08.403 MICROCONTROLLER-BASED DESIGN

L-T-P: 3 – 1 – 0 **Credits:4**

MODULE I (18 hours)

Introduction to microcontrollers – general architecture of microcontrollers and microprocessors, embedded processors.
Overview of the 8051 family – 8051 architecture – memory organisation, registers and I/O ports, addressing modes, instruction sets and assembly language programming.
C programming in 8051.

MODULE II (17 hours)

Programming 8051 timer/counter in assembly language and C.
8051 Interrupts – handling and programming.
Serial communication using 8051 – interfacing with RS232, serial port programming.

MODULE I (17 hours)

8051 interfacing – keyboard, LCD, ADC, DAC and stepper motor interface – interfacing to external memory.
Introduction to PIC microcontrollers and ARM processors.
Concept of Embedded Systems – embedded software and hardware development tools.

Text Books:

1. Muhammad Ali Mazidi, The 8051 Microcontroller and Embedded Systems, 2006, Pearson Education.
2. David E. Simon, An Embedded Software Primer, 2002, Pearson Education.

Reference Books:

1. ARM System Developer's Guide, Andrew N Sloss, Dominic Symes and Chris Wright, Elsevier 2005.
2. Design With PIC Microcontrollers, John B. Peatman, Pearson Education.
3. Kenneth Ayala, The 8051 Microcontroller, 3/e , Thomson Publishing , New Delhi.
4. David Seal, ARM Architecture Reference Manual.
5. Wayne Wolf, Computers as Components: Principles of Embedded Computing System Design, Elsevier, 2

08.404 OBJECT ORIENTED TECHNIQUES (R F)

L-T-P: 2 – 1 – 0 **Credits:3**

MODULE I (10 hours)

Fundamentals of object-oriented design: Data Abstraction, Encapsulation, classes, Inheritance and Polymorphism, class hierarchies. *Designing an object-oriented system:* Identifying the classes, Assigning Attributes and Behaviour, finding relationship between classes, Arranging classes into hierarchies: A design example. A first look at C++: Using streams for input and output. *C++ enhancements to C:* Default Function Arguments, Placement of variable declarations, the scope resolution operation, the "const" Qualifier, overloaded functions. *References:* References as Aliases, references and pointers similarities and differences, references as function parameters, references as return values.

MODULE II (13 hours)

Introduction to classes: Declaring and using classes, class members, creation and destruction of objects, accessing data members, returning a reference, "const" objects and member function. *Classes and dynamic memory allocation:* New, delete operators, "this" pointer. Static members, friends, array of class objects.

MODULE III (16 hours)

Inheritance and polymorphism: Derived class and base class, derived class constructors, overriding member functions, public and private inheritance, virtual functions, polymorphism, multiple inheritance, classes within classes. *Operator overloading:* Overloading unary operator, overloading binary operator, data conversion. Generic functions, generic classes. File processing – formatted – unformatted and random files. Microsoft foundation classes : Strings, data structure. Representing classes and attributes using UML.

Text Books:

1. Teach yourself C++ - H. Schildt, Tata McGraw Hill.
2. Schaum's outline of programming with C++ – J.R. Hubbard.
3. C++ Programming from problem analysis to program design 3rd Edn. – D.S. Malik, Thomson Publications

Reference Books:

1. Object Oriented Programming in Microsoft C++ – Rober Lafore, Galgotia Book House.
2. Object Oriented Programming in Microsoft C++ – Balagurusamy.
3. Object Oriented Programming – Barkakti
4. Fundamentals of data structures in C++ – E. Horwitz, S. Sahni and D. Mehta, Universities Press (India)
5. Fundamentals of object oriented design in UML, 4th impression 2008 – Meilir P. Jones, Pearson Education (Chapter 4 – for UML part in Module III)

08.405 DATA STRUCTURES AND ALGORITHMS (R F)

L-T-P: 2– 2 – 0 **Credits: 4**

MODULE I (14 hours)

Introduction to programming methodologies – structured approach, stepwise refinement techniques, programming style, documentation – analysis of algorithms: frequency count. Study of basic data structures – vectors, arrays, records, stacks, queues and dequeues.

MODULE II (19 hours)

Logic characteristics of strings, physical representation for strings – linked lists – trees, binary tree traversals – graphs – applications. Storage management – free storage lists, reference counters, garbage collection, storage compaction, boundary tag method.

MODULE III (19 hours)

Internal and external sorting techniques – insertion sort, merge sorting, partition exchange sorting, heap sort. Searching algorithms – hashing. External sorting – sorting with disks, sorting with tapes.

Text Books:

1. Introduction to data structures with applications – J.P. Tremblay and P.G. Sorenson, TMH.
2. Fundamentals of data structures – E. Horowitz and S. Sahni, Computer Science Press.
3. Classic data structures – D. Samanta, PHI

Reference Books:

1. Theory and problems of data structures – Seymour Lipschuts, Schaum's series.
2. Algorithms + data Structures = Programs – M. Wirth, Prentice Hall Englewood cliffs.
3. A structured approach to Programming – J.K. Hugges and J.I. Michtm, Prentice Hall.
4. Fundamentals of data structures in C – E. Horwitz, S. Sahni and S. Anderson-Freed, Universities Press (India

08.406 DATABASE DESIGN

L-T-P: 3 – 0 – 0 **Credits: 3**

MODULE I (13 hours)

Introduction to database systems : traditional file system, database/DBMS distinction, approaches to building a database, data models, data independence, three schema architecture of a database, various components of a DBMS, E/R Model, Conceptual data modeling – motivation, entities, attributes and keys, relationships, E/R diagrams.
Relational Data Model: Concept of relations, schema-instance distinction, referential integrity and foreign keys, relational algebra operations, relational calculus, Converting database specification in E/R notation to the relational schema.

MODULE II (13 hours)

SQL – data definition in SQL, querying in SQL, embedded SQL.
Dependencies – importance of a good schema design, motivation for normal forms, dependency theory – functional dependencies, Amstrong's axioms, Membership and minimal covers, 1NF, 2NF, 3NF and BCNF, Decompositions and their desirable properties, Multi-valued dependencies and 4NF, Join dependencies and 5NF.

MODULE III (13 hours)

Data Storage and indexes – File Organisations, Primary and Secondary index structures, Hash based structures, B-Trees, B+ Trees.
Transaction Processing and Error Recovery - Concepts of transaction processing, ACID properties, Concurrency control, Serializabilty, Locking based protocols for Concurrency control, Logging and Recovery Methods.

Text Books:

1. Fundamentals of Database Systems, 5th Edition, – Ramez Elmazri and Shamkant B. Navathe, Addison Wesley, 2(
2. Database systems – Design, Implementation and Management, 7th Edition – Peter Rob and Carlos Coronell, Thomson Course Technology, 2007

Reference :

Data Base System concepts – Henry F Korth and Silberschatz, Mc Graw Hill.

08.407 DATA STRUCTURES LAB (R F)

L-T-P: 0 – 0 – 4 **Credits:4**

Programming exercises in C based on the course ***08.405 Data Structures and Algorithms.***
The exercises may include the following:-

1. Representation of sparse matrix – addition, multiplication and transpose of sparse matrices
2. Use of multidimensional arrays and structures
3. Linked list – singly linked list, circular linked list, and doubly connected linked list and application problems
4. String manipulation applications. Representation of polynomials, arithmetic operations on polynomials
5. Implementation of stacks using arrays and linked lists. Application problems using stacks – Maze problem, conversion between infix, postfix and prefix, expression evaluation etc.
6. Implementation of multiple stacks
7. Implementation of Queues using linked list and array – multiple Queues, Dequeues, priority queue and applications of queues
8. Creation and traversals of binary trees – counting nodes, finding height etc.
9. Creation of binary search tree – searching an item, insertion and deletion of nodes etc.
10. Implementation of sorting and searching algorithms

08.408 OBJECT ORIENTED PROGRAMMING LAB

L-T-P: 0 – 0 – 4 **Credits: 4**

Implementation of topics covered in 08.404 (Object Oriented Techniques) using Java or C++.

Standard Template Library – Containers, Associative Arrays, Iterators.

SEMESTER V

08.501 ENGINEERING MATHEMATICS (E R F B H)

L-T-P: 3 – 1 – 0 **Credits: 4**

MODULE I (18 hours)

Discrete and continuous random variables and their probability distributions - Probability distribution (density) functions - Distribution functions - Mean and Variance - Simple problems. - Binomial, Poisson, uniform and exponential distributions - Mean and Variance of the above distributions - Normal distribution - Properties of normal distribution - Computing probabilities using Binomial, Poisson, uniform, exponential and normal distributions.

MODULE II (16 hours)

Curve fitting - Principle of least squares - Fitting a straight line - Fitting a parabola - Linear correlation and regression - Karl Pearson's coefficient of correlation - Sampling distributions - Standard error - Estimation - Interval estimation of population mean and proportions (small and large samples) - Testing of Hypothesis - Hypothesis concerning a mean, Equality of means- Hypothesis concerning one proportion, difference of two proportions.

MODULE III (18 hours)

Joint probability density function - Properties - Marginal and conditional distribution - Independence - Random processes - Classification of random processes - Examples - Average values such as mean, autocorrelation, auto covariance, correlation coefficient of random processes - stationarity - strict sense stationary process - wide sense stationary process - Autocorrelation function and its properties - Power spectral density and its properties (no proof) - Related problems - Markov chains. Transition probability matrices - Chapman-Kolmogorov equation (no proof) - Poisson process - Mean and autocorrelation of Poisson process - Related problems.

Reference Books

1. *Probability, random variable and stochastic processes*, Papoulis and S.U. Pillai, 4/e, TMH
2. *Probability and Random Processes*, Veerarajan, 2/e, TMH
3. *Probability and Random processes with application to signal processing,* Stark and Woods, 3/e, Pearson Education
4. *Probability and Random Processes for Electrical and Computer Engineers*, Gubner, Cambridge University Press, 2006

08.502 ADVANCED MATHEMATICS & QUEUEING MODELS (RF)

L-T-P: 3 – 1 – 0 **Credits: 4**

MODULE I (18 hours)

General linear programming problem - Slack and surplus variables - Standard form - Solution of LPP - basic solution - Basic feasible solution - Degenerate and non-degenerate solutions - Optimal solution - Solution by simplex method - Artificial variables - Big-M method - Network Analysis-Project Scheduling- Construction of Project networks- Critical Path Method (CPM)-Identification of Critical path using CPM- Estimation of Floats-Total float, Free float, Independent Float-Project Evaluation and Review Technique(PERT)-Computation of expected completion times by PERT.

MODULE II (16 hours)

Partitioned matrices and matrix factorization - LU decompositions - Vector space and subspace - Null space and Column spaces - Bases - Co-ordinate systems - Dimension of vector space - Rank - Change of basis - Inner product space - Length and orthogonality - Orthogonal sets - Orthogonal projection - Gram-Schmidt process - Least square problem - Quadratic form - Constrained optimization of quadratic forms - Singular value decomposition (proof of the theorem are not included).

MODULE III (18 hours)

Queuing Theory- Queues-Characteristics of Queues-Kendal's notation-Random arrivals-Arrival and Departure Distributions-Types of Queues- Basic Queuing models- M/M/1:∞/FIFO - $P_n=\rho^n P_0$ (no proof)-Derivation of the following Characteristics
(a) Probability that queue size ≥ n (b) Average number of customers in the system
(c) Average length of the waiting line – Waiting time distribution (no proof) – Waiting time in the system – Waiting time in the queue - Little's Formulae – Problems based on the above results.
M/M/1:N/FIFO model – Formulae (without proof) for the average number of units in the system and in the queue and the average waiting time – Problems.
M/M/c:∞/FIFO model – Standard results (no derivation) - Problems.

Reference Books

1. *Linear Algebra with Applications*, David C Lay, Pearson Education
2. *Linear Algebra*, Schaum Series
3. *Linear Algebra*, Kenneth Hoffmann and Ray Kunze, PHI.
4. *Linear Algebra with Applications*, Gareth Williams, Jones and Bartlett publications
5. *Linear Algebra with Applications*, Gilbert Strang, Thomson Learning
6. *Linear Programming,* G. Hadly, Addison Wesley
7. *Operations Research,* Ravindran, Philips, Solberg, Wiley
8. *Operations Research,* Kanti Swarup, Manmohan.

08.503 THEORY OF COMPUTATION

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (13 hours)

Introduction to the theory of computation. Finite state automata – description of finite automata, properties of transition functions, designing finite automata, NFA, finite automata with epsilon moves, 2-way finite automata, equivalence of NFA and DFA, Mealy and Moore machines, regular expressions, regular sets and regular grammars, pumping lemma for regular languages, closure properties of regular sets and regular grammars, applications of finite automata, decision algorithms for regular sets, minimization of FSA**.**

MODULE II (13 hours)

Chomsky classification of languages. Context-Free Grammar - derivation trees, ambiguity, simplification of CFLs, normal forms of CFGs, pumping lemma for CFGs, decision algorithms for CFGs, designing CFGs, PDA – formal definition, examples of PDA, Deterministic PDA, equivalence with CFGs.

MODULE III (13 hours)

Turing machines - basics and formal definition, language acceptability by TM, examples of TM, variants of TMs – multitape TM, NDTM, Universal Turing Machine, offline TMs, equivalence of single tape and multitape TMs. Recursive and recursively enumerable languages, decidable and undecidable problems – examples, halting problem, reducibility.

1

Text Books :

1. Introduction to Automata Theory, Languages and Computation – John E. Hopcroft , Jeffrey D.Ullman and Rajeev Motwani, Pearson Education.

Reference Books :

1. Introduction to The Theory of Computation (Second Edition), Michael Sipser, Thomson.
2. The Theory of Computation, Bernard M. Moret, Pearson Education.
3. Introduction to Automata Theory and Formal Languages – Peter Linz, Narosa Publishing.
4. Switching and Finite automata theory – Kohavi, Tata McGraw Hill

08.504 SYSTEMS PROGRAMMING (RF)

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (13 hours)

Systems Programming – What is systems programming, Difference between systems programming and application programming – Dependence on systems programming on hardware – System software and Machine architecture. SIC & SIC/XE Architecture and Programming. Traditional (CISC) machines – VAX architecture, Pentium Pro architecture, RISC machine – ultra SPARK, Power PC.

MODULE II (13 hours)

Assemblers – Basic assembler functions – machine dependent assembler features – machine independent assembler features – Hand assembly of SIC/XE programming. Assembler design options – one pass assembler, multi pass assembler – assembler implementation – MASM, SPARC assemblers, Assemblers Vs Compilers.
Loaders and Linkers basic loader functions, machine dependent loader features, machine independent loader featured, loader design options – linkage editors, dynamic linkage editors, dynamic linking, bootstrap loaders, examples – DOS linker.

MODULE III (13 hours)

Macro processors – basic macro processor functions – machine dependent and machine independent macro processor architectures – design options – implementation examples – MASM, ANSI C macro processors. Text Editors – overview of the editing process – user interface, editor structure. Debuggers – debugging functions and capabilities, relationship with other parts of the system – user interface criteria.

Text Books:
1. System Software-An Introduction to System Programming – Leland L. Beck, Pearson Education.

Reference Books:
1. Systems Programming – John J. Donovan, Tata McGraw Hill.
2. Operating Systems and Systems Programming – D.M. Damdhere, Tata McGraw Hill.

08.505 OPERATING SYSTEMS

L-T-P: 3 – 1 – 0 **Credits:4**

MODULE I (15 hours)

Introduction : Basic concepts – terminology. Historical perspective - early systems - types of OS - batch processing - multiprogramming - time sharing - real-time system - functions and components of an operating system - OS services -multiprocessor system - distributed system.
Information management: File concepts - file system - directory structure - gaining access to files - basic file system calls - sharing and security - file protection - allocation methods - implementation issues.

MODULE II (21 hours)

Processor management: CPU scheduling - scheduling concepts - scheduling algorithms - concurrent processes. Critical Section Problem and solutions - semaphores - classical problems in process synchronization.
Memory management : Basics - swapping - fixed partitions - variable partitions - overlay - paging - segmentation - segmented paging - virtual memory concepts - demand paging - page replacement - space allocation policies - dynamic linking.

MODULE III(16 hours)

Device management : Physical characteristics – disk scheduling algorithms - sector queuing - device drivers.
Dead locks : Deadlock problem - characteristics - prevention - avoidance - detection - recovery from dead lock - combined approach to dead lock handling.
Protection : Goals of protection - mechanisms and policies - access matrix and its implementation - dynamic protection structures - security.

Text Books:

Operating System Concepts – J. L. Peterson and A. Silberschatz, Addison Wesley.

Reference Books:

1. Operating System Principles – P. Brinch Hansen, Prentice Hall.
2. Operating Systems - Gary Nutt, Pearson Education.

08.506 DATA COMMUNICATION

L-T-P: 2 – 1 – 0 **Credits:3**

MODULE I (12 hours)

Communication model- Simplex, half duplex and full duplex transmission.
Time Domain and Frequency Domain concepts - Analog & Digital data and signals - Transmission Impairments - Attenuation, Delay distortion, Noise - Different types of noise - Channel capacity - Shannon's Theorem - Transmission media - twisted pair, Coaxial cable, optical fiber, terrestrial microwave, satellite microwave - synchronous and Asynchronous transmission.

MODULE II (13 hours)

Sampling theorem - Encoding digital data into digital signal - NRZ, Biphase, Multilevel binary - Encoding digital data into analog signals - ASK, FSK, PSK - Encoding analog data into digital signals - PCM, PM, DM - Encoding analog data into analog signals - AM, FM, PM - Multiplexing - TDM, FDM, WDM & DWDM.

MODULE III (14 hours)

Error Detecting and correcting codes. Error detection - parity check, CRC, VRC. Forward Error Correction - Hamming codes, Block codes, Convolution codes. Basic principles of switching - circuit switching, packet switching, message switching.
Basics of wireless communication- Introduction to WiFi, WiMax, GSM, GPRS

Text Books:
1. Data and Computer Communications, Eighth Edition - William Stallings - PHI
2. Data Communications and Networking, Fourth Edition - Behrouz A Forouzan, Tata McGraw Hil

References :

. Computer Networks, Fourth Edition – Andrew S Tanenbaum, PHI.

08.507 DIGITAL CIRCUITS LAB

L-T-P: 4 – 0 – 0 **Credits: 4**

1 Realization of digital gates
2 Realization of flip-flops
3 Design and implementation of a counter
4 Design and implementation of a shift register
5 Multiplexer / Demultiplexer
6 Timer Circuits (using 555)
7 Experiments using the 8051 microcontroller

08.508 DATABASE LAB

L-T-P: 4 – 0 – 0 **Credits: 4**

1. Familiarization of creation of databases and SQL commands (DDL, DML and DCL).Suitable exercises to practice SQL commands may be given.
2. Write SQL procedure for an application which uses exception handling.
3. Write SQL procedure for an application with cursors.
4. Write a DBMS program to prepare reports for an application using functions.
5. Write SQL block containing triggers and stored procedures.
6. Develop a menu driven, GUI based user friendly database application in any one of the domains such as Banking, Electricity Billing, Library management, Payroll, Insurance, Inventory, Health care etc. integrating all the features specified in the above exercises.

SEMESTER VI

08.601 COMPILER DESIGN (RF)

L-T-P: 3 – 1 – 0
Creidts: 4

MODULE I (18 hours)

Introduction to compilers and interpreters – overview of compilation, issues in compilation – structure of a compiler – compiler writing tools – bootstrapping – notations and concepts for languages and grammars – regular expressions – context free grammar, derivations and parse trees, BNF notations. Context of a lexical analyzer – construction of lexical analyzer, deterministic and non-deterministic finite automata.

MODULE II (18 hours)

Compile time error handling, error detection, reporting, recovery and repair. Basic parsing techniques – Top down parsing – recursive descent parser, predictive parser simple LL(1) grammar. Bottom up parsers, operator precedence parser, LR grammar, LR(0), SLR(1), LALR(1) parsers.

MODULE III (16 hours)

Syntax directed translation schemes, intermediate codes, translation of assignments, translation of array reference, Boolean expressions, case statements, back patching, code optimization, loop optimization and global optimization, sources of sample code generation.

Text books:

1. Compilers: Principles, Techniques and Tools (Second Edition) - Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, Pearson Education.
2. Compiler Design – Santanu Chattopadyaya, PHI.

Reference Books :

1. Engineering a Compiler (Second Edition) - Keith D Cooper & Linda Torczon, Elsevier.
2. Modern Compiler Implementation in C - Andrew W. Appel, Cambridge University Press.
3. Compiler Construction – Principles and Practice by Kenneth C. Louden, Cengage Learning.
4. Algorithms for Compiler Design – O.G. Kakde, Cengage Charles River Media.
5. Principles of Compiler design – V. Raghavan, Tata McGraw-Hill.

08.602 COMPUTER NETWORKS

L-T-P : 2 – 1 – 0 **Credits: 3**

MODULE I (12 hours)

Introduction – Uses – Network Hardware – LAN –MAN – WAN, Internetworks – Network Software – Protocol hierarchies – Design issues for the layers – Interface & Service – Service Primitives. Reference models – OSI – TCP/IP.
Data Link layer - Design Issues – Flow Control and ARQ techniques. Data link Protocols - HDLC DLL in Internet.

MODULE II (13 hours)

MAC Sub layer – IEEE 802 FOR LANs & MANs. Bridges - Switches - High Speed LANs - Gigabit Ethernet.Wireless LANs 802.11 a/b/g/n, 802.15.
Network layer – Shortest path routing – Flooding – Distance Vector Routing – Link State Routing – RIP - OSPF – Routing for mobile hosts – Congestion control algorithms. QoS. MPLS.

MODULE III (14 hours)

Internetworking – Network layer in internet – IP Addressing – Classful and Classless IP Adressing, Subnetting. Internet Control Protocols – ICMP, ARP, RARP, BOOTP. Internet Multicasting. IGMP. Exterior routing protocols - BGP. IPv6 – addressing – issues.
Transport Layer – TCP & UDP.
Network Management – SNMP. Voice over IP - H.323 & SIP standards. Gatekeeper.

Text Books:

Computer Networks, Fourth Edition – Andrew S Tanenbaum, PHI.

References:

1. Data Communications and Networking - Behrouz A Forouzan, Fourth Edition, Tata-McGraw Hill
2 .Data and Computer Communications, Eighth Edidtion – William Stallings, PHI.
3 .Hand book of Computer Communications Standards, Volume 1 – Willman Stallings, PHI.
4. An Engineering Approach to Computer Networks – Keshav, Addison Wesley.

08.603 SOFTWARE ARCHITECTURE

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (13 hours)

Modeling as a design technique – UML - Class Modeling –class diagrams – Links and associations – Generalization and inheritance –Navigation of Class Models – State Modeling – Events – Signal event - change event – states – state diagrams – Activity effects - Interaction Modeling – use case models –use case diagrams – sequence models – Activity models.

MODULE II (13 hours)

Software Design principles – Correctness and Robustness – Flexibility, Reusability and Efficiency – Trade offs among robustness, flexibility, reusability and efficiency – Design patterns – creational, structural and behavioral design patterns - characteristics of design patterns – delegation and recursion.

MODULE III (13 hours)

Software Architecture – Functionality and Architecture – Architecture and quality attributes – Availability tactics – Modifiability tactics – Performance tactics – Security tactics – Testability tactics – Usability tactics – Relationship of tactics to architectural patterns – Documenting Software architecture.

Text Books:

1. Object-Oriented Modeling and Design with UML (2nd Ed.), Michael Blah, James Rumbaugh, Pearson [M I]
2. Software Design – From Programming to Architecture, Eric Braude ,Wiley[M II]
3. Software Architecture in Practice (2nd Ed.), Len Bass, Paul Clements, Rick Kazman Pearson [M III]

References:

1. Software Architecture, Mary Shaw, David Garlan, PHI.
2. Software Architect BOOTCAMP 2nd Ed. Raphael Malveau, Thomas J Mowbray, Pearson.

08.604 INTERNET TECHNOLOGY

L-T-P: 3 – 1 – 0 **Creidts: 4**

MODULE I (17 hours)

Introduction - Web Browsers and Web Servers – URL.
Web Content Preparation - HTML, Cascading Style Sheets, JavaScript (Introduction to Scripting, Control Statements, Functions, Arrays, Objects), DHTML (Object Model and Collections, Event Model), XML (Creating Markup with XML -XML Namespaces, Document Type Definitions and Schema, Document Object Model, DOM Methods, Simple API for XML, Extensible Stylesheet Language, Web Services).

MODULE II (18 hours)

Protocols- HTTP, FTP, TELNET, SMTP, POP3, IMAP – MIME - Web Servers – IIS , Apache Web Server - Proxy Server - Search Engines - Content Display - Browsers, Plug-ins, Helper Applications.

Java – Packages and Interfaces, Exception Handling, Multithreaded Programming, Strings, I/O, Applets, Event Handling, AWT components, Swing components.

MODULE III (17 hours)

Network Programming in JAVA – Looking Up Internet Addresses, Sockets for Clients, Sockets for Servers, Non-Blocking I/O, UDP Datagrams and Sockets – RMI - Persistence - Java Beans – CORBA, IDL.

Text Books:

1. Internet & World Wide Web – How To Program (Third edition), H.M. Deitel, P.J. Deitel, A.B.Goldberg, Pearson Education.
2. Programming the World Wide Web 2009 (Fifth edition), Robert W. Sebesta, Pearson Education.
3. Java2 – The Complete Reference, Herbert Schildt, Tata McGraw Hill.
4. Java Network Programming (Third edition), Elliotte Rusty Harold, O'Reilly.
5. Component Software: Beyond Object-Oriented Programming, Clemens Szyperski, Pearson Education.
6. Inside CORBA, Mowbray, Pearson Education.

08.605 COMPUTER GRAPHICS

L-T-P: 2 – 1 – 0 **Credits:3**

MODULE I (12 hours)

Basic concepts in Computer Graphics – Types of Graphic Devices – Interactive Graphic inputs – Basic Raster Scan Graphics – Line Drawing Algorithms – Circle Generation Algorithms - Scan Conversion – frame buffers – solid area scan conversion – polygon filling.

MODULE II (13 hours)

Two dimensional transformations – Homogeneous coordinate systems – matrix formulation and concatenation of transformations – Windowing concepts – two dimensional clipping. Introduction to graphics in three dimension – specification of a 3D view - 3D transformations

MODULE III (14 hours)

Projections – Parallel and perspective projections – vanishing points – Hidden elimination – Back face removal, Z- Buffer algorithm, scan line algorithm. Image processing – introduction – digital image representation – relationship between pixels – gray level histogram – equalization – edge detection – Robert, Sobel, Canny edge detectors. Scene segmentation and labeling – region-labeling algorithm – perimeter measurement.

1

Text Books:

1. Computer Graphics – Donald Hearn and M. Pauline Baker, PHI
2. Principles of Interactive Computer Graphics – William M. Newman and Robert F. Sproull.
3. Pattern Recognition and Image Analysis – E. Gose, R. Johnsonbaugh, S. Jost.. PHI

Reference Books

1. Procedural Elements for Computer Graphics – David F. Rogers
2. Image Processing, Analysis, and Machine Vision – M. Sonka, V. Hlavac, and R. Boyle, Thomson India Edition.

08.606 EMBEDDED SYSTEMS

L-T-P: 3 – 1 – 0 **Credits: 3**

MODULE I (18 hours)

Introduction - Definition and classification – Processors and hardware units in an embedded system – Software embedded into the system – Embedded system-on-chip - Processor and memory. organization. I/O Devices - Synchronous, iso-synchronous and asynchronous communications from serial devices -Internal serial communication devices - Parallel port devices - Timer and counting devices - 1^2C, CAN, USB and advanced serial high-speed bus - PCI, PCI-X and advanced buses - Device drivers -Interrupt servicing mechanism.

MODULE II (16 hours)

Programming concepts - Assembly language vs high level language - C Program Elements - Queues, stacks and lists - Concepts of embedded programming in C++ - C compilers – Cross compiler – Optimization of memory usage.

MODULE III (18 hours)

Real-time operating systems - RTOS services - Structures - Resource management – File system organization and implementation – I/O subsystems – Interrupt handling - Task scheduling models - Handling of interrupt latency and deadlines - Performance metrics. Inter-process communication and synchronization – Semaphores – Priority inversion problem - Deadlock situations – Signals – Message queues – Mailboxes – Pipes – Sockets.

Text Books:
Embedded Systems - Architecture, Programming and Design, Raj Kamal, TATA McGraw Hill, 2004

08.607 INTERNET LAB

L-T-P: 0 – 0 – 4 **Credits:4**

1. Creation of HTML documents - use of external style sheets, ordered lists, tables, borders, padding, colors, embedded maps.
2. JavaScript - obtaining information on the browser and the operating system, timed JavaScript redirect, JavaScript features.
3. XML – conversion to HTML. Cascading Style Sheets, XSLT. XML document parsing using DOM.
4. Java applets – labels, lists, text fields and animation.
5. Java network programming – simple web client, e-mail client, TCP/IP client and server, chat application with datagram sockets and datagram packets.
6. Java RMI.
7. CORBA.
8. Server configuration – web server, proxy server.

08.608 COMPUTER GRAPHICS LAB

L-T-P: 0 – 0 – 4 **Credits: 4**

2D Graphics: Drawing Elementary figures (line, Polygon), Polygon Filling (Boundary fill, Flood fill and Scan fill) , Transformations (Scaling, Rotation, Reflection, Translation. Shear) Windowing and clipping (Polygon and line clipping). Interactive Graphics: Interactive input techniques (mouse programming).

2D Animations using primitives (eg : man cycling along a road, a war aircraft bombing a ship, etc).

3D Graphics: Curves and Surfaces, Clipping, Hidden line and surface removal, Surface rendering, Rotation of a 3D object about arbitrary axis.

Basics of flash animation : Motion Tweening in flash player

SEMESTER VII

08.701 SOFTWARE PROJECT MANAGEMENT

L-T-P : 2 – 1 – 0 **Credits: 3**

MODULE I (12 hours)

Software - characteristics - Process: Process-layered technology-Software process models – Waterfall model - Incremental models, Evolutionary models. Project Management concept: People – Product-Process-Project.

MODULE II (14 hours)

Software process and project metrics: - Measures- Metrics and indicators- Software measurements-metrics for software quality-Software project planning: Planning objectives - software scope-resources-software project estimation-Decomposition Techniques –Empirical estimation models-COCOMO model. Risk management: software risks-risk identification-risk projection-risk mitigation, monitoring and management-safety risks and hazards-RMMM plan.

MODULE III (13 hours)

Project scheduling and tracking: Basic concepts-relation between people and effort-defining task set for the software project-selecting software engineering task-refinement of major task-defining a task network-Scheduling-project plan. Software configuration management: baselines--the SCM process-identification of objects in software configuration-Version control-Change control-Configuration audit-status reporting-Software Quality Assurance-SQA activities.

Text Book:

1. Software Engineering – Roger S. Pressman, Sixth Edition. McGraw Hill International

References:

1. Software Project Management: A unified framework – Walker Royce, Pearson Education
2. Software Project Management in Practice – Pankaj Jalote, Pearson Education

08.702 INTERNETWORKING

L-T-P: 3 – 1 – 0 **Credits: 4**

MODULE I (17 hours)

Internet Architecture, Classful Internet Addresses, Mapping Internet Addresses to Physical addresses (ARP), Determining an Internet address at start-up (RARP), Connectionless Datagram Delivery (IPV4) , Forwarding IP datagrams, Error and Control Messages (ICMP), Classless and Subnet Address Extensions (CIDR), Protocol Layering, User datagram Protocol, Reliable Stream Transport Service.

MODULE I (18 hours)

Routing Architecture : Cores, Peers, and Algorithms, Routing Between Peers (BGP), Routing Within an Autonomous System (RIP, OSPF), Internet Multi casting, IP Switching and MPLS, Private Network Interconnection (NAT, VPN), Bootstrap and Autoconfiguration (DHCP).

MODULE I (17 hours)

Applications - DNS, Remote Login and Desktop (TELNET, SSH), File Transfer and Access (FTP, TFTP, NFS) , Electronic Mail (SMTP, POP, IMAP, MIME), WWW (HTTP), Voice and Video Over IP (RTP, RSVP, QoS).

Text Books :

1. Internetworking with TCP/IP - Volume I, Principles, Protocols and Architecture (5th Edition), Douglas E.Comer, PHI 2009
2. The Internet and Its Protocols, Adrian Farrel, Elsevier 2005.

08.703 CRYPTOGRAPHY

L-T-P: 2 – 1 – 0 **Credits :3**

MODULE I (12 hours)

Introduction to cryptology :- Cryptography and cryptanalysis, Aspects of security, Cryptanalytic attacks. Classical cipher systems - Transposition ciphers, Substitution ciphers, Hagelin machine, Statistics and cryptanalysis. The information theoretical approach - information measure and absolute security, unicity distance, Error probability and security.

MODULE II (14 hours)

The DES algorithm :- Characteristics, Alternative descriptions, Analysis of the DES, DES modes. IDEA (International Data Encryption Algorithm).
Shift Registers :- Stream and block enciphering, The theory of finite state machines, shift Registers, random properties of shift register sequences, generating function, Cryptanalysis of LFSRs, Non-linear shift registers.
Public Key Systems :- Introduction, RSA system, Knapsack system, Cracking the Knapsack system, Public key systems based on elliptic curves.

MODULE III (13 hours)

Authentication and integrity :- Protocols, Message integrity, Entity authentication with symmetrical algorithm, Message authentication with a message authentication code (MAC), Message authentication with digital signatures, Zero - knowledge techniques.
Key Management :- General aspects of key management, Key distribution for asymmetrical systems, Key distribution for symmetrical algorithms, Network security, Fair cryptosystems.

Text Books :
1. Basic Method of Cryptography, Jan C. A. Van Der Lubbe, CAMBRIDGE UNIVERSITY PRESS
2. Cryptography and Network Security - Behrouz A. Forouzan, Tata McGraw Hill.

08.704 WEB APPLICATIONS DEVELOPMENT

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (13 hours)

Introduction - Web architecture - web application lifecycle - XML and J2EE. Design and development of a J2EE application - J2EE Layers, Application Components, J2EE Architecture, Development methodology - Task list for building J2EE Applications - database design - defining the application - creating the interface, building pages, creating data access objects, validating the code. JDBC: Architecture - JDBC API, Retrieving and updating Data, SQL-to-Java Data Types, JDBC Execution Types, Metadata, Scrollable Resultsets, transaction support, Batch Statements.

MODULE II (13 hours)

Servlets: Introduction to Servlets, Benefits of Servlets, use as controller in MVC, basic HTTP, servlet container, Servlets API, javax.servelet Package, Reading Servlet parameters, service method detail, HTML clients, servlet lifecycle, HTTP response header, session management, dispatching requests, Servlets with JDBC, web applications. Java Server Pages: Generating Dynamic Content, Using Scripting Elements, Implicit JSP Objects, Conditional Processing – Displaying Values, Setting attributes, Error Handling and Debugging, Using JavaBeans Components in JSP Pages, Sharing Data Between JSP pages -Passing Control and Data between Pages – Sharing Session and Application Data – Application Models - MVC Design.

MODULE III (13 hours)

Enterprise JavaBeans : Overview, distributed programming, EJB framework, Session and entity beans, Stateless and tateful session bean, Bean attributes, Parts of a Bean, container-managed persistence (CMP) and bean managed - lifecycle of EJB - java message service (JMS) and message driven beans (MDB), distributed programming services, CORBA and RMI - Transaction management, Security, deployment, personal roles for EJB Development, building session beans - creating session beans - Entity beans.

Text Books :

1. J2EE UNLEASHED – Joseph J. Bambara, Paul R.Allen, Mark Ashnault, Ziyad Dean, Thomas Garben, Sherry Smith – SAMS Techmedia

2. Java Servlet Programming, Second Edition,Jason Hunter, William Crawford,O'Reilly Media

3.Mastering EJB(2nd Edition) – Ed Roman, Scott Ambler, Tyler Jewell – John Wiley Publications 2003.

Reference Books :

1. The J2EE Tutorial- Stepahnie Bodoff, Dale Green, Kim Hasse, Eric Jendrock, Monica Pawlan, Beth Stearns-Pearson Education –Asia.

2. Java Server Pages –Hans Bergsten, SPD O'Reilly

08.705A ALGORITHM ANALYSIS AND DESIGN

L-T-P: 4-0-0 **Credits :4**

MODULE I (16 hours)

Concepts in algorithm analysis – the efficiency of algorithms, average and worst – case analysis, Asymptotic notation, time and space complexity, Recurrences – substitution method, iteration method and master method, Analysis of sorting algorithms – insertion sorting, heaps, maintaining the heap property, building heap, heap sort algorithm, priority queues. Description of quick sort, randomized version of quick sort.

MODULE II (18 hours)

Height balanced trees – AVL Trees – Red-Black trees – Steps involved in insertion and deletion – rotations, Definition of B-trees – basic operations on B-trees, Algorithm for sets – Union and Find operations on disjoint sets, Graphs – DFS and BFS traversals, Spanning trees – Minimum Cost Spanning Trees, Kruskal's and Prim's algorithms, Shortest paths – single source shortest path algorithms, Topological sorting, strongly connected components.

MODULE III (18 hours)

Algorithm Design and analysis Techniques – Divide and Conquer techniques – Merge Sort, Integer multiplication problem, Strassen's algorithm, Dynamic programming – Matrix multiplication problem, Greedy algorithms – Knapsack problem, Back tracking – 8 Queens problem, Branch and Bound – Travelling Salesman problem. Definitions and Basic concepts of NP-completeness and NP-Hardness. Study of NP-Complete problems.

Text Books :

1. Introduction to Algorithms – Thomas H. Cormen, Charles E. Leiserson and Ronald L. Rivest, PHI.
2. Fundamentals of Computer Algorithms – Horowitz and Sahni, Galgotia Publication.
3. Fundamentals of sequential and parallel algorithms – Kenneth A. Merman and Jerome L. Paul, Vikas Publishing

Reference Books :

1. The Design and Analysis of Computer Algorithms – A.V Aho, J.E. Hopcroft and J.D. Ullman, Addison Wesley Publishing Company.
2. Introduction to the design and analysis of algorithms – A. Levitin, Pearson Education
3. Computer algorithms - Introduction to design and Analysis – Sara Baase, Allen Van Gelder

08.705B SIMULATION AND MODELING

L-T-P: 4 – 0 – 0 **Credits : 4**

MODULE I (18 hours)

Basic simulation Modeling – Discrete-event simulation – simulation of a single-server queuing system – simulation of an inventory system – steps in a simulation study – continuos simulation – combined discrete-continuous simulation – Monte-Carlo simulation – Advantages – disadvantages – and pitfalls of simulation.

MODULE I (17 hours)

Modeling complex systems - Single server queuing simulation Time- shared computer model – Job-shop model.

MODULE I (17 hours)

Simulation software – comparison of simulation packages with programming languages – classification of simulation software – desirable software features – General purpose simulation packages – Object – oriented simulation.

Text Book :

Simulation Modeling and Analysis 4th Ed. Averill M. Law, TMH

Reference :

System Simulation, Geoffrey Gordon, PHI

08.705C PRINCIPLES OF PROGRAMMING LANGUAGES

L-T-P: 4 – 0 – 0 **Credits: 4**

MODULE I (17 hours)

Names, Scopes, and Bindings**:-** Names and Scopes, Binding Time, Scope Rules, Storage Management, Aliases, Overloading, Polymorphism, Binding of Referencing Environments, Separate Compilation.
Control Flow**: -** Expression Evaluation, Structured and Unstructured Flow, Sequencing, Selection, Iteration, Recursion, Nondeterminacy.
Data Types**:-** Type Systems, Type Checking, Records and Variants, Arrays, Strings, Sets, Pointers and Recursive Types, Lists, Files and Input/Output, Equality Testing and Assignment.

MODULE II (18 hours)

Subroutines and Control Abstraction: **-** Static and Dynamic Links, Calling Sequences, Parameter Passing, Generic Subroutines and Modules, Exception Handling, Events.
Functional and Logic Languages:- Lambda Calculus, Overview of Scheme, Strictness and Lazy Evaluation, Streams and Monads, Higher-Order Functions, Logic Programming in Prolog, Limitations of Logic Programming.
Data Abstraction and Object Orientation:- Encapsulation, Inheritance, Constructors and Destructors, Dynamic Method Binding, Multiple Inheritance, Smalltalk Object Model.

MODULE III (17 hours)

Innovative features of Scripting Languages:- Scoping rules, String and Pattern Manipulation, Data Types, Object Orientation.
Concurrency:- Threads, Coroutines, Synchronization, Language-Level Mechanisms.
Run-time program Management:- Virtual Machines, Late Binding of Machine Code, Reflection, Symbolic Debugging, Performance Analysis.
Introduction to Formal Semantics and Program Verification:- Operational Semantics, Denotational Semantics, Axiomatic Semantics, Proofs of Program Correctness, Assertions in C and JAVA.

Text Books:

1. Programming Language Pragmatics, Third Edition by Michael L Scott, Morgan Kaufmann Publishers (Including the companion CD with the book).
2. Programming Languages – Principles and Practice, Second Edition by Kenneth C. Louden, Cengage Learning

Reference Books:

1. Programming Languages – Principles and Paradigms, Second Edition by Allen B. Tucker and Robert E. Noonan, Tata McGraw-Hill Edition
2. Concepts of Programming Languages, Eighth Edition by Robert W. Sebesta, Pearson Education.
3. Programming Languages – concepts & constructs, Second Edition by Ravi Sethi, Pearson Education

08.705D COMMUNICATIVE ENGLISH & TECHNICAL WRITING
(Common with 08.704(3) of CSE)

L-T-P: 3-1-0 **Credits: 4**

MODULE I (20 hours)

Listening, Reading, Speaking and Writing skills.
Listening Skills: Listening for general content- Intensive listening-Listening for specific information.
Speaking Skills: Oral practice-Describing objects/situations/people-Role play-Just A Minute/Group Discussion- informal letters-essentials of telephonic conversation-invitations-minutes of a meeting.
Reading Skills: Skimming the text- exposure to a variety of technical articles, essays, graphic representation, and journalistic articles.
Writing Skills: Skills to express ideas in sentences, use of appropriate vocabulary -sentence construction-paragraphs development-note making-editing a passage and essay writing.
Basics of Technical Communication.
Technical communication- features, Distinction between general and technical communication-language as a tool of communication- levels of communication-interpersonal, organizational, mass communication-the flow of communication: upward, downward and lateral-importance of technical communication- barriers to communication.

MODULE II (20 hours)

Forms of Technical communication.
Business letters-sales and credit letters, letter of enquiry, letter of quotation, placing order. Job application and resume. Official letters-govt. letters, letter to authorities. Reports-types, significance, structure and style, writing reports, condensing .Technical proposals-writing a proposal –the steps involved.Technical papers- projects- dissertation- thesis writing. Preparing audio-visual aids.

MODULE III (12 hours)

A non-detailed study of the autobiography: "Wings of Fire-an autobiography by APJ Abdul Kalam". *Students should read the book on their own and selected topics may be discussed in the* class.

Reference Books:
1. Basic Communication Skills for Technology – Andrea J Rutherford. *Pearson Education.*
2. Business Correspondence and Report Writing – Mohan K and Sharma R C, TMH New Delhi.
3. Effective Technical Communication – Barun K Mitra. Oxford University Press, New Delhi.
4. Everyday Dialogues in English – Robert J Dixson, PHI.

08.706A COMPUTER PERIPHERALS & INTERFACING

L-T-P: 4 – 0 – 0 **Credits: 4**

MODULE I (17 hours)

Introduction-Motherboard Components -Processors-Introduction-Microprocessor Components-Desktop processors-Microprocessor Associates-Microprocessor Packaging-Microprocessor Sockets. Memory- Introduction-DRAM, SDRAM, DDR, DDR2, DDR3. RAM slots-types- Introduction-SIMM, DIMM, RIMM, Micro DIMM, SoDIMM. Expansion Slots- PCI slot, AGP Slots, PCI-Express slots, USB, Serial ports, Parallel ports.

MODULE I (18 hours)

Input / Output Devices – Scanners –flat bed scanner-working process. Printers – Impact and Non Impact Printers– Dot matrix, working – Laser printers, working– Inkjet printers, working. Mechanical mouse and Optical mouse-working. Storage interfaces – ATA/IDE -SATA-SCSI.

MODULE I (17 hours)

Display adapters- introduction- VGA, SVGA, XGA, SXGA, WXGA, WUXGA,WQXGA– Serial access mass storage devices - Magnetic tapes and Streamer tapes - Random access mass storage devices -Magnetic disks, Magneto Optical disks, read and write process- Hard disks -tracks and sectors-operation of hard disk–. Introduction-CDs, DVDs, Blu-ray Discs.

1

Text Books :

1. Upgrading and Repairing PCs – ScottMueller, Pearson Education.
2. David Groth, A+ Study Guide - Core Module - - B.P.B
3. Hardware and Networking-Vikas Gupta-Dreamtech press.

Reference :

The Indispensable PC Hardware Book – Hans Peter Messmer, Addison Wesley/Pearson Education

08.706B OPTIMIZATION TECHNIQUES

L-T-P: 4 – 0 – 0 **Credits : 4**

MODULE I (17 hours)

General methods of solving operations research models, scientific methods in operations research - Mathematical formulation of linear programming problem, Graphical solution, Simplex algorithm and its applications, use of artificial variables, quality, economic interpretation, degeneracy and elementary sensitivity analysis – Transportation problem – mathematical formulation – initial feasible solution by VAM method, degeneracy, unbalance transportation problem – Assignment problem, mathematical formulation, the assignment algorithm, unbalanced assignment problems

MODULE II (18 hours)

Replacement model, types of replacement problems, problem of choosing between two machines, determination of best replacement age of machine using present worth and discount rate, group replacement - game theory – definition of a game – two person zero sum game – graphical solution, application in marketing, advertisement etc. – decision theory – decision under risk – expected value of profit or loss, expected variance criterion, decision trees, decision under uncertainty – the Laplace criterion, the mini-max criterion, minimax regret criterion, Hurvitz criterion.

MODULE III (17 hours)

Network analysis – project scheduling by PERT – CPM, arrow head representation, calculation of critical path, probability and cost consideration in project scheduling. Construction of the time chart-resource leveling.

Text Books :

1. Operations research, B S Goel, S K Mittal
2. Operations Research , Frederick S Hiller, Generald J Liebermann
3. Principles of Operations Research for managers, Frank S Budnick, Dennis McLeavy, Richard Mojena

08.706C DATA MINING TECHNIQUES
(Common with 08.705(4) of CSE)

L-T-P: 4-0-0 **Credits:4**

MODULE I (17 hours)

Fundamentals of data mining - Basic data mining tasks, Issues, DM versus KDD Data preprocessing- Aggregation, Sampling, Dimensionality reduction, Feature subset selection, Feature creation, Discretization and Binarization, Variable transformation. Data warehousing and OLAP Technology – Introduction to Data warehouse, Multidimensional data model, Data warehouse architecture and implementation, Data warehousing and data mining, System architecture.

MODULE II (17 hours)

Association and Correlation - Basic algorithms, Advanced association rule techniques, Measuring the quality rules, From association mining to correlation analysis, Constraint based association mining.
Association and Prediction - Classification and prediction, Issues, Algorithms - Decision tree-based, statistical-based, Distance-based, Neural network and rule-based. Support vector machines, Other classification methods, Prediction, Accuracy and Error measures, Evaluation of accuracy of classifier or predictor, Increasing the accuracy, model selection.

MODULE III (18 hours)

Cluster analysis – Types of data in cluster analysis, classification of major clustering methods. Partitional algorithms - Hierarchical methods, Density based methods, Grid based methods, Model based clustering methods. Clustering large data bases, Constraint based cluster analysis.
Advanced Topics - Multidimensional analysis and descriptive mining of complex data objects, Spatial mining, Multimedia mining, Text mining, Web mining, Temporal mining.

1

Text Books :

1. Data Mining : Concepts and Techniques - Jiawei Han, Micheline Kamber, Morgan Kaufmann Publishers.
2. Data Mining : Introductory and Advanced Topics - Margaret H. Dunham, S.Sridhar, Pearson Education.

Reference Books :

1. Building the Data Warehouse - William H. Inmon, Wiley Publishing.
2. Data mining techniques - Arun K. Pujari, Universities Press.
3. Data Warehousing, Data Mining and OLAP – A. Berson and S. J. Smith, Tata McGraw-Hill.

08.707 COMPUTER NETWORKS LAB

L-T-P: 0-0-4 **Credits : 4**

Experiments Using Routers and Switches

1. Basic router configuration.
2. Implementing static routing.
3. Implementing dynamic routing using RIP
4. Implementing dynamic routing using OSPF
5. Implementing dynamic routing using EIGRP
6. Basic switch configuration
7. VLAN configuration
8. VTP, VTP pruning.
9. Implement inter-VLAN routing
10. Backup and recovery of configuration files of a router using TFTP server.
11. Access Control List (Standard and Extended)
12. Configuring PPP.

Practice Experiments

Familiarization of different Network Cables- Color coding - Crimping.

Familiarization of Wireless Access Point.

08.708 SEMINAR / PROJECT DESIGN

L-T-P: 0 – 0 – 4 **Credits : 4**

Each student should present a seminar of 30 minutes duration on any one of the emerging topics in Information Technology. The seminars should preferably be based on research papers from reputed journals and should be done under the guidance of a faculty member of the department. A seminar report should be prepared and submitted.

Each student along with other team members and under the supervision of a faculty member should identify a problem for the final year project. It should be based on the core subjects of the discipline and could involve software and/or hardware implementation. The preliminary work for the project - literature survey, design etc. - should be carried out in this semester.

An evaluation should be conducted at the end of the semester. For awarding internal marks, the relative weightage of the seminar and the project design will be 1:1.

SEMESTER VIII

08.801 MOBILE COMPUTING

L-T-P: 3 – 1 – 0 **Credits: 4**

MODULE I (17 hours)

Introduction , Wireless Transmission – Frequencies for radio transmission, Signals, Antennas, Signal Propagation, Multiplexing, Modulations, Spread spectrum. Medium Access Control – SDMA, FDMA, TDMA, CDMA, Cellular Wireless Networks. Telecommunication systems – GSM, GPRS, DECT, TETRA, UMTS and IMT-2000 .

MODULE II (17 hours)

Satellite Networks - Basics, Parameters and Configurations, Capacity Allocation – FAMA and DAMA. Broadcast Systems – DAB, DVB. Wireless LAN – IEEE 802.11 - IEEE 802.11a – 802.11b, HIPERLAN – Blue Tooth.

MODULE III (18 hours)

Mobile Network Layer - Mobile IP, Dynamic Host Configuration Protocol, Mobile ad-hoc networks. Introduction to wireless sensor networks. Mobile Transport Layer - Traditional TCP, Classical TCP improvements, TCP over 2.5/3G wireless networks. Support for mobility – File Systems, WWW, WAP, i-mode, SyncML, WAP 2.0.

Text Books:

1. Mobile Communications - Jochen Schiller, Second Edition, Pearson Education
2. Wireless Communications and Networks - William Stallings, Pearson Education

08.802 E-COMMERCE

L-T-P: 3 – 0 – 0 **Credits: 3**

MODULE I (13 hours)

Definition and scope of e-commerce - Advantages and constraints - Strategy making in online environment - Framework for e-commerce.
Basic Technology - Intranets and extranets - Planning an intranet - Extranets and Supply Chain Management - Hosting a web site - Choosing an ISP - Mobile commerce - Website evaluation and usability testing.

MODULE II (13 hours)

Market opportunity analysis - Internet marketing - Tracking customers - Customer service - Web portals and web services - Branding.
Business models in e-commerce - B2C and B2B models - advantages and disadvantages - SCM and B2B - Electronic Data Interchange.

MODULE III (13 hours)

Ethical issues - Legal issues - Copyrights and trademarks - Warranties - Taxation - Online gambling - International issues - Intellectual Property Rights.
Payment systems - Electronic money - Requirements for internet-based payments - Types of electronic payment media - Credit cards - Smart cards - E-cash - E-wallet - Electronic Funds Transfer - B2B and e-payment - M-commerce and e-payment.

Text Books :

1. Electronic Commerce - From Vision to Fulfillment, 3rd Edition, Elias M. Awad, Pearson Education 2008.
2. Introduction to E-commerce, 2nd Edition, Jeffrey F. Rayport and Bernard J. Jaworski, Tata McGraw-Hill Edition, 2008.

08.803 E-SECURITY

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (12 hours)

Security in Computing. Elementary Cryptography. Program Security.

MODULE I (14 hours)

Protection in general purpose Operating Systems.
Designing trusted Operating Systems.
Database Security.

MODULE I (13 hours)

Security in Networks. Administering Security. Legal, Privacy and Ethical issues in Computer security.

Text Book :

Security in Computing - Charles P Pfleeger, Shari Lawrence Pfleeger, Pearson Education.

Reference :

1. Principles of Information Security - Michael E. Whitman, Herbert J. Mattord, Course Technology Cengage Learning 2008.
2. PKI : Implementing and Managing E Security - Andrew Nash, Derek Brink, Bill Duane, McGraw Hill.

08.804 SOFTWARE TESTING

L-T-P: 2 – 1 – 0 **Credits: 3**

MODULE I (13 hours)

Characteristics of Software – Software Development process – Software quality Management – Processes related to software quality - Fundamentals of Software Testing – Principles of Software Testing – Structured approach to Testing - Developing Testing methodologies – Levels of Testing – Acceptance Testing – Special Tests – Testing Tools.

MODULE II (13 hours)

Test planning - Test strategy – Test plan templates (System testing) – Guidelines for developing test plan - Test Estimation – Test standards – Building Test data and Test cases - Test Scenario – Test Scripts - Tools used to build test data – testing object oriented software – Testing web applications.

MODULE III (13 hours)

Test metrics and Test reports – categories of the product/project test metrics – Resources consumed in Testing – Effectiveness of testing – defect density – defect leakage ratio – residual defect density – test team efficiency – test case efficiency - test reports Integration test reports – System Test report – acceptance test report - guidelines for writing and using test report - final test reporting – test status report - benchmarking.

Text Books :

1. Software Testing, Principles , Techniques and Tools - M G Limaye, TMHB
2. Introducing Software Testing - Louise Tamres, Pearson

References :

1. Software Testing - Effective methods, Tools and Techniques - Renu Rajani, Pradeep Oak, TMH
2. The Art of Software Testing - Glenford J. Myers, Wiley
3. Software Testing Fundamentals Methods and Metrics -Marnie L Hutcheson, Wiley
4. Effective Software Testing, 50 Specific Ways to Improve Your Testing - Elfriede Dustin Pearson

08.805A ADVANCED MICROPROCESSORS

L-T-P: 4 – 0 – 0 **Credits : 4**

MODULE I (17 hours)

Intel 8085 – Introduction-Addressing modes - Instruction set - CPU pins & associated signals - Interrupt Systems – Assembly Language Programming
Intel 8086 – Architecture - Addressing modes - Instruction set – Input Output – Interrupts – Design - Assembly Language Programming.
The Mechanics of Program Execution.

MODULE II (17 hours)

Pipelined Execution - Superscalar Execution - The Intel Pentium and Pentium Pro - P, PowerPC Processors: 600 Series, 700 Series, and 7400 - Intel's Pentium 4 vs. Motorola's G4e:Approaches and Design Philosophies. Intel's Pentium 4 vs. Motorola's G4e: The Back End.

MODULE III (18 hours)

64-Bit Computing and x86-64 - The G5: IBM's PowerPC 970- Understanding Caching and Performance-Intel's Pentium M, Core Duo, and Core 2 Duo.

Text Books :

1. Inside the Machine, An Illustrated Introduction to Microprocessors and Computer Architecture - Jon Stokes, No Starch Press 2006.

2. Microprocessors Theory & Applications: Intel & Motorola – Revised Edition by M. Rafiquzzaman, PHI.

08.805B NETWORK PROGRAMMING

L-T-P: 4 – 0 – 0 **Credits: 4**

MODULE I (18 hours)

Internet Protocol, The structure of TCP /IP software in an operating system, Network interface layer, Address Recovery and binding global, Software organization, Routing table and Routing algorithm, Fragmentation and reusability of datagrams, Error processing, Multi cast processing.

MODULE II (17 hours)

User datagrams. TCP- Data structures and Input processing. Finite state machine implementation, Output processing timer management, flow control and adaptive retransmission, Urgent data processing and the push function.

MODULE III (17 hours)

Socket level interface, Active Route propagation and Passive acquisition, Route propagation with an SPF algorithm.

Text Books :
Internetworking with TCP / IP - Volume II, Design, Implementation and Internals, D. E. Comer and D. L Stevens, PHI.

08.805C GRAPH THEORY
(Common with 08.805(4) of CSE)

L-T-P: 4-0-0 **Credits: 4**

MODULE I (16 hours)

What is graph – Application of graphs – finite and infinite graphs – Incidence and Degree – Isolated vertex, pendent vertex, Null graph.
Paths and circuits – Isomorphism, sub graphs, walks, paths and circuits, Connected graphs, disconnected graphs, Euler graphs, Hamiltonian paths and circuits – Travelling salesman problem.
Trees – properties, pendent vertex, Distance and centres - Rooted and binary tree, counting trees, spanning trees.

MODULE II(18 hours)

Combinatorial versus geometric graphs, Planar graphs, Different representation of planar graphs, geometric dual, combinatorial dual, vector spaces of graph, ban2 vectors of a graph, orthogonal vectors and spaces Directed graphs – types of digraphs, Digraphs and binary relation, Euler graphs, trees with directed edges.

MODULE III18 hours)

Graph theoretic algorithms and computer programming - Algorithm for computer representation of a graph, algorithm for connectedness and components, spanning tree, directed circuits, shortest path, searching the graphs, Isomorphism.
Graphs in switching and coding theory – contact networks, Analysis of contact Networks, synthesis of contact networks, sequential switching networks, unit cube and its graph, graphs in coding theory.

Text Books :
1. Graph Theory – Frank Harara, Narosa Publishers.
2. Graph Theory – Narasingh Deo, PHI.

Reference Books :
1. Graphs Theory Applications – L.R. Foulds, Narosa Publishers.
2. A First Look at Graph Theory – John Clark and Derek Allan Hotton, Allied.

08.806A SOFT COMPUTING

L-T-P: 4 – 0 – 0 **Credits: 4**

MODULE I (17 hours)

Comparison of Soft Computing Methods -Neural networks, Fuzzy Logic, Genetic Algorithm with Conventional Artificial Intelligence(hard computing) Neural Networks- Different Architectures, Back-propagation Algorithm, Hybrid Learning Rule, Supervised Learning- Perceptrons, Back-propagation Multilayer Perceptrons, Unsupervised Learning – Competitive Learning Network.

MODULE II(18 hours)

Fuzzy Set Theory – Basic Definition and terminology, Basic Concepts of Fuzzy Logic, Set Theoretic Operators, Membership functions- formulation and parameterization. Fuzzy Union, Intersection, and Complement. Fuzzy Rules and Fuzzy Reasoning. Fuzzy Inference Systems- Mamdani and Sugeno Fuzzy models. Fuzzy Assocaitive Memories. Neuro-Fuzzy Modelling.

MODULE III(18 hours)

Genetic Algorithm – Basics of Genetic Algorithms, Design issues in Genetic Algorithm, Genetic Modelling, Hybrid Approach, GA based Fuzzy Model Identification. Fuzzy Logic controlled Genetic Algorithm, Neuro- Genetic Hybrids & Fuzzy – Genetic Hybrids.

Text Book :

Neural Networks, Fuzzy Logic & Genetic Algorithms, S Rajasekharan, S A Vijayalekshmi Pai, PHI 2003.

References :

1. *Neurofuzzy and Soft Computing,* J S R Jang, C T Sun, E Mizutani, PHI.
2. *Neural Networks,* James A Freeman & David M Skapura, Pearson.
3. *Genetic Algorithms,* David E Goldberg, Pearson.
4. *Fuzzy Logic, Intelligence, control, and Information,* John Yen & Reza Langari, Pearson.
5. *Neural Fuzzy Systems,* C T Lin & C S G Lee, PHI.
6. *Fuzzy Engineering,* Bart KoskO, PHI 1997.
7. *Neural networks,* Simon Haykins, PHI / Pearson.

08.806B DISTRIBUTED SYSTEMS

L-T-P: 4 – 0 – 0 **Credits:4**

MODULE I (17 hours)

Characteristics of distributed System: Examples of distributed systems – resource sharing and web – world wide web – issues in the design of distributed system. System models: Architectural models and fundamental models. Networking and internetworking: Types of network – network principles – Internet protocols

MODULE II(17 hours)

Interprocess communication : the API for Internet protocol – external data representation and Marshalling – client server communication - group communication-Case study: inter process communication in Unix. Distributed objects and remote invocation: communication between distributed objects – remote procedure call – Events and notification.

MODULE III(18 hours)

Operating system support: Operating system layer – protection – processes and threads-communication and invocation – Operating system architecture.
Distributed file system: File service architecture – Sun network file system- Transactions and concurrency control: Transactions, nested transactions-locks-optimistic concurrency control.
Replication : System model and group Communication.

Text Books:
Distributed Systems: Concepts and Design – George Coulouris, Jean Dollimore and Tim Kindberg, Pearson Education
References:
1. Distributed Systems: Principles and Paradigms – Andrew S Tanenbaum and Maarten Van Steen, Pearson Education
2. Distributed Systems and Computer Networks – Morris Solomon and Jeff Krammer, PHI

08.806C WEB SERVICES

L-T-P: 4 – 0 – 0 **Credits: 4**

MODULE I (18 hours)

Introduction to web services - Benefits of web services - How web services work. XML schema - Basic elements and attributes - Types - Occurrence constraints - Element groups - Namespaces - Qualification - Global declarations - Modular schemas - Extensions and restrictions - Substitution groups - Importing types.

MODULE II (17 hours)

Simple Object Access Protocol - SOAP messages - SOAP message exchange model - SOAP encoding and XML schemas - SOAP data types - SOAP transports.

MODULE III (17 hours)

Web Services Description Language - Data types and messages - Defining a web service interface - Defining a web service implementation - Message patterns. Universal Directory and Discovery Interface - UDDI registries - UDDI publish interface - UDDI inquiry interface - Using UDDI and WSDL together.

Text Books :

1. .NET Web Services Architecture & Implementation, Keith Ballinger, Pearson Education 2003.
2. C# How to Program, Deitel & Deitel, Pearson Education 2002.
3. XML in Action : Web Technology, Pardi, PHI 2002.
4. Web Services - An Introduction, B.V. Kumar, S.V. Subrahmanya, Tata McGraw Hill 2009.

08.807 WEB APPLICATIONS LAB

L-T-P: 0 – 0 – 4 **Credits: 4**

1. Implementing and deploying web applications using Servlets, HTML and JSPs.
2. Testing the application on an Application Server.
3. Debugging Web applications locally and remotely.
4. Developing applications in a team environment.
5. Retrieval of data from database using SQL and exchange of information in XML format.

08.808 PROJECT & VIVA VOCE

L-T-P: 0 – 0 – 4 **Credits: 4**

The project should be based on the core subjects of the discipline. The work can be carried out in the department under the supervision of a faculty member or with the help of an external organization. In the latter case, the motivation of the organizations should be purely academic and they should provide an external guide whose qualifications should be on par with that of a faculty member. An internal guide will be consistently interacting with the external guide and monitoring the progress of the project. There should be a mid-semester and end-semester evaluation of the project.

The student has to submit a thesis in the prescribed format, duly certified by the internal guide and external guide(if any).

In the viva voce, the student's performance will be evaluated based on the project work, the seminar presented and the knowledge of the courses in the whole curriculum. The distribution of the marks will be in the ratio 2:1:2, respectively.