

2nd/1

S.R.W. - II

PROPOSED SYLLABUS FOR M.C.A. COURSE

CS 101: Introduction to Computing and Its Applications

Transistors, Integrated Circuits (LSI, VLSI). Operation of processor, Number System, Digital Circuits, ALU, Memory Chips (ROM, RAM, DRAM), Storage Devices, Memory Hierarchy, I/O Devices, Bus Systems, Operating Systems: Windows and Linux. Basics of C Language, Concepts of Objects and Classes, Introduction to Object Oriented Programming, Network communication infrastructure, Protocols, Wireless LAN Mobile Computing, Web Technology, The Internet and Intranet, WWW, Java fundamentals, Multimedia Application, Computer Network Security, e-Commerce.

Text/Reference Books :

1. The Essential Guide to Computing : The Story of Information Technology. E. Garrison Walters, PHI, 2001.
2. Introduction to Computing System : From Bits to Gates to C and Beyond. Yale N. Patt and Sanjay J. Patel, Prentice Hall India, 1999.
3. Programming in C: V Rajaraman

CS 102 : Mathematical Foundation

Discrete structures and Significance, Fundamental Discrete Structure. Sets, Sequences, Product Set, Relations and Computing Significance, Permutation, Combination, Recurrence Relations, Fundamental Proof Techniques, Partial Orders and Poset, External Elements Lattices, Finite Boolean Algebras, Boolean Functions and Polynomial, Propositions, Logical Connectives and Operations, Conditionals, Biconditionals, Contradiction, Contrapositive, Tautology, Contingency and Contradiction Transformation to Propositional Forms Reasoning Using Equivalence Transformation, Rules of Substitution and Inferences, Normal Forms : DNF, CNF, PDNF, PCNF, Graph, its types and Computing Significance, Graph as a Data Structure, Eulerian and Hamiltonian Paths, and Circuits. Alphabets, Strings and Languages, Discrete Automation, Finite Automation, Transition System, Function and properties, Deterministic Finite Automation, Turning Machine and its Construction.

Text / References Books :

1. Discrete Math Structure. Kolman et al, PHI, 2000
2. Science of Programming, Gries D, Narosa, 2001
3. Intro. To Theory of Automata, Languages and Computation, Ullman et al, Narosa, 1999
4. Theory of Computer Science - Mitter, PHI, 2002
5. Fundamentals of Theory of Computation, Lewis et al, PHI, 2000

CS 103: Introduction to Programming Paradigms

Algorithms and Flow-charts, Programming Languages, Compilation, Linking, Testing, Debugging and Documentation, Introduction to C language, Character set, Variables and identifiers, Built in data type, arithmetic operators and expression, constant and literals, relational operator and logical connectivity, Sample assignment statement, Basic Input/ output statement, Simple C program, Conditional statement and loops. Decision making within a program, Different conditional statement in C, Looping statement in C, Structured programming, nested loop, infinite loop. Array and Pointer, Static and Dynamic memory allocation, Function: Modular programming and Function, Structure, Union and File system

Text/ Reference Books:

1. Programming in C, Herbert Schildt, TMH, Fifth Edition, 2002
2. C How to program, Deital & Deital, Pearson Edition, Third Edition, 2001
3. Programming in C, Denis Ritchie, TMH, Fourth Edition, 2002

CS 104: Statistical Techniques

1. Probability and Probability Distributions
Various definitions of probability, Additive and Multiplicative theorems, Independent events, Probability distribution, Mathematical expectation, Additive and Multiplicative theorems of expectation, Binomial, Poisson and Normal distributions, Fitting of probability distributions.
2. Descriptive Statistics
Measures of central tendency, Dispersion, Measures of dispersion, Moments, Product moment correlation coefficient, Rank correlation, Linear regression, Properties of regression coefficient Multiple linear regression.
3. Numerical Methods
Transcendental and Polynomial Equations : Iterative method, Regula-Falsi method, Newton-Raphson method, Roots of polynomial: Graeffe's and Bairstow methods, Solution of system of linear algebraic equations: Gauss elimination, Gauss-Jordan method, Data fitting, Method of least squares
4. Tests of Significance
Null and alternative hypotheses, One tail and two tail tests, Two types of error, Large sample tests, Small sample tests: Test of single mean, test of equality of two means, Paired t test, Test of goodness of fit, Test of independence of attributes, Test of variance
5. Sampling Techniques and Analysis of Variance
Sampling and complete enumeration, Simple random sampling, Stratified random sampling, Proportional and Optimum allocations
ANOVA : One way and two way classifications

Text/ Reference Books:

1. G.W. Snedcor, W.G. Cochran, "Statistical Methods", 6 Edn, East West Press.
2. S.C. Gupta, "Introduction to Mathematical Statistics", 1973, Sultan Chand
3. S.C. Chapra and R.P. Canale "Numerical Methods for Engineers", 2002 TMH

Applied - C

CS 105: Business Data Processing and File Systems

Basic Ideas of the System: System and its Characteristics, Introduction Systems and Technology, Business system, data Processing and Technology, Business System Context, Environment. Framework for a System in Business, Role of IT in Business Data Processing. System Related Challenges for Business: Improving Business Processes, Benefiting from Trends and Innovations, Maximizing Benefit from Information, Extending Human Skills, Extracting the most from Surrounding Infrastructure, responding to System related Risk, Building and Maintaining Systems, Analyzing System in Business Terms: Need for Framework and Models, Business and BP as System, IS and Business Processes, Analyzing IS and Business point of View, Strategy for Analyzing, Description and Evaluation of B-Process Architecture, Linking B- Process and Product Performances, Evaluation of B-Process Performances, Evaluation of B-Product Performances, Information Technology in Business, Information and its Determinants, IT and its Functions, IT Trend and Limitations, IT Performance Variable, Computer System Architecture and Trend, Software and Programming, Programming as a B-Process, Major Developments in Programming, Structured Programming, Principles and Techniques of Programming, Program Planning Tools, Testing and Verification, File System and BDP Tools, File and other Structures, File Type, Organization and Operations, File Management, Introduction to suitable BDP Tools.

Text/ Reference Books:

1. Information Systems-A Management Perspective, Alter S. Pearson Education 2000
2. Data Processing Schaum's Outline Series, Martin M. Lipschuts, TMH, 2001
3. Data Processing and Information Technology, C.S. French, BPB Publication, 1996

CS 201: Computer Architecture

Review of Number Systems; Combinational System, Switching algebra and logic circuits, Karnaugh map, Logic gates, simplification of expressions, implementation using gates, one bit adder, one bit ALU(add Sub, AND, OR), Encoders, multiplexers, Tri-state logic gates, Sequential Systems, Latches and Flip-Flops, Registers, Counters, Half-adders, Full-adders. Introduction to Computer Design: Design levels, data Paths, Registers, Busses, Instruction Set Design: Instructions Formats, Addressing Modes, Assembly Language. RISC Machine, Control Design. Hardwired and Microprogramming. Memory & I/O Memory organization, Cache Memory, Memory Management, I/O, Interrupts, DMA. Pipelining. Parallel Processors, Recent development in Computer Architecture. Performance and Cost: Selecting Computers based on Benchmarks.

Text/ Reference Books:

1. Information Systems-A Management Perspective, Alter S. Pearson Education 2000
2. Data Processing Schaum's Outline Series, Martin M. Lipschuts, TMH, 2001
3. Data Processing and Information Technology, C.S. French, BPB Publication, 1996

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REC

CS202 : Data Structure and Program Design

Basic Concepts of Data Representation : Abstract Data Types, Fundamental and Derived Data Types, Fundamental and derived Data Types, Representation and Implementation, Different Data Structures, Algorithm Design and Comparison Algorithm. Arrays and Linked Lists: Representation of Arrays and Linked Lists, Comparison of Arrays and Linked Lists. Stacks and Queues: Representation of Stacks and Queues (Dynamic and Static), Operations on Stacks and Queues. Applications of Stacks, Application of Queues. Trees: Representation of trees (Static and Dynamic). Different types of Trees, Operations on Trees, Tree Construction, Application of Tree., Searching and Sorting: Different Methods of Searching, Comparison of Different Searching Methods, Different Methods of Sorting, Comparison of Different Methods of representation, Operations of Graph, Minimal Spanning tree Algorithm, Shortest Path Algorithm.

Text / Reference Books :

1. R. Kruse, Data Structure and Program Design in C++ second Edition, PHI, 1997
2. Data Structure using C and C++, Y.Langsam, M.J.Augenstien and A.M. Tanenbaum Second Edition, 2000

CS203 : Object Oriented Programming

Introduction to Java, Java Buzzwords Data types and variables. Operators, Control Statements, Arrays, Methods, Recursion, Constructors, This and Final keywords, Garbage collection., Object-Oriented Programming. Introduction Objects, superclasses and Subclasses. Protected Members. Relationship Between superclass Objects and Subclass Objects. Constructors and finalizers in Subclasses. Encapsulation. Inheritance., Polymorphism., Packages and Interfaces., Examples of Packages and Interfaces. Exception Handling and Multithreading Programming., Exception Types., Uncaught Exceptions., Using Try and catch., Nested Try Statements., Throw, throws, finally., Java Thread Model., Thread Priorities, Synchronization., Main thread. Advance Java., Overview of JDBC, Applets, Servlets. Java Beans, EJB. Different Types of Drivers. Jar Files., Java Security Tools.

Text / Reference Books :

1. The Complete Reference, Herbert Schmidt, TMH, Fifth Edition, 2002
2. How to program, Deitel & Deitel, Pearson Edition, Third Edition, 2001
3. Core java Vol-1 and II (Sun Microsystems Press), Hortsman and Cornell, PEA, II and Edition, 2001

CS2004 : Database Management System

Database: Concept, Comparative view, goals etc.; Data independence, Consistency, security & integrity; DBMS models: hierarchical, relational and network; Structured query language and Programming interference; Database design and architecture; DBMS Applications: ORACLE, /DB2/Progress/any other; Introduction to distributed databases, concurrency control and recovery. Assorted Topics in Databases.

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Text / Reference Books :

1. Fundamentals of Database Systems, Elmsari & Nava the, Fourth Edition, AWP,2002
2. Database Management System, Ramakrishna, third Edition, TMH, 2000
3. Database System a practical approach to design implementation and Management, Thomas M. Connolly, Person Education Third Edition, 2002

CS205 : Object Oriented Analysis and Design

Introduction : Object Oriented approach, its features & significance., S/W Complexity & its causes, S/W Crisis & the related issues need to be resolved. Modeling : Object Modeling : Objects & classes, Links & Associations, Generalization & inheritance, Grouping Constructs, Advanced Object Modeling Aggregation, abstract classes, multiple inheritance, Meta data, candidate keys and Constraints. Dynamic Modeling : Events & states, operations, nested state diagram, concurrency. Functional Modeling : DFDS, specifying operations, constraints., Analysis and System design: Analysis: object modeling, Functional modeling adding operations, iteration. System design : subsystem, concurrency, allocation to processors and tasks, management of data stores, control implementation, Boundary condition, Architectural framework, Object Design, Optimization, Implementation of control, Adjustment of inheritance, Design of associations, documentation, comparison of methodologies, Implementation: Using a programming language, using a database system, Programming Styles: Object Oriented style : Reusability, extensibility, robustness and Programming-In-The-Large.

Text /Reference Books :

1. Object Oriented Modeling and Design, J. Rum Baugh, PH1,2003
2. Object Oriented Analysis and Design, G.Booch,2000

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III SEM

CS301 - Operating System (~~Shifted to CS-205~~)

UNIT-I

Definitions, Components and types of Operating system, Operating System Services, System Calls, System Programs, System Structure, System Design and Implementation, System Generations, I/O subsystem Overview, I/O hardware, Application I/O interface, Kernel I/O Subsystem, Linux User and programmer Interface

UNIT-II

Process Concepts, Process State & Process Control Block, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Multiple-Processor Scheduling Real-Time Scheduling, Threads Introduction, Multithreading models, Example System- process management in Linux

UNIT-III

The Critical Sections Problem, Semaphores, Classical Problem of Synchronization, Example system-Interprocess communication in Linux Deadlock Characterizations, Method for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock.

UNIT-IV

Storage management Logical Versus Physical Address Space, Swapping, Contiguous Allocating, Paging, Segmentation, Segmentation With Paging, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing, Demand Segmentation, Example System Memory management in Linux

UNIT-V

Disk Scheduling, Disk Management, Swap Space Management, Disk Reliability, Stable Storage Implementation, File Concepts, Directory Structure, Protection File system in Linux

Text Books :

1. Operating System Principles by Silberschatz A. and Peterson J. L., Wiley
2. Operating Systems by Dhamdhere, TMH

References:

1. Operating Systems by Deitel, Deitel & Choffnes.
Operating Systems by Stalling, Pearson

CS302 - Computer Networks

Introduction to Computer Networks: Evolution of Computer Networks; Networks goals, uses and applications; Network Hardware and Software; Protocol Hierarchies, Design issues for the Layer; Reference Models: OSI and TCP/IP; Example Networks-Internet,

Fundamentals of Data Transmission: Data Transmission systems and Operations; Encoding: Standard Encoding Schemes; Transmission Media: Magnetic media, Twisted wire-pair, Co-axial Cable, Fibre optics; Wireless media-Radio and Microwave Transmission; Switching- Message, Circuit and Packet Switching; Serial and Parallel Transmission-Asynchronous and Synchronous Transmission;

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- **The Data Link Layer:** Need for Data Link Control, Service provided by the Data Link Layer, Frame Design Consideration, Flow Control Mechanism, Data Link Error Control Error Control in Stop-and-wait Mechanism & Sliding Window Mechanism, Sequence numbering, Piggybacking Acknowledgements. Mac layer and its different protocols.

IEEE 802.3 Ethernet: Contention Access, CSMA, CSMA/CD, Physical Topology of Ethernet, Ethernet Repeater, Types of Ethernet.

Bridges and Switches: LAN Bridge, Transparent Bridges, Spanning Tree Algorithm, Ethernet Switches.

The Network Layer: Network Layer Design issue, Purpose of Network Layer, Functions of the Network Layer IP address, classful and classless IP address, NAT.

Introduction to Internet Protocol: IPv4 and IPv6 Format, ARP, RARP, DHCP, ICMP.

Routing Algorithms: Static Routing, Dynamic Routing, Distance Vector Routing Algorithm, Routing Information Protocol, Link State Routing, OSPF Routing Protocol, Border Gateway Protocol, Congestion control by chock packet, QoS, Leaky bucket, and Token Bucket.

Introduction to Transport Layer: Difference between TCP & UDP, Port number, TCP connection – Three way handshaking, Connection termination – half close, half open.

Introduction to Application Layer: Introduction of DNS, e-mail, SMTP, POP3 etc.

Congestion: Congestion Control Algorithms, General Principle of Congestion Control; Congestion Prevention Policies; Congestion Control in Virtual Circuit Subnet and Datagram Subnet; Techniques for achieving good quality of service (QoS).

Text Books:

1. Data Communications and Networks, by Forouzan, TMH

Reference Books:

1. Computer Networks, by Tanenbaum, Pearson Education
2. Data & Computer Communication, by William Stallings, Pearson Education
3. Computer Networking, by Kurose & Ross, Pearson Education
4. Networking, All-in-one Desk Reference, 10 Books in 1 by Doug Lowe, Wiley

CS303 - Design and Analysis of Algorithms

Introduction: Algorithm, performance evaluation of algorithms, space & time complexity, notion of optimality.

Divide and Conquer: Finding the maximum and minimum - Quick Sort - Selection - Strassen's matrix multiplication, etc

Greedy Algorithm: Knapsack Problem, (0-1 Knapsack, Fractional Knapsack), Activity selection problem, Huffman's Codes, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, Dijkstra's Algorithm, etc.

Dynamic Programming: Knapsack Problem DP solution, Activity selection problem DP solution, All pairs shortest paths, Traveling salesman problem.

Randomized Algorithms and Amortized Analysis: Basics ideas of randomized Algorithms (Las Vegas and Monte Carlo types), Simple examples (Randomized Quick sort and its analysis, Min-Cut algorithm and its analysis), Amortized analysis and its significance (Illustration through examples).

Graph Algorithms: Breadth First Search (BFS), Depth First Search (DFS), Strongly Connected Components, Euler Tour, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, Single Source Shortest Path.

Introduction to NP-Completeness: Basic concepts.

Text Books:

1. Introduction to Algorithm, 2e, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, PHI

Reference Books:

1. The Design and Analysis of Computer Algorithms by A.V. Aho, J.E.Hopcroft and J.D. Ullman, Pearson Education.
2. Beginning Algorithms by Simen Harris, James Ross, Wiley India.
3. Fundamentals of Computer Algorithms by E.Horowitz and S. Sahni, Galgotia,
4. Algorithms by Richard Johansonbaugh, and Marcus Schaefer, Pearson Algorithm
5. Algorithms - Introduction to Design and Analysis by S. Baase, Pearson Education.
6. Algorithms and Complexity, by H.S.Wilf, PHI.

CS304 – Software Engineering

- **Software & Software Process:** Concept of Program, Concept of Software product & types of Software, Concept of Software based System, Evolution of Software Engineering, Software process, people & project, SDLC
- **Software standards & Software models:** SEI-Capability Maturity Model, ISO, OMG, CORBA,IEEE,ANSI, Linear Sequential Model (Water Fall) , Evolutionary Model, Proto Typing Model, Spiral Model
- **Software Project Management:** Initial Requirement Analysis, System modeling, Function point analysis, Project Scheduling Gantt Chart, Project Estimation COCOMO, Project control PERT, Risk Management, Software Team, Life cycle model selection
- **Software Requirement Analysis:** Functional requirement, Non Functional requirements, Requirement gathering, Fact Finding Methods, Requirement Verification & Validation, Requirement Specification (SRS)
- **Software Design:** Design tools:UML,DFD,VTOC,HIPO,ERD, System Architecture Design Object oriented design using UML tools, Coupling & Cohesion, System structure/modular Design , Data Design (ERD), Process Design, I/O Design, User Interface Design, System Interface Design,
Software Coding: Code review, Code documentation, Code optimization,

Software Testing: Concept of software testing, Testing strategies (Black Box & White Box), Testing methods (Coverage based, Mutation test), Test cases (Test Input, Test area, Test Output, Test report), Test levels : (Unit, Integration, System), Alpha test & Beta test.
Software Implementation : Implementation Plan, Deployment diagram, Implementation Method

- **Software Quality Assurance:** Software reliability, Software quality standards, Software quality attributes,
 - **Software Maintenance:** Perfective maintenance, Corrective maintenance, Adaptive maintenance
 - **Software Change Management:** Software Configuration item, Baseline, Software change implementation, Software Change control, Software Re-engineering (Forward & Reverse)
- CASE TOOLS**
- **Advance Software Engineering topics:** Web software engineering, Mobile software engineering, Clean room software engineering

Practical

Lab based UML tools, CASE tools & Project Management tools

Ref. Books: 1. Rajib Mall, Fundamentals of Software Engineering, PHI
2. Waman Jawadkar, Principle & Practice in Software Engineering, TMH

CS305 : Elective – I

CS401 – Web Technology

Web Programming: Concept of JDBC (Java Database Connectivity), working with SQL, Stored Procedure, Security in Java, Class loader, Byte code Verification, security Manager and permission, Digital Signatures, Code Signing, Encryption.

Introduction to J2EE: Its advantage, Enterprise Architecture Types, Understanding EJB, its architecture, EJB Roles, Benefits and limitations of Enterprise Beans. Session Beans: Stateful and Stateless Beans, Entity Beans, Beans Managed Persistence, Container Managed Persistence.

Advanced Web technology in J2EE: Understanding Directory Services and JNDI, Introduction to LDAP, LDAP operation, working with LDAP Server, Introduction to Web Containers and Web Applications, Introduction to HTTP protocol, Web Application Life Cycle.

Creating Web Application: Understanding Servlet programming, its Life-Cycle, Servlet Configuration, Understanding Servlet sessions. Understanding of JSP and JSTL, JSP documents, Elements, tag extensions, tag libraries, validation, translation time mechanism, translation-time classes. Understanding JavaServer Pages Standard Tag Library, tags in JSTL, core tag library, XML tag library, using Internationalization Actions.

Web Application Deployment and Authentication: Enterprise Application Development Process, Deploying Web Application, Understanding CLASSPATH, Securing Web Applications, basic authentication with JAX-RPC Example, Client Certificate Authentication over HTTP/SSL

Text Books:

1. Java Server Programming J2EE 1.4 Edition BlackBook (Dreamtech Press)
2. Core Java™ Volume II By Cay S. Horstmann & Gary Cornell (Pearson)

Reference Book:

1. J2EE 1.4 Bible by McGovern (Wiley India)

CS402 - Cryptography and network security

Introduction: The OSI Security Architecture, Security attack, Security Services, Security Mechanism, A model for Network Security

Symmetric Cipher: Classical Encryption Techniques, Symmetric Cipher Model, Block Cipher Principles, DES, Differential and Linear Cryptanalysis, Block Cipher Design Principle, The Euclidean Algorithm, Finite field of Form $GF(p)$, Advance Encryption Standard (AES), AES Cipher, Multiple Encryption and Triple DES, Stream Cipher and RC4, Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random number generation.

Public Key Encryption and Hash Function: Fermat's & Euler's Theorems, The Chinese Remainder Theorem, RSA Algorithm, Diffe-Hellman Key Exchange, Elliptic Curve Cryptography, Message authentication code, Security of Hash Functions and MAACs, Secure Hash algorithm, Whirlpool, HMAC, CMAC, Digital Signature.

Network Security Applications: Kerberos, X.509 Authentication Service, S/MIME, IP Security Architecture, Encapsulating Security Payload, Secure Socket Layer (SSL), Transport layer security, Secure Electronic Transaction.

System Security: Intrusion detection, Password Management, Virus countermeasure, Denial of Service Attack, Firewall design principles, Trusted System.

Text Book:

1. Cryptography and Network Security: Principles and Practices, 4e, William Stallings, Pearson Education.
2. Cryptography and Network Security by Behrouz Forouzan, TMH

Reference Book:

1. Introduction to Cryptography, Johannes A. Buchmann, Springer
2. Beginning Cryptography with java by David Hook, Wiley Dreamtech.
3. Modern Cryptography Theory & Practices by Wenbo Mao, Pearson Education
4. Cryptography for Database and Internet Application by Nick Galbreath, Wiley Dreamtech
5. Network Security: Private Communication in a Public World, 2e, by Charlie Kaufman, Radia Perlman, and Mike Speciner, Pearson Education.

CSB-03

CS403 - Soft Computing

Essentials of Artificial Neural Networks: Introduction, Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity (Feed forward, feedback, Single and Multi-layer), Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules (Error Correction, Hebbian, Competitive, Stochastic), Types of Application (Pattern Classification, Pattern Clustering, Pattern Association / Memory, Function Approximation, Prediction, Optimization)

Support Vector Machines, Boltzmann Machine, Feedback (Recurrent) Networks and Dynamical Systems Matrix memories, Bidirectional Associative Memory, Hopfield Neural Network, Principal Component Analysis Networks (PCA), Kohonen's Self-Organizing Maps, Linear Vector Quantization, Independent Component Analysis Networks (ICA)

Fuzzy Logic: Basic concepts, fuzzy set theory, basic operations, fuzzification, defuzzification, neurofuzzy approach, applications

Evolutionary and Genetic Algorithms: Basic concepts of evolutionary computing, genetic operators, fitness function and selection, genetic programming, other models of evolution and learning

Rough Set Theory: Basic concepts, indiscernability relation, lower and upper approximation, decision systems based on rough approximation, applications

Text Book:

1. Jacek M. Zurada. Introduction to Artificial Neural Systems, Jaico Publishers, 1992.
2. S. Haykin. Neural Networks: A Comprehensive Foundation, Prentice Hall, 1999

Reference Book:

1. P. S. Churchland and T. J. Sejnowski. The Computational Brain. MIT Press, 1992.
2. A. M. Ibrahim. Introduction to Applied Fuzzy Electronics. PHI, 2004
3. Z. Pawlak. Rough Sets, Kluwer Academic Publishers, 1991.
4. Genetic Algorithm in Search Optimization and Machine Learning, D. E. Goldberg, Pearson Education, 1989
5. An Introduction to Genetic Algorithms, Melanie Mitchell, PHI, 1998

CS404 - Computer graphics & Multimedia Applications

Introduction: History, Advantages, Application, I/O Devices Graphic Packages, Languages.

Graphics Techniques: Jag Free Images on a Raster CRT Interactive Graphics processor for Digital Logic Simulation System, Interactive techniques for 3-D shaded Graphics.

2D Graphics: Drawing Elementary figures, Polygon Filling, Transformations, Windowing and clipping, Display file segmentation. Interactive Graphics: Interactive input techniques, Event handling, Input functions;

Graphics Standards A 3D Models: Device Independence AI in Graphics Software, Implementation of Graphics Kernel System (GKS).

Graphical Workstations: Routing output to workstations, Types of GKS, Workstations.

Evaluation of Various 3D Models: Mathematical Preliminaries, Curves and Surfaces, Clipping, Hidden line and surface removal, rendering, Computer Animation, 3D Shaded computer Animation the use of 3D abstract Graphical types in Computer Graphics and Animation. 3-Dimensional Reconstruction. A case study, Real-time graphics.

Introduction to Visualization, Tools for Visualization, Applications etc.

Text Books:

1. Computer Graphics C Version by Donald Hearn, and M. Pauline Baker, Pearson Education.
2. Mathematical Elements for Computer Graphics by Roger, Tata McGraw Hill Computer Graphics by Hearn, and Baker, PHI

Reference Books:

1. Principles of Interactive Graphics, by Newman and R. F. Sproull: McGraw-Hill.
2. Computer Graphics: A programming approach, by Harrington McGraw-Hill.
3. Fundamentals of Interactive Computer Graphics, by Foley & A. Van Dam, Addison Wesley.

CS405 – Elective – II

CS406 – Minor Project

V SEM

CS501 – Wireless networks

Introduction: Why wireless, IEEE 802.11

802.11 MAC Fundamentals: Challenges for MAC, Access mode, Contention based access using DCF, Fragmentation and reassembly, Frame format, 802.11 framing in detail (DS bits, BSSID, RTS, CTS, control frame, management frame), Contention based data service, Frame processing and bridging, 802.11 to Ethernet,

WEP: WEP cryptographic operations, WEP data processing, Problem with WEP, User authentication with 802.1x.

802.11i Robust security networks, TKIP, and CCMP: Temporal key Integrity protocol, Counter mode with CCB-MAC, Robust security network operation

Management operations: Association, power conservation, timer synchronization, spectrum management.
Contention free service with PCF.

Physical Layer: Physical layer architecture, Radio Link, RF with 802.11, Frequency, GFSK, PLCP, DSSS, HR/DSSS. 802.11a and 802.11j (OFDM Phy), 802.11g (extended rate PHY), 802.11n: MIMO-OFDM.

Experiencing on 802.11 on Windows OS, Linux

802.11 Access point: Functions of AP, Power over Ethernet, Selecting AP.

Security Architecture: Authentication and Access Point, Ensuring secrecy through encryption, selecting security protocols.

Site planning and project Management: Network requirement, PHY layer selection and design, Planning placing AP, Using Antennas to tailor Coverage.

802.11 Network analysis, 802.11 performance tuning.

Text Books:

1. 802.11 Wireless Networks by Mathew S. Gast, SPD

CS502 – Distributed System

Fundamentals: Definition, Evolution of distributed Computing System Distributed Computing System Models, Distributed Operating System, Designing a distributed Operating System, Introduction of distributed computing environment

Message Passing: Introduction Desirable features, Issues in IPC by message passing, synchronization, Buffering, Multi datagram messages, encoding and decoding message data.

Remote Procedure Calls: Introduction, The RPC Model, Transparency of RPC, Implementing RPC mechanism RPC messages server management, parameter-passing and call semantic, Communication protocols for RPC's.

Distributed Shared Memory: Introduction, Architecture of DSM Systems Design and implementation, granularly, structure of shared memory space Consistency models, replacement strategy, Thrashing.

Resource Management: Desirable feature, Task assignment approach, Load-balancing approach, Load-sharing approach.

Process Management: Process Migration, Threads.

Distributed File Systems: Intakes, Desirable features, File models, File accessing models, file-sharing semantic, File- caching schemes, File replication Fault tolerance, Automatic Transactions, Design principle.

Text Book:

1. George Coulouris, Jean Dollimore and Tim Kindberg "Distributed Systems Concepts and Design", Third Edition, Pearson Education Asia,

Reference Books:

1. 2002 Distributed Computing by Liu, Pearson Education.
2. Distributed Computing by Hagit Attiya and Jennifer Welch, Wiley India.
3. Distributed Operating Systems: concept and Design by P.K. Sinha, PHI
4. Distributed Operating System by Tanenbaum, Pearson Education

CS503 - Data & web mining

Introduction to data mining, need for data warehousing and data mining, application potential, keywords and techniques.

Data Warehousing and On-line analytical Processing (OLAP): Aggregation operations, models for data warehousing, star schema, fact and dimension tables , conceptualization of data warehouse and multidimensional databases, Relationship between warehouse and mining.

Data mining primitives: Data preprocessing, data integration, data transformation. Definition and specification of a generic data mining task. Description of Data mining query language with examples.

Association analysis: Different methods for mining association rules in transaction based data bases. Illustration of confidence and support. Multidimensional and multilevel association rules. Classification of association rules. Association rule algorithms – A priori and frequent pattern growth.

Classification and Prediction: Different classification algorithms. Use of genie index, decision tree induction, Bayesian classification, neural network technique of back propagation, fuzzy set theory and genetic algorithms.

Clustering: Partition based clustering, hierarchical clustering, model based clustering for continuous and discrete data. Scalability of clustering algorithms. Parallel approaches for clustering.

Web mining: Web usage mining, web content mining, web log attributes.

Data mining issues in object oriented data bases, spatial data bases and multimedia data bases and text data bases.

Text books:

1. Data Mining Concepts and Techniques, by J. Han, M. Kamber, Harcourt India.
2. Data Mining : introductory and Advanced Topics, by M. Dunham, Pearson Pub,
3. Data Mining Techniques, by A.K. Pujari, Universities Press.

CS504 – Elective III

CS505 – Elective IV

CS506 - Colloquial

VI SEM

CSP601 – Final Project (Industrial)

LIST OF ELECTIVES & SYLLABUS

CSE01 – Compiler Design

- ✓ **Introduction to Compilers:** Compilers and translators, The phases of a compiler, Compiler writing tools, The Lexical and Syntactic structure of a language, operators, Assignment statements and parameter translation.
- ✓ **Lexical Analysis:** The role of the lexical analyzer, Specification of tokens, lexical analysis tool.
- ✓ **Syntax Analysis:** Role of Parser, CFG, Top-down parsing, bottom-up parser, Operator-precedence parsing, LR Parsers, The Canonical Collection of LR (0) items, Constructing SLR, Canonical LR, and LALR parsing tables, Use of ambiguous grammars in LR parsing, An automatic parser generator, Implementation of LR parsing tables, and constructing LALR sets of items.
- ✗ **Syntax Directed Translation:** Syntax tree, Bottom-up evolution of S-attributed definitions, L-attributed definition, top-down translation, Bottom-up evaluation of inherited attributed, Recursive evaluators.
- ✗ **Type Checking:** Static vs. Dynamic Checking, Type expression, Type Checking, Type Equivalence, Type Conversion.
- ✗ **Symbol Tables:** Structure of Symbol Table, Simple Symbol Table (Linear Table, Ordered List, Tree, Hash Table), Scoped Symbol Table (Nested Lexical Scoping, One Table per Scope, One Table for all Scopes).
- ✗ **Intermediate Code Generation:** Intermediate Language, Intermediate representation Technique, Three-address code, quadruples and triples, Translation of assignment statements, Boolean expressions, Control Flow, Case Statement, and Function Call.
- ✗ **Code Generation:** Factors affecting code generation, Basic Block, Code generation for tree, Register Allocation and assignment, DAG representation, Code generation using dynamic programming, code-generator generators.
- ✗ **Error Detection and Recovery:** Errors, Lexical Phase errors, Syntactic- Phase errors, Semantic errors.
- ✗ **Code Optimization:** Need for optimization, Optimization of Basic Blocks, Loops in flow graph, Optimizing transformation (Compile time evaluation, common sub-expression elimination, Variable Propagation, Code Movement Optimization, Strength Reduction, Dead code optimization, Loop Optimization), Local Optimization, Global Optimization, Computing Global data flow equation, Setting up data flow Equations, Iterative Data Flow Analysis.

Text Books:

1. Compilers: Principles, Techniques, and Tools by Alfred V. Aho, Ravi Sethi, Jeffery D. Ullman, Pearson Education.

2. Compiler Design by Santanu Chattopadhyay, PHI

Reference Book:

1. Modern Compiler Design by Dick Grune, E. Bal, Ceriel J.H. Jacobs, and Koen G. Langendoen, Wiley Dreamtech

CSE02 - Visual Programming

Introduction: Introduction to .NET Architecture, Features of Visual Studio.NET,

VB.NET FUNDAMENTALS 9

Introduction to .NET Framework - Controls - Menus and Dialog Boxes - Variables and Operators - Decision Structures - Loops and Timers - Debugging - Trapping and Handling Errors

VB.NET PROGRAMMING 9

Modules and Procedures - Arrays and Collections - Exploring Text Files and String Processing - Automating Microsoft Office Applications - Deployment of VB.NET Applications.

VB.NET UI DESIGN AND DATABASE APPLICATIONS 9

Windows Forms - Graphics and Animation - Inheriting Forms and Creating Base Classes - Working with Printers - ADO.NET - Data Grid Control

VC++ FUNDAMENTALS 9

Windows Programming Fundamentals - Event Driven Programming - MFC Library Application Framework - App Wizard - Class Wizard - Event Handling - Message Mapping - Device Context - Dialog Data Exchange and Validation (DDX and DDV)

VC++ UI DESIGN AND DATABASE APPLICATIONS 9

Dialog Based Applications - Windows Common Controls - Using ActiveX Controls - SDI and MDI applications - Document View Architecture - Splitter Windows - Serialization - Reading and Writing Documents - ODBC - MFC Database Classes.

Text Books:

1. Michael Halvorson, "Visual Basic.NET", Prentice Hall of India, New Delhi, 2002.
2. Beginning Visual C# 2005 By Karli Watson, Christian Nagel, Wiley India
3. Microsoft Visual C# .NET - STEP by STEP by SHARP & JAGGER Microsoft /PHI

Reference Books:

1. Professional C# 2005 by Christian Nagel, Bill Evgen, Wiley India
2. The Complete Reference C# 2.0 By Schildt, TMH

CS-407 CSE03 - Artificial Intelligent

Introduction: Why AI, Importance of AI, Thought and Thinking Machine; Characteristics of intelligent behavior; Computer as a mechanical slave, Desirable features of AI programming languages Like LISP, Prolog, and other programming language fore AI. Underlying Assumptions about intelligence; Physical Symbol System Hypothesis; its importance in AI. AI Techniques- definition and examples and Criteria of success.

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Channel allocation: Fixed Channel Allocation, Dynamic Channel Allocation, Hybrid Channel Allocation, Flexible Channel Allocation

Location Management: Location Management Problem, Location management Update principles (No-Update, Full-Update, Lazy-Update, Selective-Update), Location management Architecture (two tier, Tree-based, hierarchical etc.), Location Management Algorithms (Two location, Reporting Cell, Profile-based, etc)

Mobility Model: Individual mobility model (Random walk, Random way-point, random-direction, smooth random, Gauss-Markov model), Group-based mobility model (Column, Nomadic, Pursue, Reference Point Group-Mobility model)

Mobile Protocols: Mobile-IPv4, Ipv.6, Mobile TCP (m-TCP)

Information Dissemination: Information dissemination through wireless medium, broadcasting, Push, Pull, Periodic, on-demand, real-time, variable-sized data broadcasting schemes.

WAP: WAP architecture, Wireless Markup language, WMLScript, MMS, Case study of Nokia phone simulator.

Mobile Payment Models: Payments in Mobile environment, e-cash, M-pay, Pay-box, EMPS, e-ticket

Mobile Computing application development using J2ME platform.

Text Books:

1. Mobile Communications by Jochen Schiller, Pearson Publications
2. Mobile Computing (ed.) by Tomasz Imielinski & Henry F. Korth, Kluwer Academic Publishers
3. Mobile Computing – Technology, Application & Service Creation, Asoke Talukder, Roopa Yavagal, McGraw Hill Publications

CSE 05: New Paradigms in Computing

Introduction: Need of new computing system.

Understanding Cloud Computing: Beyond the desktop, developing cloud service, cloud computing for everyone (like for family, community, corporation etc.)

Cloud Services: Collaboration on calendars, schedules, & Task Management, Collaborating on event management, Collaborating on project management, Collaborating on word processing, Spreadsheets, Databases, Collaborating on presentations, Storing and sharing file & other online content, Sharing digital photographs, etc.

Introduction to Grid Computing: High Speed Network, Architecture, Case study of live project.

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LIST OF ELECTIVES & SYLLABUS

CSE01 – Compiler Design

- 305
- ✓ Introduction to Compilers: Compilers and translators, The phases of a compiler, Compiler writing tools, The Lexical and Syntactic structure of a language, operators, Assignment statements and parameter translation.
 - ✓ Lexical Analysis: The role of the lexical analyzer, Specification of tokens, lexical analysis tool.
 - ✗ Syntax Analysis: Role of Parser, CFG, Top-down parsing, bottom-up parser, Operator-precedence parsing, LR Parsers, The Canonical Collection of LR (0) items, Constructing SLR, Canonical LR, and LALR parsing tables, Use of ambiguous grammars in LR parsing, An automatic parser generator, Implementation of LR parsing tables, and constructing LALR sets of items.
 - ✗ Syntax Directed Translation: Syntax tree, Bottom-up evolution of S-attributed definitions, L-attributed definition, top-down translation, Bottom-up evaluation of inherited attributed, Recursive evaluators.
 - ✗ Type Checking: Static vs. Dynamic Checking, Type expression, Type Checking, Type Equivalence, Type Conversion.
 - ✗ Symbol Tables: Structure of Symbol Table, Simple Symbol Table (Linear Table, Ordered List, Tree, Hash Table), Scoped Symbol Table (Nested Lexical Scoping, One Table per Scope, One Table for all Scopes).
 - ✗ Intermediate Code Generation: Intermediate Language, Intermediate representation Technique, Three-address code, quadruples and triples, Translation of assignment statements, Boolean expressions, Control Flow, Case Statement, and Function Call.
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CSE02 - Visual Programming

515
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Introduction to Grid Computing: High Speed Network, Architecture, Case study of live ... etc.

Introduction to Bioinformatics computing: How information is represented and transmitted in a biological system.

Computing in Ad-Hoc Networks & Wireless Sensor Networks.

Text Books:

1. Cloud Computing by Que, Pearson Education
2. Bioinformatics Computing by Bryan Bergeron, Pearson Education

Reference Books:

1. Wireless Sensor Networks by Ananthran Swami, Zhao, Hing etl, Wiley
2. Ad Hoc Wireless Networks by Ram Murthy and B. S. Manoj, Pearson Education

- Introduction to parallel computing
- Classification of parallel computers
- Interconnection network
- Parallel Computer Architecture
- Parallel Algorithms & Parallel programming
- Operating system for parallel computers

CSE06 - Accountancy & Computerize Financial Management

Introduction: Basic Assumptions on which structure of the subject-Accounting-is raised, Concept, Postulates, Principles and procedure. Definition of Accounting, Accounting Equation, Kinds of Accounts and Rules for recording the business transactions based on kinds of accounts, Accounting Statements : Accounting Procedure. Recording transactions in Journal and Posting in Ledger, Trial Balance : Total and Balance method of preparing the Trail Balance, Types of Errors and their Rectification.

Financial Statements and Their Analysis: Financial Statements : Preparation of Trading A/C, Profit & Loss A/C and Balance sheet (Sole Proprietorship only), Ratio Analysis: Significance, Uses, Limitations and Classification of Accounting Ratios, Profitability Ratios, Activity Ratios, Solvency Ratios, Capital Structure Ratios, Practical Problems.

Costing: Costing as a Decision-Making tool for the Management, Marginal and Absorption Costing, Application of Marginal Costing including simple problems on Make or Buy and Product-Mix, Cost, Volume and Profit analysis : Assumption, Uses and Limitation of Break-Even Analysis, Profit-Volume Ratio, Margin of Safety, Practical Problems, Standard Costing and Variance Analysis, Computerized Standard Costing.

Financial Management: Concept of Funds and relevant Inflow & out flow, Effect of Taxes and Estimation of Inflow, Capital Budgeting, Methods of Project Appraisal: Traditional Techniques, Discounted Cash-Flow or Time-Adjusted Techniques, Payback Period, Average Rate of Return (ARR), Present Value (PV), Net Present Value (NPV), Internal Rate of Return (IRR) Methods, Profitability Index, Practical Problems, Budgeting, Types of Budgets, Cash Budget, Preparation of Cash Budget, Simple Practical Problems.

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Text Books:

1. Management Accounting by Khan & Jain (Tata Mc GrawHill)
2. Financial Management by Khan & Jain (Tata Mc GrawHill)

Reference Books:

1. Ref. Books Financial Management by L.M. Pandey
2. Introduction to Mgt. Accounting by Charles T. Horngren.
3. Book Keeping and Accounting by Dr. M. Asif Khan (URDU)
4. Cost Accounting by Prof. Nafees Baig
5. Accounting for Mgt. by S. K. Bhattacharyya & Deaven

CSE07 - Management & Information System

CS 405

- Management system: Types of Management system, Management System Requirement, Management Level
- Management Function and Business process: Sale and Order processing, Finance & Budgeting, Human Resource Management, Production Plan & Control, Marketing
 - Portfolio Management & IT application: Portfolio Management Concept, Portfolio Management Method, Design and Implementation of Portfolio management, Tools and Techniques
- Enterprise Resource Plan(ERP): Evolution of Enterprise Information System, Concept of ERP, Supply Chain Management, Customer Relationship Management, ERP Design and Implementation, ERP tools : SAP, iCUBE

- Ref. Books:
1. K.C.Laudon and J.P. Laudon, Management Information System(Managing the Digital firm) PHI.
 2. Sadagopan S., Management Information System, TMH

CSE08 - Parallel Computing

504

Introduction to Parallel Computing: Supercomputers and grand challenge problems, Modern Parallel Computers, Data Parallelism, Functional Parallelism, Pipelining and Data Clustering, Minsky Conjecture.

Performance Analysis: Introduction, Speedup, Superlinear Speedup and Efficiency, Amdahl's Law, Gustafson Law, Gustafson-Barsis's Law, The Karp-Flatt Metric, The Isoefficiency Metric, Isoefficiency Relation, Cost and Scalability.

Interconnection Networks: Tree, Diamond Network, Mesh, Linear Array, Ring, Star, Hypercube, Chordal ring, Cube-connected-cycles, Perfect shuffle network, ILLIAC IV, Torus, Butterfly, Mesh-of-tree, Pyramid, Generalized Hyperbus, Twisted Cube, Folded Hypercube, Incomplete Hypercube, Enhanced Incomplete Hypercube, Cross-Connected Cube, Banyan Hypercube.

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Parallel Computational Models: PRAM, CRCW, CREW EREW, Simulating CRCW on CREW & EREW, PRAM algorithms, P-Complete problems.

Introduction to Parallel Algorithms: PVM, MPI Paradigms, Simple parallel programs in MPI/PVM environments, Parallel algorithms on network, Addition of Matrices, Multiplication of Matrices, Systolic Array.

Text Books:

1. Hwang and Briggs, Computer Architecture and Parallel Processing, McGraw Hill.

Reference Books:

1. Crichlow, Introduction to Distributed and Parallel Computing, PHI.
2. M.J.Quinn, Designing Efficient Algorithms for Parallel Computers, McGraw-Hill.
3. V.Rajaraman, Elements of Parallel Computing, Prentice-Hall of India.
4. Joseph JA JA, Introduction to Parallel Algorithms, Addison Wesley.
5. S.G.Akl, The Design and Analysis of Parallel Algorithms, PHI.
6. Shashi Kumar M et al. Introduction to Parallel Processing, PHI New Delhi.

CSE09 – Embedded System

Introduction to Embedded System: Overview of embedded systems, features, requirements and applications of embedded systems, recent trends in the embedded system design, common architectures for the ES design, embedded software design issues, interfacing and communication Links, introduction to development tools.

Computer Hardware: CPU, Memory, I/O Interfaces, Architecture Issues

Embedded System Architecture: Basics of 8-bit RISC microcontroller (PIC), block diagram, addressing modes, instruction set, timers, counters, stack operation, programming using PIC controller, basics of 32-bit microprocessor (ARM), processor and memory organization, data operations, flow of control, pipelining in ARM, ARM bus

Real-time operating systems: Task Management, IPC facility, real-time clock server, interrupt services, kernel architecture, scheduling, synchronization, types of embedded OS

Embedded System Development Process: Requirement Specification: Co-design Design of system architecture, Choosing an OS, Choosing the development environment, Testing, High-level Language Support, C and C++ Cross compilers uses, Java 2, Jini

Programming Embedded Controllers: Characteristics of embedded routines, Initialization of hardware, Perform error recovery, exception processing, Scheduling of tasks, Sequencing, Co-routines, Pre-emptive, Foreground/ Background task etc

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Application of Embedded Systems: Industrial and control applications, networking and telecom applications, DSP and multimedia applications, applications in the area of consumer appliances, concept of smart home. Consumer electronics, Biomedical Systems.

Text Books:

1. Fundamentals of Embedded Software, where C and assembly meet, by Daniel W. Lewis, Pearson Education.
2. Embedded System by Raj Kamal, TMH
3. An embedded Software Primer, by David E. Simon, Pearson Education.
4. Design with PIC Microcontrollers, by John B. Peatman, Pearson Education, 1997.

Reference Books:

1. Fundamentals of Embedded Software by Deniel Lewis, Pearson Education
2. Microprocessors: From assembly language to C using PIC18Fxx2, by Robert B. Reese, SPD.
3. Computers as Components: Principles of Embedded Computing System Design, by Wayne Wolf, Elsevier Publication.
4. Enterprise, J2ME – Developing Mobile Java Applications, by Michael Juntao Yuan, Pearson Education.
5. ARM System Developer's Guide – Designing and Optimizing System Software, by Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Publications.
6. Embedded/Real Time Systems: Concepts, Design and Programming, by K. V. K. K. Prasad, Dreamtech Press,

CSE10: Real Time Systems

Introduction: Hard vs. Soft real time systems, A reference model of real time system.

Real-time scheduling: Clock driven approach, Weighted Round-robin approach, Priority driven approach, Dynamic vs. static system, EDF and LST algorithm, Off line vs. online Scheduling

Resource and Resource Access control: Resource contention, resource access control, Nonpreemptive critical section, Basic Priority-Inheritance protocol, Basic Priority Ceiling Protocol, Stack based, Priority-ceiling protocol, preemption ceiling protocol, Controlling access to multiple-Unit resource and data object.

Multiprocessor scheduling, Resource Access Control, and Synchronization: Model of multiprocessor & distributed systems, task assignment, multiprocessor Priority-ceiling protocol, Scheduling algorithm for end-to-end periodic tasks, schedulability of fixed-priority end-to-end periodic Tasks, Predictability & Validation of dynamic multiprocessor system, Scheduling flexible computations and tasks with temporal distance constraints.

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Real-Time Communication: Model of Real-Time communication, Priority based service discipline, for switched network, weighted round-robin service disciplines, medium access-control protocol of broadcast network.

Text Books:

1. Real-Time system by Jane W. S. Liu, Pearson Education
2. Real-Time Systems by C. M. Krishna and K. G. Shin, McGraw Hill
3. Real Time System Design and Analysis: An Engineer Handbook by Laplante, PHI

Reference Books:

1. Real time systems design and analysis by Philip A. Laplante, Wiley India.
2. Embedded Real Time system concept design and programming by Dr. K.V. K.K. Prasad, Wiley India

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III SEM

CS301 - Operating System

UNIT-I

Definitions, Components and types of Operating system, Operating System Services, System Calls, System Programs, System Structure, System Design and Implementation, System Generations. I/O subsystem Overview, I/O hardware, Application I/O interface, Kernel I/O Subsystem. Linux User and programmer Interface

UNIT-II

Process Concepts, Process State & Process Control Block, Process Scheduling, Scheduling, Criteria, Scheduling Algorithms, Multiple-Processor Scheduling Real-Time Scheduling, Threads Introduction, Multithreading models, Example System- process management in Linux

UNIT-III

The Critical Sections Problem, Semaphores, Classical Problem of Synchronization, Example system-Interprocess communication in Linux Deadlock Characterizations, Method for Handling Deadlocks, Deadlock Prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock, Combined Approach to Deadlock.

UNIT-IV

Storage management Logical Versus Physical Address Space, Swapping, Contiguous Allocating, Paging, Segmentation, Segmentation With Paging, Virtual Memory, Demand Paging, Performance of Demand Paging, Page Replacement, Page Replacement Algorithms, Allocation of Frames, Thrashing, Demand Segmentation, Example System Memory management in Linux

UNIT-V

Disk Scheduling, Disk Management, Swap Space Management, Disk Reliability, Stable Storage Implementation. File Concepts, Directory Structure, Protection File system in Linux

Text Books :

1. Operating System Principles by Silberschatz A. and Peterson J. L., Wiley
2. Operating Systems by Dhamdhere, TMH

References:

1. Operating Systems by Deitel, Deitel & Choffnes.

Operating Systems by Stalling, Pearson

CS302 - Computer Networks

Introduction to Computer Networks: Evolution of Computer Networks; Networks goals, uses and applications; Network Hardware and Software; Protocol Hierarchies, Design issues for the Layer; Reference Models: OSI and TCP/IP; Example Networks-Internet,

Fundamentals of Data Transmission: Data Transmission systems and Operations; Encoding: Standard Encoding Schemes; Transmission Media: Magnetic media, Twisted wire-pair, Co-axial Cable, Fibre optics; Wireless media-Radio and Microwave Transmission; Switching- Message, Circuit and Packet Switching; Serial and Parallel Transmission-Asynchronous and Synchronous Transmission;

The Data Link Layer: Need for Data Link Control, Service provided by the Data Link Layer, Frame Design Consideration, Flow Control Mechanism, Data Link Error Control Error Control in Stop-and-wait Mechanism & Sliding Window Mechanism, Sequence numbering, Piggybacking Acknowledgements, Mac layer and its different protocols.

IEEE 802.3 Ethernet: Contention Access, CSMA, CSMA/CD, Physical Topology of Ethernet, Ethernet Repeater, Types of Ethernet.

Bridges and Switches: LAN Bridge, Transparent Bridges, Spanning Tree Algorithm, Ethernet Switches.

The Network Layer: Network Layer Design issue, Purpose of Network Layer, Functions of the Network Layer IP address, classful and classless IP address, NAT.

Introduction to Internet Protocol: IPv4 and IPv6 Format, ARP, RARP, DHCP, ICMP.

Routing Algorithms: Static Routing, Dynamic Routing, Distance Vector Routing Algorithm, Routing Information Protocol, Link State Routing, OSPF Routing Protocol, Border Gateway Protocol, Congestion control by chock packet, QoS, Leaky bucket, and Token Bucket.

Introduction to Transport Layer: Difference between TCP & UDP, Port number, TCP connection – Three way handshaking, Connection termination – half close, half open.

Introduction to Application Layer: Introduction of DNS, e-mail, SMTP, POP3 etc.

Congestion: Congestion Control Algorithms, General Principle of Congestion Control; Congestion Prevention Policies; Congestion Control in Virtual Circuit Subnet and Datagram Subnet; Techniques for achieving good quality of service (QoS).

Text Books:

1. Data Communications and Networks, by Forouzan, TMH

Reference Books:

1. Computer Networks, by Tanenbaum, Pearson Education
2. Data & Computer Communication, by Willian Stallings, Pearson Education
3. Computer Networking, by Kurose & Ross, Pearson Education
4. Networking, All-in-one Desk Reference, 10 Books in 1 by Doug lowe, Wiley

CS303 - Design and Analysis of Algorithms

Introduction: Algorithm, performance evaluation of algorithms, space & time complexity, notion of optimality.

Divide and Conquer: Finding the maximum and minimum - Quick Sort - Selection - Strassen's matrix multiplication, etc

Greedy Algorithm: Knapsack Problem, 0-1 Knapsack, Fractional Knapsack), Activity selection problem, Huffman's Codes, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, Dijkstra's Algorithm, etc.

Dynamic Programming: Knapsack Problem DP solution, Activity selection problem DP solution, All pairs shortest paths, Traveling salesman problem.

Randomized Algorithms and Amortized Analysis: Basics ideas of randomized Algorithms (Las Vegas and Monte Carlo types), Simple examples (Randomized Quick sort and its analysis, Min-Cut algorithm and its analysis), Amortized analysis and its significance (Illustration through examples).

Graph Algorithms: Breadth First Search (BFS), Depth First Search (DFS), Strongly Connected Components, Euler Tour, Minimum Spanning Tree, Kruskal's Algorithm, Prim's Algorithm, Single Source Shortest Path.

Introduction to NP-Completeness: Basic concepts.

Text Books:

1. Introduction to Algorithm, 2e, by Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein, PHI

Reference Books:

1. The Design and Analysis of Computer Algorithms by A.V. Aho, J.E.Hopcroft and J.D. Ullman, Pearson Education.
2. Beginning Algorithms by Simen Harris, James Ross, Wiley India.
3. Fundamentals of Computer Algorithms by E.Horowitz and S. Sahni, Galgotia,
4. Algorithms by Richard Johansonbaugh, and Marcus Schaefer, Pearson Algorithm
5. Algorithms - Introduction to Design and Analysis by S. Baase, Pearson Education.
6. Algorithms and Complexity, by H.S.Wilf, PHI.

CS304 – Software Engineering

- **Software & Software Process:** Concept of Program, Concept of Software product & types of Software, Concept of Software based System, Evolution of Software Engineering, Software process, people & project, SDLC
- **Software standards & Software models:** SEI-Capability Maturity Model, ISO, OMG, CORBA, IEEE, ANSI, Linear Sequential Model (Water Fall) , Evolutionary Model, Proto Typing Model, Spiral Model
- **Software Project Management:** Initial Requirement Analysis, System modeling, Function point analysis, Project Scheduling Gantt Chart, Project Estimation COCOMO, Project control PERT, Risk Management, Software Team, Life cycle model selection
- **Software Requirement Analysis:** Functional requirement, Non Functional requirements, Requirement gathering, Fact Finding Methods, Requirement Verification & Validation, Requirement Specification (SRS)
- **Software Design:** Design tools: UML, DFD, VTOC, HIPO, ERD, System Architecture Design Object oriented design using UML tools, Coupling & Cohesion, System structure/modular Design , Data Design (ERD), Process Design, I/O Design, User Interface Design, System Interface Design,
Software Coding: Code review, Code documentation, Code optimization,

Software Testing: Concept of software testing, Testing strategies (Black Box & White Box), Testing methods (Coverage based, Mutation test), Test cases (Test Input, Test area, Test Output, Test report), Test levels : (Unit, Integration, System), Alpha test & Beta test,
Software Implementation : Implementation Plan, Deployment diagram, Implementation Method

- **Software Quality Assurance:** Software reliability, Software quality standards, Software quality attributes,
 - **Software Maintenance:** Perfective maintenance, Corrective maintenance, Adaptive maintenance
 - **Software Change Management:** Software Configuration item, Baseline, Software change implementation, Software Change control, Software Re-engineering (Forward & Reverse)
- CASE TOOLS**
- **Advance Software Engineering topics:** Web software engineering, Mobile software engineering, Clean room software engineering

Practical

Lab based UML tools, CASE tools & Project Management tools

Ref. Books: 1. Rajib Mall, Fundamentals of Software Engineering, PHI
2. Waman Jawadekar, Principle & Practice in Software Engineering, TMH

CS305 : Elective – I

CS401 – Web Technology

Web Programming: Concept of JDBC (Java Database Connectivity), working with SQL, Stored Procedure, Security in Java, Class loader, Byte code Verification, security Manager and permission, Digital Signatures, Code Signing, Encryption.

Introduction to J2EE: Its advantage, Enterprise Architecture Types, Understanding EJB, its architecture, EJB Roles, Benefits and limitations of Enterprise Beans. Session Beans: Stateful and Stateless Beans, Entity Beans, Beans Managed Persistence, Container Managed Persistence.

Advanced Web technology in J2EE: Understanding Directory Services and JNDI, Introduction to LDAP, LDAP operation, working with LDAP Server, Introduction to Web Containers and Web Applications, Introduction to HTTP protocol, Web Application Life Cycle.

Creating Web Application: Understanding Servlet programming, its Life-Cycle, Servlet Configuration, Understanding Servlet sessions. Understanding of JSP and JSTL, JSP documents, Elements, tag extensions, tag libraries, validation, translation time mechanism, translation-time classes. Understanding JavaServer Pages Standard Tag Library, tags in JSTL, core tag library, XML tag library, using Internationalization Actions.

Web Application Deployment and Authentication: Enterprise Application Development Process, Deploying Web Application, Understanding CLASSPATH, Securing Web Applications, basic authentication with JAX-RPC Example, Client Certificate Authentication over HTTP/SSL

Text Books:

1. Java Server Programming J2EE 1.4 Edition BlackBook (Dreamtech Press)
2. Core JavaTM Volume II By Cay S. Horstmann & Gary Cornell (Pearson)

Reference Book:

1. J2EE 1.4 Bible by McGovern (Wiley India)

CS402 - Cryptography and network security

Introduction: The OSI Security Architecture, Security attack, Security Services, Security Mechanism, A model for Network Security

Symmetric Cipher: Classical Encryption Techniques, Symmetric Cipher Model, Block Cipher Principles, DES, Differential and Linear Cryptanalysis, Block Cipher Design Principle, The Euclidean Algorithm, Finite field of Form $GF(p)$, Advance Encryption Standard (AES), AES Cipher, Multiple Encryption and Triple DES, Stream Cipher and RC4, Placement of Encryption Function, Traffic Confidentiality, Key Distribution, Random number generation.

Public Key Encryption and Hash Function: Fermat's & Euler's Theorems, The Chinese Remainder Theorem, RSA Algorithm, Diffe-Hellman Key Exchange, Elliptic Curve Cryptography, Message authentication code, Security of Hash Functions and MAACs, Secure Hash algorithm, Whirlpool, HMAC, CMAC, Digital Signature.

Network Security Applications: Kerberos, X.509 Authentication Service, S/MIME, IP Security Architecture, Encapsulating Security Payload, Secure Socket Layer (SSL), Transport layer security, Secure Electronic Transaction.

System Security: Intrusion detection, Password Management, Virus countermeasure, Denial of Service Attack, Firewall design principles, Trusted System.

Text Book:

1. Cryptography and Network Security: Principles and Practices, 4e, William Stalling, Pearson Education.
2. Cryptography and Network Security by Behrouz Forouzan, TMH

Reference Book:

1. Introduction to Cryptography, Johannes A. Buchmann, Springer
2. Beginning Cryptography with java by David Hook, Wiley Dreamtech.
3. Modern Cryptography Theory & Practices by Wenbo Mao, Pearson Education
4. Cryptography for Database and Internet Application by Nick Galbreath, Wiley Dreamtech
5. Network Security: Private Communication in a Public World, 2e, by Charlie Kaufman, Radia Perlman, and Mike Speciner, Pearson Education.

CS403 - Soft Computing

Essentials of Artificial Neural Networks: Introduction, Artificial Neuron Model, Operations of Artificial Neuron, Types of Neuron Activation Function, ANN Architectures, Classification Taxonomy of ANN – Connectivity (Feed forward, feedback, Single and Multi-layer), Neural Dynamics (Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement), Learning Rules (Error Correction, Hebbian, Competitive, Stochastic), Types of Application (Pattern Classification, Pattern Clustering, Pattern Association / Memory, Function Approximation, Prediction, Optimization)

Support Vector Machines, Boltzmann Machine, Feedback (Recurrent) Networks and Dynamical Systems Matrix memories, Bidirectional Associative Memory, Hopfield Neural Network, Principal Component Analysis Networks (PCA), Kohonen's Self-Organizing Maps, Linear Vector Quantization, Independent Component Analysis Networks (ICA)

Fuzzy Logic: Basic concepts, fuzzy set theory, basic operations, fuzzification, defuzzification, neurofuzzy approach, applications

Evolutionary and Genetic Algorithms: Basic concepts of evolutionary computing, genetic operators, fitness function and selection, genetic programming, other models of evolution and learning

Rough Set Theory: Basic concepts, indiscernability relation, lower and upper approximation, decision systems based on rough approximation, applications

Text Book:

1. Jacek M. Zurada. Introduction to Artificial Neural Systems, Jaico Publishers, 1992.
2. S. Haykin. Neural Networks: A Comprehensive Foundation, Prentice Hall, 1999

Reference Book:

1. P. S. Churchland and T. J. Sejnowski. The Computational Brain. MIT Press, 1992.
2. A. M. Ibrahim. Introduction to Applied Fuzzy Electronics. PHI, 2004
3. Z. Pawlak. Rough Sets, Kluwer Academic Publishers, 1991.
4. Genetic Algorithm in Search Optimization and Machine Learning, D. E. Goldberg, Pearson Education, 1989
5. An Introduction to Genetic Algorithms, Melanie Mitchell, PHI, 1998

CS404 - Computer graphics & Multimedia Applications

Introduction: History, Advantages, Application, I/O Devices Graphic Packages, Languages.

Graphics Techniques: Jag Free Images on a Raster CRT Interactive Graphics processor for Digital Logic Simulation System, Interactive techniques for 3-D shaded Graphics.

2D Graphics: Drawing Elementary figures, Polygon Filling, Transformations, Windowing and clipping, Display file segmentation. Interactive Graphics: Interactive input techniques, Event handling, Input functions;

Graphics Standards A 3D Models: Device Independence AI in Graphics Software, Implementation of Graphics Kernel System (GKS).

Graphical Workstations: Routing output to workstations, Types of GKS, Workstations.

Evaluation of Various 3D Models: Mathematical Preliminaries, Curves and Surfaces, Clipping, Hidden line and surface removal, rendering, Computer Animation, 3D Shaded computer Animation the use of 3D abstract Graphical types in Computer Graphics and Animation. 3-Dimensional Reconstruction. A case study, Real-time graphics.

Introduction to Visualization, Tools for Visualization, Applications etc.

Text Books:

1. Computer Graphics C Version by Donald Hearn, and M. Pauline Baker, Pearson Education.
2. Mathematical Elements for Computer Graphics by Roger, Tata McGraw Hill Computer Graphics by Hearn, and Baker, PHI

Reference Books:

1. Principles of Interactive Graphics, by Newman and R. F. Sproull: McGraw-Hill.
2. Computer Graphics: A programming approach, by Harrington McGraw-Hill.
3. Fundamentals of Interactive Computer Graphics, by Foley & A. Van Dam, Addison Wesley.

CS405 – Elective – II

CS406 – Minor Project

V SEM

CS501 – Wireless networks

Introduction: Why wireless, IEEE 802.11

802.11 MAC Fundamentals: Challenges for MAC, Access mode, Contention based access using DCF, Fragmentation and reassembly, Frame format, 802.11 framing in detail (DS bits, BSSID, RTS, CTS, control frame, management frame), Contention based data service, Frame processing and bridging, 802.11 to Ethernet,

WEP: WEP cryptographic operations, WEP data processing, Problem with WEP, User authentication with 802.1x.

802.11i Robust security networks, TKIP, and CCMP: Temporal key Integrity protocol, Counter mode with CCB-MAC, Robust security network operation

Management operations: Association, power conservation, timer synchronization, spectrum management.

Contention free service with PCF.

Physical Layer: Physical layer architecture, Radio Link, RF with 802.11, Frequency, GFSK, PLCP, DSSS, HR/DSSS. 802.11a and 802.11j (OFDM Phy), 802.11g (extended rate PHY), 802.11n: MIMO-OFDM.

Experiencing on 802.11 on Windows OS, Linux

802.11 Access point: Functions of AP, Power over Ethernet, Selecting AP.

Security Architecture: Authentication and Access Point, Ensuring secrecy through encryption, selecting security protocols.

Site planning and project Management: Network requirement, PHY layer selection and design, Planning placing AP, Using Antennas to tailor Coverage.

802.11 Network analysis, 802.11 performance tuning.

Text Books:

1. 802.11 Wireless Networks by Mathew S. Gast, SPD

CS502 – Distributed System

Fundamentals: Definition, Evolution of distributed Computing System Distributed Computing System Models, Distributed Operating System, Designing a distributed Operating System, Introduction of distributed computing environment

Message Passing: Introduction Desirable features, Issues in IPC by message passing, synchronization, Buffering, Multi datagram messages, encoding and decoding message data.

Remote Procedure Calls: Introduction, The RPC Model, Transparency of RPC, Implementing RPC mechanism RPC messages server management, parameter-passing and call semantic, Communication protocols for RPC's.

Distributed Shared Memory: Introduction, Architecture of DSM Systems Design and implementation, granularly, structure of shared memory space Consistency models, replacement strategy, Thrashing.

Resource Management: Desirable feature, Task assignment approach, Load-balancing approach, Load-sharing approach.

Process Management: Process Migration, Threads.

Distributed File Systems: Intakes, Desirable features, File models, File accessing models, file-sharing semantic, File- caching schemes, File replication Fault tolerance, Automatic Transactions, Design principle.

Text Book:

1. George Coulouris, Jean Dollimore and Tim Kindberg "Distributed Systems Concepts and Design", Third Edition, Pearson Education Asia,

Reference Books:

1. 2002 Distributed Computing by Liu, Pearson Education.
2. Distributed Computing by Hagit Attiya and Jennifer Welch, Wiley India.
3. Distributed Operating Systems: concept and Design by P.K. Sinha, PHI
4. Distributed Operating System by Tanenbaum, Pearson Education

CS503 - Data & web mining

Introduction to data mining, need for data warehousing and data mining, application potential, keywords and techniques.

Data Warehousing and On-line analytical Processing (OLAP): Aggregation operations, models for data warehousing, star schema, fact and dimension tables , conceptualization of data warehouse and multidimensional databases, Relationship between warehouse and mining.

Data mining primitives: Data preprocessing, data integration, data transformation. Definition and specification of a generic data mining task. Description of Data mining query language with examples.

Association analysis: Different methods for mining association rules in transaction based data bases. Illustration of confidence and support. Multidimensional and multilevel association rules. Classification of association rules. Association rule algorithms – A priori and frequent pattern growth.

Classification and Prediction: Different classification algorithms. Use of genie index, decision tree induction, Bayesian classification, neural network technique of back propagation, fuzzy set theory and genetic algorithms.

Clustering: Partition based clustering, hierarchical clustering, model based clustering for continuous and discrete data. Scalability of clustering algorithms. Parallel approaches for clustering.

Web mining: Web usage mining, web content mining, web log attributes.

Data mining issues in object oriented data bases, spatial data bases and multimedia data bases and text data bases.

Text books:

1. Data Mining Concepts and Techniques, by J. Han, M. Kamber, Harcourt India.
2. Data Mining : introductory and Advanced Topics, by M. Dunham, Pearson Pub,
3. Data Mining Techniques, by A.K. Pujari, Universities Press.

CS504 – Elective III

CS505 – Elective IV

CS506 - Colloquial

VI SEM

CSP601 – Final Project (Industrial)

Text Books:

1. Management Accounting by Khan & Jain (Tata Mc GrawHill)
2. Financial Management by Khan & Jain (Tata Mc GrawHill)

Reference Books:

1. Ref. Books Financial Management by L.M. Pandey
2. Introduction to Mgt. Accounting by Charles T. Horngren.
3. Book Keeping and Accounting by Dr. M. Asif Khan (URDU)
4. Cost Accounting by Prof. Nafees Baig
5. Accounting for Mgt. by S. K. Bhattacharya & Deaven

CSE07 - Management & Information System

- Management system: Types of Management system, Management System Requirement, Management Level
- Management Function and Business process: Sale and Order processing, Finance & Budgeting, Human Resource Management, Production Plan & Control, Marketing
 - Portfolio Management & IT application: Portfolio Management Concept, Portfolio Management Method, Design and Implementation of Portfolio management, Tools and Techniques
- Enterprise Resource Plan(ERP): Evolution of Enterprise Information System, Concept of ERP, Supply Chain Management, Customer Relationship Management, ERP Design and Implementation, ERP tools : SAP, iCUBE

- Ref. Books: 1. K.C.Laudon and J.P. Laudon, Management Information System(Managing the Digital firm) PHI.
2. Sadagopan S., Management Information System, TMH

CSE08 - Parallel Computing

Introduction to Parallel Computing: Supercomputers and grand challenge problems, Modern Parallel Computers, Data Parallelism, Functional Parallelism, Pipelining and Data Clustering, Minsky Conjecture.

Performance Analysis: Introduction, Speedup, Superlinear Speedup and Efficiency, Amdahl's Law, Gustafson Law, Gustafson-Barsis's Law, The Karp-Flatt Metric, The Isoefficiency Metric, Isoefficiency Relation, Cost and Scalability.

Interconnection Networks: Tree, Diamond Network, Mesh, Linear Array, Ring, Star, Hypercube, Chordal ring, Cube-connected-cycles, Perfect shuffle network, ILLIAC IV, Torus, Butterfly, Mesh-of-tree, Pyramid, Generalized Hyperbus, Twisted Cube, Folded Hypercube, Incomplete Hypercube, Enhanced Incomplete Hypercube, Cross-Connected Cube, Banyan Hypercube.

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Parallel Computational Models: PRAM, CRCW, CREW EREW, Simulating CRCW on CREW & EREW, PRAM algorithms, P-Complete problems.

Introduction to Parallel Algorithms: PVM, MPI Paradigms, Simple parallel programs in MPI/PVM environments, Parallel algorithms on network, Addition of Matrices, Multiplication of Matrices, Systolic Array.

Text Books:

1. Hwang and Briggs, Computer Architecture and Parallel Processing, McGraw Hill.

Reference Books:

1. Crichlow, Introduction to Distributed and Parallel Computing, PHI.
2. M.J.Quinn, Designing Efficient Algorithms for Parallel Computers, McGraw-Hill.
3. V.Rajaraman, Elements of Parallel Computing, Prentice-Hall of India.
4. Joseph JA JA, Introduction to Parallel Algorithms, Addison Wesley.
5. S.G.Akl, The Design and Analysis of Parallel Algorithms, PHI.
6. Shashi Kumar M et al. Introduction to Parallel Processing, PHI New Delhi.

CSE09 – Embedded System

Introduction to Embedded System: Overview of embedded systems, features, requirements and applications of embedded systems, recent trends in the embedded system design, common architectures for the ES design, embedded software design issues, interfacing and communication Links, introduction to development tools.

Computer Hardware: CPU, Memory, I/O interfaces, Architecture Issues

Embedded System Architecture: Basics of 8-bit RISC microcontroller (PIC), block diagram, addressing modes, instruction set, timers, counters, stack operation, programming using PIC controller, basics of 32-bit microprocessor (ARM), processor and memory organization, data operations, flow of control, pipelining in ARM, ARM bus

Real-time operating systems: Task Management, IPC facility, real-time clock server, interrupt services, kernel architecture, scheduling, synchronization, types of embedded OS

Embedded System Development Process: Requirement Specification: Co-design Design of system architecture, Choosing an OS, Choosing the development environment, Testing, High-level Language Support, C and C++ Cross compilers uses, Java 2, Jini

Programming Embedded Controllers: Characteristics of embedded routines, Initialization of hardware, Perform error recovery, exception processing, Scheduling of tasks, Sequencing, Co-routines, Pre-emptive, Foreground/ Background task etc

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Dr. S. S. Srinivas
Head of Department
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Application of Embedded Systems: Industrial and control applications, networking and telecom applications, DSP and multimedia applications, applications in the area of consumer appliances, concept of smart home. Consumer electronics, Biomedical Systems.

Text Books:

1. Fundamentals of Embedded Software, where C and assembly meet, by Daniel W. Lewis, Pearson Education.
2. Embedded System by Raj Kamal, TMH
3. An embedded Software Primer, by David E. Simon, Pearson Education.
4. Design with PIC Microcontrollers, by John B. Peatman, Pearson Education, 1997.

Reference Books:

1. Fundamentals of Embedded Software by Deniel Lewis, Pearson Education
2. Microprocessors: From assembly language to C using PIC18Fxx2, by Robert B. Reese, SPD.
3. Computers as Components: Principles of Embedded Computing System Design, by Wayne Wolf, Elsevier Publication.
4. Enterprise, J2ME – Developing Mobile Java Applications, by Michael Juntao Yuan, Pearson Education.
5. ARM System Developer's Guide – Designing and Optimizing System Software, by Andrew N. Sloss, Dominic Symes, Chris Wright, Elsevier Publications.
6. Embedded/Real Time Systems: Concepts, Design and Programming, by K. V. K. K. Prasad, Dreamtech Press,

CSE10: Real Time Systems

Introduction: Hard vs. Soft real time systems, A reference model of real time system.

Real-time scheduling: Clock driven approach, Weighted Round-robin approach, Priority driven approach, Dynamic vs. static system, EDF and LST algorithm, Off line vs. online Scheduling

Resource and Resource Access control: Resource contention, resource access control, Nonpreemptive critical section, Basic Priority-Inheritance protocol, Basic Priority Ceiling Protocol, Stack based, Priority-ceiling protocol, preemption ceiling protocol, Controlling access to multiple-Unit resource and data object.

Multiprocessor scheduling, Resource Access Control, and Synchronization: Model of multiprocessor & distributed systems, task assignment, multiprocessor Priority-ceiling protocol, Scheduling algorithm for end-to-end periodic tasks, schedulability of fixed-priority end-to-end periodic Tasks, Predictability & Validation of dynamic multiprocessor system, Scheduling flexible computations and tasks with temporal distance constraints.

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Real-Time Communication: Model of Real-Time communication, Priority based service discipline for switched network, weighted round-robin service disciplines, medium access-control protocol of broadcast network.

Text Books:

1. Real-Time system by Jane W. S. Liu, Pearson Education
2. Real-Time Systems by C. M. Krishna and K. G. Shin, McGraw Hill
3. Real Time System Design and Analysis: An Engineer Handbook by Laplante, PHI

Reference Books:

1. Real time systems design and analysis by Philip A. Laplante, Wiley India.
2. Embedded Real Time system concept design and programming by Dr. K.V. K.K. Prasad, Wiley India

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