Fuzzy Systems.

UNIT VII

Evolutionary Computing

Introduction, Overview of Evolutionary Computing, Genetic Algorithms and Optimization, The Schema Theorem: The Fundamental Theorem of Genetic Algorithms, Genetic Algorithm Operators, Integration of Genetic Algorithms With Neural Networks, Integration of Genetic

Algorithms With Fuzzy Logic, Known Issues In Gas, Population-Based Incremental Learning, Evolutionary Strategies, ES Applications.

UNIT VIII

Applications and Case Studies

Pattern Recognition, Image Processing, Information Retrieval Systems, Share Market Analysis, Soft Computing For Colour Recipe Prediction, Case Studies.

References:

1. **Fuzzy Logic with Engineering Applications**, by Timothy J. Ross, McGraw-Hill, 1997.
2. **Computational Intelligence Principles, Techniques and Applications**, by A.Konar, Springer, 2005.
3. **Introduction to Pattern Recognition- Statistical, Structural, Neural and Fuzzy Logic Approaches**, by M.Friedman and Abraham Kandal, World Scientific, 2005.
4. **Soft Computing and Intelligent Systems Design**, by Fakhreddine.O. Karray and Clarence De Silva, Pearson Education.
5. **Neuro-Fuzzy and Soft Computing** by J.S.R. Jang, C.T. Sun and E.Mizutani, PHI, 2004, Pearson Education 2004.

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Pre Ph.D (Computer Science and Engineering)

(09PH05213)SPEECH RECOGNITION

UNIT I
Introduction
Speech production mechanism, Classification of speech, Sounds, Nature of speech signal, Models of speech production.

UNIT II
Speech Signal Processing
Purpose of speech processing, Digital models for speech signal, Digital processing of speech signals, Significance, Short time analysis.

UNIT III
Speech Signal Represenatation And Coding
Short Time Fourier Analysis, Acoustic Model of Speech Production, Linear Predictive Coding, Cepstral Processing, Perceptual Motivated Representations, Formant Frequencies, Role of Pitch, Scalar Waveform Coders, Scalar Frequency Domain Coders, Code Excited Linear Prediction, Low –Bit Rate Speech Coders.

UNIT IV
Speech Recognition
Hidden Markov Models (HMM), Practical Issues in Using HMMs, HMM Limitations Acoustic Modeling, Phonetic Modeling, Language Model, Speaker Recognition Algorithms, Signal Enhancement For Mismatched Conditions.

UNIT V
Speech Synthesis
Formant Speech Synthesis, Concatenative Speech Synthesis, Prosodic Modification of Speech, Source Filter Models for Prosody Modification, Evaluation of Text to Speech System.

UNIT VI
Spoken Language Understanding
Dialog Structure, Semantic Representation, Sentence Interpretation, Discourse Analysis, Dialog Management, Response Generation and Rendition, Case Study.

UNIT VII
Speech Enhancement
Introduction, Classification of Speech Enhancement Methods, Short-Term Spectral Amplitude Techniques, Speech Modeling and Wiener Filtering, Adaptive Noise Cancelling, Systems Based on Fundamental Frequency Tracking, Performance Evaluation.

UNIT VIII

Speech Quality Assesment

Introduction, Subjective Quality, Objective Quality Measures, Objective Versus Subjective Measures.

Case Studies: Isolated word recognition, Connected word recognition, Speaker Identification.

References:

1. **Digital processing of speech signals** by L.R.Rabiner and R.E Schafer: Prentice Hall, 1978.
2. **"Discrete- Time Speech Signal Processing" by** Thomas F.Quateri, Pearson education, 2002.
3. **Spoken Language Processing" by** Xuedong Huang, Alex Acero, Hsiad, Wuen Hon, "Prentice Hall, 2001.
4. **Discrete time processing of speech signals by** John R. Deller, Jr., John G. Proakis and John H. L. Hansen, Macmillian Publishing company, 1993.
5. **Speech Communication: Human and Machine by** Douglass O'Shaughnessy, Addison Wesley 1987.
6. **Digital Processing of Speech Signals by** L.R.Rabiner and R.W.Schafer, Engle wood Cliffs, N.J., Prentice Hall, 1978.
7. **Fundamentals of Speech Recognition by** L.Rabiner and B.H.Juang, Enlewood Cliffs, Prentice Hall, 1993.
8 **Speech Analysis Synthesis and Perception** by J.L. Flanagan : 2nd Edition- Springer vertag, 1972.
9 **Principles of Computer.** I. H.Witten
10 **"Speech and Audio Signal Processing" by** B.Gold N.Morgan, Wiley and Sons, 2000.
11 **"Computer Speech-Recognition, Compression, Synthesis" by** M.R.Schroeder, Springer Series in Information Sciences, 1999.
12 **"Speech and Language Processing" by** Daniel Jurafsky & James H. Martin,Pearson Education, 2000.
13 http://www. cse.iitm.ac.in/moodle/course

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR
Pre-Ph.D - Computer Science & Engineering
(09PH05214) DIGITAL IMAGE PROCESSING

UNIT - I

Digital Image Fundamentals -- image model, image sampling and quantization, basic relationships between pixels, neighbors, distance measures – linear and nonlinear operations.

UNIT - II

Image enhancement in the spatial domain : gray-level transformation, histogram processing, enhancement using arithmetic and logic operators, basic spatial filtering, smoothing and sharpening spatial filters, combining the spatial enhancement methods.

UNIT – III

Image enhancement in the frequency domain: Fourier transform – one dimensional, two dimensional DFT, filtering – Smoothing frequency domain filters - lowpass filters – highpass filters – Homomorphic filtering.

UNIT-IV

Image restoration : A model of the image degradation/restoration process, noise models, restoration in the presence of noise–only spatial filtering, Weiner, constrained least squares filtering, geometric transforms.

UNIT - V

Image Compression : Fundamentals, image compression models, error-free compression, Lossy compression, Lossy predictive coding, transform coding, Wavelet Coding, image compression standards.

UNIT - VI

Morphological Image Processing : Preliminaries, dilation, erosion, open and closing, hit or miss transformation, basic morphologic algorithms—boundary extraction, region filtering, convex hull, thinning, skeletons, pruning.

UNIT - VII

Image Segmentation : Detection of discontinuous, edge linking and boundary detection, thresholding, region–based segmentation, segmentation by morphological watersheds.

UNIT - VIII

Object Recognition : Patterns and patterns classes, recognition based on decision–theoretic methods, matching, optimum statistical classifiers, neural networks, structural methods – matching shape numbers, string matching. Wavelets – Subband Coding, The Haar Transform.

References:

1. **Image Processing, Analysis, and Machine Vision by** Milan Sonka, Vaclav Hlavac and Roger Boyle, Thomson Learning.
2. **Introduction to Digital Image Processing with Matlab** by Alasdair McAndrew, Thomson Course Technology
3. **Computer Vision and Image Processing by** Adrian Low, B.S.Publications
4. **Digital Image Processing using Matlab, Rafeal C.Gonzalez**, Richard E.Woods, Steven L. Eddins, Pearson Education.
5. **Digital Image Processing by** William K. Prat, Wily
6. **Digital Image Processing and Analysis by** B. Chanda, D. Datta Majumder, Prentice Hall of India, 2003.
7. **Digital Image Processing by** Rafeal C.Gonzalez, Richard E.Woods, Pearson Education.

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY ANANTAPUR
ANANTAPUR
Pre-Ph.D - Computer Science & Engineering
(09PH05215) ARTIFICIAL INTELLIGENCE

UNIT I

Introduction: AI-Acting and Thinking humanly, rationally, Searching: Searching for solutions, Uniformed Search Strategies, Informed Search Strategies, Heuristic Functions.

UNIT II

Local Search Algorithms and Optimization problems: Hill-climbing, Simulated annealing, Local beam, Genetic algorithms, Constraint Satisfaction problems, Backtracking Search for CSPs.

UNIT III

Adversial Search : Games ,Optimal Decisions in Games, Alpha- Beta Pruning, Evaluation Functions, Cutting off search, Games that include an Element of chance, Game programs, Knowledge and reasoning- I: Logical Agents.

UNIT IV

Knowledge and reasoning- II: First-Order Logic: Syntax and Semantics, Using First Order Logic, Knowledge Engineering, Inference in first-Order Logic: Propositional Vs
First-Order Inference, Unification and Lifting Resolution, Forward and Backward Chaining.
Structural reasoning: Probability and Bayes theorem, Bayesian networks.

UNIT V

Planning: Classical planning problem, Language of planning problems, Expressiveness and extension, planning with state-space search, Partial-Order planning, Planning Graphs,
Planning with Propositional Logic.

UNIT VI

Learning: Forms of learning, Induction learning, Learning Decision Tree, Statistical learning methods, learning with complete data, learning with hidden variables- EM Algorithm, Instance based learning. Neutral networks.

UNIT VII

Connectionist Models: Introduction, Hopfield networks, Learning in Neural Networks, Applications of Neural Networks, Recurrent Networks, Distributed Representations, Connectionist AI and Symbolic AI.

Genetic Algorithms: Copying Nature's Approaches

A Peak into The Biological World, Genetic algorithms, Significance of The Genetic operators, Termination Parameters, Niching and Speciation, Evolving Neural Networks, Theoretical Grounding, Ant Algorithms.

UNIT VIII

Artificial Immune Systems: Introduction, The Phenomenon of Immunity, Immunity and Infection, The Innate Immune System- The First Line of Defense, Recognition, Clonal Selection, Learning, Immune Network Theory, Mapping Immune Systems to practical Applications, Other Applications.

References:

1. **" Artificial Intelligence- A Modern Approach" by** Russell, Norvig 2e,2004, PEA .
2. **" Expert Systems- Principles and Programming",** Giarratano, Riley 3e, 2003, Thomson.
3. "Artificial Intelligence-Structures and strategies for Complex problem Solving" by George F Luger 4e, 2004, PEA.
4. **"Artificial Intelligence" by** Rich, Knight, Nair 3e, Tata McGraw-Hill.