B.E. III YEAR (4YDC) COMPUTER ENGINEERING

CO 3402 : THEORY OF COMPUTATION

Theory:

1. Introduction, Review of Sets, Relations and Functions, Graphs, Trees, Proof Techniques; Languages and Grammars – Fundamental Concepts, Predicate Calculus.
2. Finite Automata- DFAs, NFAs, Regular Expressions, Regular Grammars and Languages, Properties of Regular Languages, Pumping Lemma for Regular Languages.
3. Pushdown Automata- Context Free Grammar, Parsing, Ambiguity, Nondeterministic PDAs, Normal form of CFGs, CFG to NPDA, NPDA to CFGs. Deterministic PDA, Pumping Lemma for CFGs.
4. Turing Machines – Turing Machine as acceptor, Recognizing a Language, Universal TMs, Linear Bounded Automata, Context Sensitive Languages, Recursively Enumerable Languages, Unrestricted Grammars.
5. Chomsky Hierarchy, Concept of Solvability and Unsolvability, Church's Thesis, Complexity Theory – P and NP problems, Introduction to Petri Nets.

Text Books

1. Cohen John, "Introduction to Computer Theory", Second Edition, Wiley and Sons, 1996.
2. Hopcroft, Ullman, Motwani, "Introduction to Languages, Automata and Computation", 2nd Edition, Pearson Education, 2003.
3. Peter Linz, "An Introduction to Formal Languages and Automata", Jones and Bartlett, 2001.

Reference Books

1. Lewis and Papadimitiriou, "Elements of Theory of Computation", Pearson Education, 2002.
2. Mandrioli D. and Gezzi C., "Theoretical Foundations of Computer Science", Krieger Publishing Co., Inc., USA, 1993.
3. K.L.P. Mishra and N. Chandrasekaran, "Theory of Computation", Prentice Hall, 1998.

CO 3405 : DATA BASE MANAGEMENT SYSTEMS

Theory:

1. Basic Concepts of Data and Information, Overview of Information Systems, File organization and access methods; Introduction to DBMS, Difference between DBMS and traditional file storage system. Characteristics of DBMS. Data Models, Schemas and Instances, DBMS architecture, Components of DBMS. Data Independence. Study of Entity Relationship Model, Type of attributes, Entity types, Relationship and Cardinalities, Participation, Roles and constraints.
2. Relational Data Model: Domains, Tuples, Attributes, Relations, keys and types of keys, Integrity Constraints, Relational Algebra: Queries using Select operation, project operation, renaming, joins, union, intersection, difference, division, and product etc. Relational Calculus, Tuple calculus. Query Language: SQL –basic SQL queries, functions, constraints, joins and nested queries, QBE (Query By Example), Indexing, and PL/SQL.
3. Normalization Theory and Database methodologies: Relation Schemas, Functional Dependencies- Definition and rules of axioms, Normal forms- 1NF, 2NF, 3NF and BCNF, Dependency preservation, properties, loss less join decomposition. Query Processing and Optimization: Various algorithms to implement select, project & join operation of relational algebra, complexity measures.
4. Transaction Processing: Introduction to Concurrency and Recovery, Read and Write Operations, Transaction properties, Transaction states, Schedules, Serializability, types of serializability and test for serializability, Concurrency Control: Types of Locks, Timestamp Based, Validation Based etc. Multiversion schemes, Recovery: Basic concepts, techniques based on deferred update and immediate update, Shadow paging, check points.
5. Storage structure: Secondary Storage Devices, RAID, Heap Files and Sorted files, Hashing techniques, Indexing techniques: Bitmap Indices, Case Study of any contemporary DBMS.

Text Books

1. Korth H.F. & Silberschatz A., Sudarshan, "Database Systems", McGraw-Hill, Sixth edition, 2010.
2. Elmasri R., Navathe S.B., "Fundamentals of Database Systems", The Benjamin/ Cummings Publishing Company. Inc., 2004.
3. Date C.J., "An Introduction to Database Systems", Addision Wesley, 8th edition, 2003

Reference Books

1. Oracle 9i, The Complete Reference, Oracle Press.
2. Alexis Leon, Mathews Leon, "Database Management Systems", Leon Press Chennai and Vikas Publishing House Private Limited, New Delhi, 2002.

CO 3407 : COMPUTER NETWORKS

Theory:

1. Introduction to computer networks & their uses, Different topologies. ISO-OSI model: Layered Architecture, Peer-to-Peer processes and encapsulation, Function and Services of OSI layers; The Physical layer: Digital Signals, Transmission Impairments and Maximum data rate of a channel, Shennons theorem, Nyquist theorem. Transmission media: Guided and Unguided medias. Circuit, Packet and Message switching, virtual Circuit. Introduction to ISDN & its components.
2. The data link layer: Design issues & function, Error detection & correction, Forward error correction Versus Retransmission, Hamming code & CRC codes, Framing: Fixed size and Variable size Frame, Bit stuffing and Byte stuffing. Data link layer protocols: Simplest, Stop and Wait, Sliding window protocols, PPP, SLIP, HDLC. The medium access sublayer: Static and Dynamic Channel Allocation, Protocols: ALOHA Protocol, CSMA (CSMA/CD, CSMA/CA), Collision Free Protocol- Bit Map.
3. IEEE 802 standards for LANs (IEEE 802.3, IEEE 802.4, IEEE 802.5), LAN Devices: HUB, Switches- Learning, Cut-Through and store and forward switches, Bridges: IEEE 802.x to IEEE 802.y, Spanning Tree, Remote Bridge. Internetworking Devices: Routers & gateways. The network layer: Design issues and functions, Internal organization (Virtual Circuit & Datagrams).
4. Routing algorithms: Shortest path routing, Flooding, LSR, Distance Vector Routing, Hierarchical Routing. Introduction to TCP/IP Protocol stack: Protocol Architecture, Classful IP addressing, ARP, RARP, IP Datagrams with options and its delivery, ICMP.
5. Subnet, Supernet, CIDR. Transport Layer: Congestion control, Load Shedding, Jitter control, addressing and multiplexing, Connection establishment and connection release, flow control. Application layer: Introduction to DNS and Email.

Text Books

1. Tanenbaum A. S., "Computer Networks", Pearson Education, 4th edition, 2003.
2. Behrouz A Forouzan, "Data communication and networking", TMH publication, 4th edition, 2006.
3. Comer, "Internetworking with TCP/ IP Vol-1", Pearson education, 4th Edition, 2002.

Reference Books

1. Peterson & Davie, "Computer Networks", Thomson Learning.
2. W. Richard Stevens, "TCP/IP Illustrated Vol-1 " Addison-Wesley.
3. Craig Zacker, "Networking The Complete Reference", TMH, 2001.

CO 3408 : OBJECT ORIENTED SOFTWARE ENGINEERING

Theory:

1. Review of Object Orientation, OOP Concepts, Object Oriented Programming, System life cycle, Models & Model Architectures.
2. Introduction to RUP, Best Practices of RUP, RUP software life cycle, '4+1 view' model, Workflows.
3. Introduction to UML, Notations, Structural Modeling: Class diagram, Object diagram, Component diagram, Deployment diagram, Behavioral Modeling: Usecase diagram, Sequence diagram, Collaboration diagram, Statechart diagram, Activity diagram, Relationships, Stereotypes, UML based case tools i.e. Rational Rose.
4. Testing Strategies, Project Management, Rational Tool Mentors. Introduction to Design Patterns.
5. Illustrative Case Studies like ATM, Payroll, Course and Registration System.

Text Books

1. Ivar Jacobson, "Object Oriented Software Engineering", Pearson Education, 2002.
2. Booch G., James R., Ivar J., "The Unified Modeling Language", User Guide, Pearson Education, 2004.

Reference Books

1. Stephen R. Schach, "Object Oriented Classical Software Engg." Tata McGraw Hill, 2007.
2. Phillipe Kruchten, "The Rational Unified Process - An Introduction", Pearson Ed. 2000.
3. Craig Larman, "Applying UML & Patterns", Pearson Ed. 2004.
4. Ivar J, Grady B, James R., "The Unified Software Development Process", Pearson Ed. 2003.
5. Timothy C. Lethbridge, Robert Laganiere, "Object Oriented Software Engg." , Tata McGraw Hill, 2004.
6. IBM Rational Modules

CO 3452 : OPERATING SYSTEMS

Theory:

1. Introduction to Operating Systems: Function, Evolution, Different Types, Desirable Characteristics and features of an O/S, Operating Systems Services: Types of Services, Different ways of providing these Services – Utility Programs, System Calls.
2. File Systems: File Concept, User's and System Programmer's view of File System, Disk Organization, Tape Organization, Different Modules of a File System, Disk Space Allocation Methods – Contiguous, Linked, Indexed. Directory Structures, File Protection, System Calls for File Management, Disk Scheduling Algorithms.
3. CPU Scheduling : Process Concept, Scheduling Concepts, Types of Schedulers, Process State Diagram, Scheduling Algorithms, Algorithms Evaluation, System calls for Process Management; Multiple Processor Scheduling; Concept of Threads.
   Memory Management: Different Memory Management Techniques – Partitioning, Swapping, Segmentation, Paging, Paged Segmentation, Comparison of these techniques, Techniques for supporting the execution of large programs: Overlay, Dynamic Linking and Loading, Virtual Memory – Concept, Implementation by Demand Paging etc.
4. Input / Output : Principles and Programming, Input/Output Problems, Asynchronous Operations, Speed gap Format conversion, I/O Interfaces, Programme Controlled I/O, Interrupt Driven I/O, Concurrent I/O.
   Concurrent Processes : Real and Virtual Concurrency, Mutual Exclusion, Synchronization, Inter- Process Communication, Critical Section Problem, Solution to Critical Section Problem : Semaphores – Binary and Counting Semaphores, WAIT & SIGNAL Operations and their implementation.
   Deadlocks: Deadlock Problems, Characterization, Prevention, Avoidance, Recovery.
5. Introduction to Network, Distributed and Multiprocessor Operating Systems.
   Case Studies: Unix/Linux, WINDOWS and other Contemporary Operating Systems.

Text Books

1. Silberschatz, Galvin, Gagne, "Operating System Concepts'', Wiley, 9/E, 2013.
2. William Stalling, "Operating Systems", Pearson Education, 5/E, 2006.

Reference Books

1. Andrew S. Tanenbaum, "Modern Operating Systems", 3/e, Prentice Hall, 2006.
2. Maurice J. Bach, " The Design of Unix Operating System", Prentice Hall of India, 1999.
3. Bovet & Cesati, "Understanding the Linux Kernel", O'Reily, 2/E.
4. Peter Norton, "Complete Guide to Windows XP", SAMS, 2002.

CO 3460 : SYSTEMS PROGRAMMING

Theory:

1. Introduction to System Programming, Evolution and Components of System Software. C language features for low level programming: Pointer data type and pointer manipulation, memory allocation- deallocation, accessing memory and registers, handling system calls, inline assembly code.
2. Translators and Compilers: Program translation; Introduction to assemblers, review of language grammars and specification of programming languages; Program Compilation, Compilation phases-lexical analysis, parsing and syntax checking, Semantic analysis, Code generation and optimization, machine dependent and independent Compilation; threaded program execution; cross compilers; Issue in compilation of Object Oriented Programs; Object and executable file formats. Cases like GCC and TCC.
3. Interpreters: Virtual machine and program interpretation; Types of interpreters; Target languages for interpretation and Interpreter organization. Cases like JVM and .NET CLR; Just-In-Time compilation.
4. Linkers and Loaders: Address resolution, linking of subroutines and program relocation; various loading schemes; dynamic linking and DLLs; Object linking and embedding.
5. Text editors & Word Processors, Debug monitors, IDE, Device Drivers.

Text Books

1. D. M. Dhamdhere, "System Programming and Operating System" Tata McGraw Hill.
2. John J. Donovan, "Systems Programming", Tata McGraw Hill, New Delhi.

Reference Books

1. David Watt and Deryck Brown, "Programming Language Processors: Compiler & Interpreters", Prentice Hall, 2000.
2. Alfred V. Aho and Jeffrey D.Ullman, "Principle of Compiler Design", Narosa Publishing House.

CO 3462 : INTERNET AND WEB TECHNOLOGY

Theory:

1. Introduction to the Internet, Overview of TCP/IP protocol suit, Applications of Internet: Email, telnet, FTP etc; Internet Service Providers, IP Addresses, DNS; Evolution of WWW, URL
2. HTTP: Headres, working, methods, MIME type and content encoding, Session tracking and Cookies; Web Sockets; HTML–SGML, Basic HTML Elements, Tags and usages, HTML Standards, Issues in HTML, DHTML: Introduction, Cascading Style Sheets. Peer-to-Peer Networking- Concept and details of any one tool such as Napster, BitTorrent, Gnuella etc.; Peer-to-Peer naming- Distributed Hash tables.
3. Browser: Working of a Browser, Plug-ins; Study of one browser such as Internet Explorer, Mozilla Firefox etc.; Search Engines- Evolution of search engines, Working of Search Engines; Search strategies, indexing.
4. Client Side Programming: Java Applets, Java Script, Javascript Regular expressions, Java script and HTML DOM, Advanced Javascript and HTML forms,, AJAX etc.
   Web Servers; Server-Side technologies- plug-in; Server Side Programming: CGI, Servlet, JSP, Introduction to J2EE etc.
5. XML – Basic Standards, Namespaces, DTDS, XML Schema, Linking & Presentation Standards, Parsing XML, XPath, XML Transformation; Web site planning and design; Application lifecycle; Android based web application.

Text Books

1. Uttam K. Roy, "Web Technologies", Oxford University Press, 2012
2. Atul Kahate, "Web Technologies", Tata-McGraw Hill, 2013
3. Moller,"An Introduction to XML and Web Technologies", Pearson Education, 2012

Reference Books

1. Jackson, "Web Technologies", Pearson Education, 2012
2. Deitel, "Internet & World Wide Web", 5/e, Pearson Education, 2013

Research Journals

1. IEEE Internet Computing magazine,
2. ACM Transaction on Internet Technology
3. ACM Transaction on the Web

CO 3463 : DESIGN AND ANALYSIS OF ALGORITHMS

Theory:

1. Review of elementary Data Structures: Stacks, Queues, Lists, Trees, Hash, Graph. Internal representation of Data Structures, Code tuning techniques: Loop Optimization, Data Transfer Optimization, Logic Optimization.
2. Definitions of complexity, Time and Space Complexity; Time space tradeoff, various bounds on complexity, Asymptotic notation: O-notation, Ω-notation, Θ-notation, Recurrences and Recurrences solving techniques: Recursion-tree method and Master method, Average time analysis methods: Probabilistic methods.
3. Design and analysis of algorithms using the brute-force, greedy, dynamic programming, divide-and-conquer and backtracking techniques.
4. Algorithm for sorting and searching, Randomized Algorithms, Number-theoretic algorithms, Matrix Manipulation algorithms, Graph Algorithms: BFS and DFS.
5. NP-hard and NP-complete problems, Approximations Algorithms, Data Stream Algorithms, Introduction to design and complexity of Parallel Algorithms and Semi-Numerical Algorithms.

Text Books

1. Cormen, Leiserson, Rivest, Stein, "Introduction to Algorithms", Second Edition, Prentice Hall of India, 2001.
2. Aho A.V., Hopcroft J.E., J. Ullman, "Design and Analysis of Computer Algorithms", Addison Wesley, 1998.
3. Horowitz E. and Sahani, "Fundamentals of Computer Algorithms", Galgotia Publications, 1984.

Reference Books

1. Knuth D., "Fundamental algorithms: The Art of Computer programming", Volume – I, Third Edition, Pearson Education 1998.
2. Knuth D., "Semi numerical Algorithms: The Art of Computer programming", Volume – II, Third Edition, Pearson Education 1998.
3. Knuth D., "Sorting and Searching: The Art of Computer programming", Volume – III, Second Edition Pearson Education 1998.
4. John Kleinberg, Trades E., "Algorithm Design", Pearson Education 2002.
5. A. Papoulis, S.U. Pillai, "Probability, Random Variables and Stochastic Processes", McGraw Hill, Fourth Edition 2006.