

Unit I : The extended entity relationship model and object model, the ER model revisited, complex data types, user defined abstract data types and structured types, Subclasses, Superclasses, Inheritance, Specialization and generalization, Relationship types of degree higher than two.

Unit II :Object-Oriented Databases, overview of object-oriented concepts, object identity, object structure and type constructors, Encapsulation of operations, methods and persistence, type hierarchies and inheritance, type extents and persistent programming languages, OODBMS architecture and storage issues, transactions and concurrency control, examples of ODBMS.

Unit III:Object Relational and Extended Relational Databases, database design for an ORDBMS, nested relations and collections, storage and access methods; Query processing and optimization, an overview of SQL3, implementation issues for extended type, systems comparison of RDBMS, OODBMS, ORDBMS.

Unit IV: Parallel and Distributed Databases and Client-Server Architecture, architecture for parallel databases, parallel query evaluation, parallelizing individual operations, sorting joins, distributed database concepts, data fragmentation, replication and allocation, techniques for distributed database design, query processing in distributed databases Concurrency control and recovery in distributed databases, An overview of client-server architecture.

Unit V : Databases on the Web and Semi-Structured Data, Web interfaces to the web, overview of XML, structure of XML data, document schema, querying, XML data, storage of XML data, XML applications, The semi-structured data model, implementation issues Indexes for text data.

Unit VI : Enhanced Data Models for Advanced Applications, active database concepts, temporal database concepts, Spatial databases : concept and architecture, deductive databases and query processing, mobile databases, geographic information systems.

TEXT BOOKS :

- 1) Elmsari and Navathe, "Fundamentals of Database Systems"
- 2) Ramakrishnan and Gehrke, "Database Management Systems"
- 3) Korth, Silberschatz, Sudarshan, "Database System Concepts"

REFERENCE BOOKS :

- 1) Rob and Coronel, "Database Systems : Design, Implementation and Management"
- 2) Date and Longman, "Introduction to Database Systems".

Unit I : Network Technology : Introduction, media issues, data link protocols, the OSI model, networking topologies, types of networks, protocols capabilities, NetBIOS, IPX, TCP/IP, CSMA/CD, token passing, frame relay, networking devices, repeaters, bridges, routers, switches, gateways, network design issues, data in support of network design, network design tools, protocols and architecture.

Unit II: Network performance, Modeling and Estimation : Issues related with optimizing network performance, probability, stochastic processes, modeling and performance evaluation, queuing theory, queuing models, estimating model parameters, throughput utilization, modeling network as graph external and internal representation, complexity issues, network traffic controls.

Unit III: Network Administration : Function and responsibilities, network issues : planning, implementation, fault diagnosis and recovery, network design : problem definition, multipoint line layout heuristics, CMST algorithms, ESAU-Willam's algorithm, Shannon's algorithm, unified algorithm, Bin packing algorithm, Terminal assignments and concentrator location.

Unit IV: High Speed Networks : Need, characteristics, challenges, applications, frame relay, ATM, ISDN, High speed LANs : Ethernet, fiber channel, DQDB, SMDS, B-ISDN, STM, DSL, and DWDM, architecture transport, switching and routing in optical domain, optical network management, internetworking.

Unit V: Network Security : basic cryptographic techniques, security in OSI architecture, internet and networked computing, Kerberos, firewalls, proxy, etc. Security applications in commerce and banking. IP Telephony : VOIP system architecture, protocol hierarchy, structure of a voice endpoint, protocols for the transport of voice media over IP networks, Providing IP quality of service for voice, signaling protocols for VOIP, PSTN gateways, VOIP applications.

Unit VI: Storage Networks : introduction, challenges, SCSI protocols and architecture : RAID, backup and mirroring, fiber channel attached storage, network attached storage including NFS, CIFS, and DAFS, management of network storage architectures. New storage protocols, architectures and enabling technologies.

REFERENCE BOOKS :

- 1) Stallings W., "High Speed Networks and Internets : Performance and Quality of Service", Prentice Hall, 2002.
- 2) Kershenbaum A., "Telecommunications Network Design Algorithms", Tata McGraw Hill.
- 3) Ramaswami R., Shivrajan K., "Optical Networks", Morgan Kaufmann.
- 4) Douskalis B., "IP Telephony : The Integration of Robust VOIP Service", Pearson Edu. Asia.
- 5) Douglas E. Comer, "Computer Networks and Internet", Pearson Edu. Asia.
- 6) Stallings W., "High Speed Networks :TCP/IP and ATM Design Principles", Prentice Hall, 1998.
- 7) Andrew Tanenbaum, "Computer Network", PHI.

UNIT I : Process and Operating system The process abstraction, Switching context, Embedded system project Management, Intercrosses communication and power consumption. Introduction to Real time systems, Embedded systems , Perceive computing application areas, Overview of Embedded system architecture, Recent Trends in Embedded system.

UNIT II: RTOS

Features Characteristics of RTOS,. Task Scheduling , Signals, Events, Queues, Mail Boxes. Creation of Threads and Inter Thread Communication

UNIT III: Fault techniques

Introduction, Fault causes, Types , detections, fault and Error containment, Reducancy, Hardware, software, time , Integrated failure Handling

UNIT IV: Embedded Hardware:

ARM Processor, PIC Microchip 16 Bit Processor, Detailed study of 16F877A,Atmel 89c51 Microcontroller development board.

UNIT V: Chip Design and Programming

Target Devices Different type of ASICS , FPGA , CPLD Architectures and programming

UNIT VI: Case Study

Study of any Two RTOS, eg. VxWorks, RTLinux, micro c/OS-II : Memory Management, task state diagram , preemptive priority, context switches.

TEXT BOOKS:

1. Dr. K.V. K. K. Prasad “Embedded / Real Time System : Concepts, Design, & Programming - Black Book” Dreamtech Press Publication
2. Frank Vahid, Tony Givargis, “Embedded System Design”, Willey
3. Smith M., “Application Specific Integrated Circuits”
4. Raj Kamal, “Embedded Systems”, Tata McGraw-Hill

REFERENCE BOOKS:

1. Sriram Iyer, Pankaj Gupta, “Embedded Real time Systems Programming”, Tata M. Hill.
2. Tammy Nergaard “Embedded Systems Architecture - A Comprehensive Guide For Engineering & Programming”, Elsevier Publication
3. Barr M., “RTOS”
4. Jane W.S. “Real Time Systems”, Pearson Education
5. C.M. Krishana, Kang G., Shin, “Real Time System” –M.G. Hill
6. Vx Works Programming Guide

i) SOFTWARE ENGINEERING METHODOLOGIES

Unit I: Software Process Models : Software Process Framework, Process Patterns, Personal and Team Process Models, Process Models: Waterfall Model, Incremental Models, Evolutionary Models, Iterative Development, The Unified Process, Agile process, Process Assessment, CMMI, Impact of Processes and Outcomes, Process Selection and applicability.

Unit II: Requirements Engineering : Requirements Engineering Tasks, Requirement Elicitation Techniques, Software Requirements: Functional, Non-Functional, Domain, Requirements Characteristics and Characterization, Requirement qualities, Requirement Specification, Requirement Traceability, System Analysis Model Generation, Requirement Prioritization.

Unit III:UML Concepts : Programming In Small Versus Programming In Large, UML 2.0 History/ New Features MDA/ MOF/ XMI/ CORBA, Introduction to UML Metamodel, Extensibility Mechanisms and its usage, Introduction to OCL, Specification techniques of diagrams in UML.

Unit IV:Behavioral Model : Use Cases, Use Case Diagram Components, Use Case Diagram, Actor Generalization, Include and Extend, Template for Use Case Narrative, Using Use Cases Data Dictionary : Finding the Objects, Responsibilities, Collaborators, and Attributes, CRC Cards, Dynamic Behavior: Sequence diagrams, object lifelines and message types, Activity Diagrams : Decisions and Merges, Synchronization.

Unit V: Design Engineering : Design quality, Design Concepts, The Design Model, Introduction to Pattern-Based Software Design, Architecture styles : Main program with sub program style, Abstract data type style, Repository, Layered. Architectural Design: Software Architecture, Data Design and Architectural Design.

Unit VI: Object Oriented Design : Design of Objects, Design and Factoring, Design of Software Objects, Features and Methods, Cohesion of Objects , Coupling between Objects , Coupling and Visibility, Inheritance, Establishing The Object Model, Refining classes and associations, Analysis model vs. design model classes, Categorizing classes: entity, boundary and control, Modeling associations and collections, Achieving reusability, Reuse through delegation , Identifying and using service packages.

REFERENCE BOOKS:

1. Ian Sommerville, "Software Engineering", 7th Edition, Addison-Wesley, 2004
2. Grady Booch, James Rumbaugh, Ivar Jacobson, "Unified Modeling Language Users Guide", 2nd Edition, Addison- Wesley,.
3. Jim Arlow, Ila Neustadt, "UML 2 and Unified Process: Practical Object Oriented Analysis and Design. ", 2nd Edition, Addison- Wesley,
4. Tom Pender, "UML Bible", John Wiley & Sons,.
5. Stephen H. Kan, "Metrics and Models in Software Quality Engineering", Pearson Education,

Unit I : Artificial Intelligence : Intelligence, Artificial intelligence, intelligent systems. Knowledge representation : Reasoning, issue and acquisition : propositional calculus, predicate calculus, Rule-based knowledge representation, symbolic reasoning under uncertainty.

Unit II: Expert Systems : introduction, expert systems, stages in the development of expert system, probability-based expert systems, expert system tools, difficulties in developing expert systems, applications of expert systems.

Unit III: Fuzzy Systems : introduction, foundation of fuzzy systems, fuzzy relations, arithmetic operations of fuzzy numbers, linguistic descriptions and their analytical forms, defuzzification methods, fuzzy logic in control and decision-making applications, hardware realization of the analog fuzzy controller.

Unit IV : Artificial Neural Networks : introduction, Neuron physiology, artificial neurons, artificial neural networks, features of artificial neural networks, backpropagation training algorithms, functional link neural networks, cascade correlation neural networks.

Unit V :Genetic Algorithms and Evolutionary Programming : introduction, genetic algorithms, procedures of genetic algorithms, the working of genetic algorithms, the logic behind genetic algorithms, evolutionary programming, the working of evolutionary programming, genetic-algorithm-based machine learning classifier system.

Unit VI : Swarm Intelligent Systems : introduction, background of Ant intelligent systems, importance of the ant colony paradigm, ant colony systems, development of the ant colony systems, application of ant colony intelligence, the working of ant colony systems, particle Swarm intelligent systems, engineering applications of PSIS and future research.

TEXT BOOK :

- 1) N.P.Padhy, "Artificial Intelligence and Intelligent Systems", Oxford.

REFERENCE BOOKS :

- 1) Hakin, Simon 2003, "Neural Networks : A Comprehensive Foundation", PHI, New Delhi.
- 2) Kosko B. 1997, "Neural Networks and Fuzzy Systems", PHI, New Delhi.
- 3) Rajasekaran S. and G.A.Vijayalakshmi Pai, 2003, "Neural Networks, Fuzzy Logic and Genetic Algorithms", PHI, New Delhi.
- 4) Sriram, Ram D. 1977, "Intelligent Systems for Engineering - A Knowledge-Based Approach", Springer, London.

ELECTIVE-I
(iii) LEGAL AND PROFESSIONAL ETHICS

Unit-I Technical communication: Oral presentations Technical writing, System documentation, Technical requirements Team Work Culture: Collaboration, Group dynamics, Leadership styles, Personality types, Collaboration tools.

Unit-II Social informatics, Social impact of IT on society, Online communities & social implications, Philosophical context, Diversity issues, Gender-related issues, Cultural issues, Accessibility issues, Globalization issues, Economic issues in computing, Digital divide.

Unit-III Foundations of intellectual property, Ownership of information, Plagiarism, Software piracy, Fair use, Digital Millennium Copyright Act (DMCA), Copyrights, patents, trademarks and trade secrets, NDAs, International differences.

Unit-IV Legal Issues: Compliance to Cyber laws, Hackers/crackers, Computer crime, Viruses, System use policies & monitoring, Risks and liabilities of computer-based systems, Accountability, responsibility, liability.

Unit-V Organizational context: Business processes, IT environment, Organizational culture, Professionalism, Relationships with professional societies., Codes of professional conduct, such as IEEE, ACM, BCS, ITAA, AITP. Ethics and history of ethics, Whistle-blowing, Workplace issues (harassment, discrimination), Identify theft, Ethical hacking,

Unit-VI Implications of: History of computer hardware, software, History of the Internet History of Telecommunications, The IT profession, IT education. Privacy and civil liberties.

BOOKS RECOMMENDED:

1. Meenakshi Raman, Sangeeta Sharma, "Technical Communication – English Skills for Engineers" Oxford Higher Education
2. George Reynolds, "Ethics in Information Technology", Thomson Course Technology, 2003
3. Sara Baase, "A Gift of Fire: Social, Legal and Ethical Issues for Computing and the Internet", PHI publications
4. Richard A. Spinello, "Case Studies in Information Technology Ethics", Second Edition, PHI
