3IT1 MATHEMATICS III (Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3, Tutorial: 1**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction: Engineering application of optimization, Statement and classification of optimization problem, single variable and multivariable optimization with and without constraints.
II	Linear Programming: Formulation of Linear Programming problem, Graphical Approach, General Linear Programming problem, Simple Method. Duality in Linear Programming and Transportation Problems.
III	Project Scheduling: Project Scheduling by PERT and CPM Network Analysis. Sequencing Theory: General Sequencing problem n-jobs through 2 machines & 3 machines and 2-jobs through m machines.
IV	LAPLACE TRANSFORM: Laplace transform with its simple properties. Inverse Laplace transform, convolution theorem (without proof), solution of ordinary differential equation with constant coefficient, solution of partial differential equation having constant coefficient with special reference to diffusion, Heat conduction and wave equation. Boundary value problems
V	NUMERICAL ANALYSIS: Difference operators forward, backward, control, shift and average operators and relation between them. Newton's and Gauss forward and backward interpolation formula for equal interval, Sterling & formula for control difference. Lagranges Interpolation formula. Inverse Interpolation. Numerical differentiation by Newtons, Gauss and Sterling's formula. Numerical Integration by Simpson's one third and there eight rule. Numerical Integration of ordinary differential equation of first order by Picards method, Euler's and modified Euler's method, Milure's method and Runga Kutta fourth order method. Solution of difference equation.

Text/References:

1. Operation Research By Kanti Swaroop, P. K. Gupta & Manmohan, Sultan chand & sons
2. Integral Transform By Dr. R.K. Gupta, A.R. Vashishtha, Krishna Prakashan Mandir Meerut
3. Calculus of Finite Differences & Numerical Analysis By Dr. Gupta & Malik Krishna Prakashan Mandir Meerut
4. Engineering Mathematics III By Jain and Rawat, CBC
5. Engineering Mathematics III By Prof. K.C. Sarangi and others, Genius publications

3IT2 ELECTRONIC DEVICES & CIRCUITS (Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Mobility and conductivity, charge densities in a semiconductor, Fermi Dirac distribution, carrier concentrations and fermi levels in semiconductor, Generation and recombination of charges, diffusion and continuity equation, Mass action Law, Hall effect. Junction diodes, Diode as a ckt. element, load line concept, clipping and clamping circuits, Voltage multipliers.
II	Transistor characteristics, Current components, Current gains: alpha and beta. Operating point. Hybrid model, h-parameter equivalent circuits. CE, CB and CC configuration. DC and AC analysis of CE,CC and CB amplifiers. Ebers-Moll model. Biasing & stabilization techniques. Thermal runaway, Thermal stability.
III	SMALL SIGNAL AMPLIFIERS AT LOW FREQUENCY : Analysis of BJT and FET, RC coupled amplifiers. Frequency response, midband gain, gains at low and high frequency. Miller's Theorem. Cascading Transistor amplifiers, Emitter follower. JFET, MOSFET, Equivalent circuits and biasing of JFET's & MOSFET's. Low frequency CS and CD JFET amplifiers. FET as a voltage variable resistor. Source follower.
IV	FEEDBACK AMPLIFIERS : Classification, Feedback concept, Transfer gain with feedback, General characteristics of negative feedback amplifiers. Analysis of voltage-series, voltage-shunt, current- series and current-shunt feedback amplifier. Stability criterion.
V	OSCILLATORS : Classification. Criterion for oscillation. Tuned collector, Hartley, Colpitts, RC Phase shift, Wien bridge and crystal oscillators, Astable, monostable and bistable multivibrators. Schmitt trigger.

Text/References:

1. Electronic devices & circuits theory By R.L. Boylestad, Louis Nashelsky ,Pearson education
2. Integrated Electronics By Millman Halkias, T.M.H
3. Electronic devices & circuits By David Bell, Oxford Publications
4. Grob's Basic Electronics By Schultz, T.M.H.

3IT3 DATA STRUCTURES & ALGORITHMS (Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Definition & characteristics of algorithms, structures. Difficulties in estimating exact execution time of algorithms. Concept of complexity of program. Asymptotic notations: Big-Oh, theta, Omega- Definitions and examples, Determination of time and space complexity of simple algorithms without recursion. Representing a function in asymptotic notations viz $5n^2-6n=\theta(n^2)$ Arrays: Array as storage element, Row major & column major form of arrays, computation of address of elements of n dimensional array.
II	Arrays as storage elements for representing polynomial of one or more degrees for addition & multiplication, sparse matrices for transposing & multiplication, stack, queue, dequeue, circular queue for insertion and deletion with condition for over and underflow, transposition of sparse matrices with algorithms of varying complexity (Includes algorithms for operations as mentioned). Evaluation of Expression: Concept of precedence and associativity in expressions, difficulties in dealing with infix expressions, Resolving precedence of operators and association of operands, postfix & prefix expressions, conversion of expression from one form to other form using stack (with & without parenthesis), Evaluation of expression in infix, postfix & prefix forms using stack. Recursion.
III	Linear linked lists: singly, doubly and circularly connected linear linked lists-insertion, deletion at/ from beginning and any point in ordered or unordered lists. Comparison of arrays and linked lists as data structures. Linked implementation of stack, queue and dequeue. Algorithms for of insertion, deletion and traversal of stack, queue, dequeue implemented using linked structures. Polynomial representation using linked lists for addition, Concepts of Head Node in linked lists. Searching: Sequential and binary search
IV	Non-Linear Structures: Trees definition, characteristics concept of child, sibling, parent child relationship etc, binary tree: different types of binary trees based on distribution of nodes, binary tree (threaded and unthreaded) as data structure,

	insertion, deletion and traversal of binary trees, constructing binary tree from traversal results. Threaded binary Tree. Time complexity of insertion, deletion and traversal in threaded and ordinary binary trees. AVL tree: Concept of balanced trees, balance factor in AVL trees, insertion into and deletion from AVL tree, balancing AVL tree after insertion and deletion. Application of trees for representation of sets.
V	Graphs: Definition, Relation between tree & graph, directed and undirected graph, representation of graphs using adjacency matrix and list. Depth first and breadth first traversal of graphs, finding connected components and spanning tree. Single source single destination shortest path algorithms. Sorting: Insertion, quick, heap, topological and bubble sorting algorithms for different characteristics of input data. Comparison of sorting algorithms in term of time complexity. NOTE: 1. Algorithm for any operation mentioned with a data structure or required to implement the particular data structure is included in the curriculum.

Text/References:

1. An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH
2. Data Structures in C/C++, Horowitz, Sawhney
3. Data Structures in C/C++, Tanenbaum, PHI

3IT4 OBJECT ORIENTED PROGRAMMING (Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction: Review of structures in C, accessing members of structures using structure variables, pointer to structures, passing structures to functions, structures as user defined data types.
II	Introduction to programming paradigms- (Process oriented and Object oriented). Concept of object, class, objects as variables of class data type, difference in structures and class in terms of access to members, private and public Basics of C++: Structure of C++ programs, introduction to defining member functions within and outside a class, keyword *using*, declaring class, creating objects, constructors & destructor functions, Initializing member values with and without use of constructors, simple programs to access & manipulate data members, *cin* and *cout* functions. Dangers of returning reference to a private data member, constant objects and members function, composition of classes, friend functions and classes, using *this* pointer, creating and destroying objects dynamically using *new* and *delete* operators. Static class members, container classes and iterators, proxy classes. members of a class, data & function members. Characteristics of OOP- Data hiding, Encapsulation, data security.
III	Operator overloading: Fundamentals, Restrictions, operator functions as class members v/s as friend functions. Overloading stream function, binary operators and unary operators. Converting between types.
IV	Inheritance: Base classes and derived classes, protected members, relationship between base class and derived classes, constructors and destructors in derived classes, public, private and protected inheritance, relationship among objects in an inheritance hierarchy, abstract classes, virtual functions and dynamic binding, virtual destructors.
V	Multiple inheritance, virtual base classes, pointers to classes and class members, multiple class members. Templates, exception handling.

Text/References:

1. How to Program C++, Dietel, Pearson
2. Mastering C++ By K.R.Venugopal, TMH
3. Object Oriented Programming in C++ By Robert Lafore, Pearson
4. Object Oriented Design & Modelling, Rambaugh, PHI

3IT5 DIGITAL ELECTRONICS (Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	NUMBER SYSTEMS, BASIC LOGIC GATES & BOOLEAN ALGEBRA: Binary Arithmetic & Radix representation of different numbers. Sign & magnitude representation, Fixed point representation, complement notation, various codes & arithmetic in different codes & their inter conversion. Features of logic algebra, postulates of Boolean algebra. Theorems of Boolean algebra. Boolean function. Derived logic gates: Exclusive-OR, NAND, NOR gates, their block diagrams and truth tables. Logic diagrams from Boolean expressions and vica-versa. Converting logic diagrams to universal logic. Positive, negative and mixed logic. Logic gate conversion.
II	DIGITAL LOGIC GATE CHARACTERISTICS: TTL logic gate characteristics. Theory & operation of TTL NAND gate circuitry. Open collector TTL. Three state output logic. TTL subfamilies. MOS & CMOS logic families. Realization of logic gates in RTL, DTL, ECL, C-MOS & MOSFET. Interfacing logic families to one another.
III	MINIMIZATION TECHNIQUES: Minterm, Maxterm, Karnaugh Map, K map upto 4 variables. Simplification of logic functions with K-map, conversion of truth tables in POS and SOP form. Incomplete specified functions. Variable mapping. Quinn-Mc Klusky minimization techniques.
IV	COMBINATIONAL SYSTEMS: Combinational logic circuit design, half and full adder, subtractor. Binary serial and parallel adders. BCD adder. Binary multiplier. Decoder: Binary to Gray decoder, BCD to decimal, BCD to 7-segment decoder. Multiplexer, demultiplexer, encoder. Octal to binary, BCD to excess-3 encoder. Diode switching matrix. Design of logic circuits by multiplexers, encoders, decoders and demultiplexers.
V	SEQUENTIAL SYSTEMS: Latches, flip-flops, R-S, D, J-K, Master Slave flip flops. Conversions of flip-flops. Counters : Asynchronous (ripple), synchronous andsynchronous decade counter, Modulus counter, skipping state counter, counter design. Ring counter. Counter applications. Registers: buffer register, shift register.

Text/References:

1. Digital integrated electronics, By Herbert Taub, Donald L. Schilling
2. Modern Digital Electronics By R.P. Jain, TMH
3. Digital Logic and Computer Design By M. Morris Mano, PHI
4. Fundamentals of Digital circuits By A. Anand kumar, PHI
5. Digital circuit design By S. Salivahanan, Sarivazhagan, Vikas publications

3IT6.1 OPTICAL COMMUNICATION (Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	OPTICAL FIBERS - Basic optical laws and definitions, Principles of light propagation in fibers, Ray theory, Optical fiber modes and configurations, Step index and graded index fibers, Monomode and multimode fibers, Fiber materials, fiber fabrication, Fiber optic cables. Attenuation, signal distortion in optical fibers, Dispersion-intra modal & inter modal, Dispersion shifted and flattened fiber.
II	OPTICAL SOURCES - LED's- Structure, Materials, Characteristics, Modulation, Power & efficiency, Laser Diodes - Basic concept, Hetro Structure, properties and modulation.
III	OPTICAL DETECTORS - PIN and Avalanche photo diodes, photo detector noise, detector response time, Avalanche multiplication noise. Photo diode materials. Fundamental of Optical Receiver Operation.
IV	OPTICAL FIBER COMMUNICATION SYSTEMS- Source to fiber coupling, fiber to fiber joints, fiber splicing, fiber connectors. Principle components. Link design calculation, Applications, Wavelength division multiplexing.
V	OPTICAL FIBER MEASUREMENTS: Measurements of Fiber attenuation, Dispersion, refractive index profile, Numerical aperture & diameter.

Text/References:

1. Fiber optics communication By Harold Kolimbiris, Pearson education
2. Optical fiber communication By John M.Senior, Pearson education
3. Fiber Optics and Optoelectronics By R.P. Khare, Oxford Publication
4. Principles of Optical Fiber By Gerd Keiser, TMH

3IT6.2 FUNDAMENTALS OF LINUX SHELL PROGRAMMING

(Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction: Logging in, changing password (*passwd* command only), *man, xman, info* commands to access on line help. Simple commands like *ls, cp, mv, grep, head, tail, sort, uniq, diff, echo, date, which, whereis, whatis, who, finger w* (option and variations included). Directory commands, access permissions, changing access permissions for files and directories, hard & symbolic links. Environment and path setting.
II	vi editor: Creating and editing files, features of vi, insertion deletion, searching, substitution operations, yank, put, delete commands, reading & writing files, *exrc* file for setting parameters, advance editing techniques. vim(improved vi). Programming utilities: Compiling & linking C, C++ programs, *make* utility, debugging C programs using *gdb*, system call.
III	Introduction to X-window system: x-window as client/ server system, concept of window manager, remote computing & local displays, *xinitrc* file, customize X work environment and applications, customizing the *fvwm* window manager.
IV	Shell: Meaning and purpose of shell, Introduction to types of shell. The command line, standard input and standard output, redirection, pipes, filters special characters for searching files and pathnames. Bourne Again SHell: shell script-writing and executing, command separation & grouping, redirection, directory stack manipulation, processes, parameters & variables, keyword variables.
V	Shell Programming: Control structures, the *Here* document, expanding *NULL* or *USET* variables, Builtins, functions, history, aliases, job control, filename substitution. source code management- RCS and CVS. *awk* utility.

Text/References:

1. A practical Guide to Linux, Sobell, Pearson.
2. A Practical Guide to Linux Commands, Editors, and Shell Programming, Sobell, Pearson.
3. A Practical Guide to Fedora and Red Hat Enterprise Linux, Sobell, 5e, Pearson

3IT6.3 MANAGEMENT INFORMATION SYSTEM

(Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction to MIS: concept, Definition, role, Impact and effectiveness of MIS. E-business enterprise: Introduction, E-business, E-commerce, E-communication, E-collaboration. Information Security Challenges: Security Threats controlling and management.
II	Basic of Management Information System: Decision Making, Information and knowledge, OO- Technology and MIS, Business process Re-engineering.
III	Application of Management Information system: Application in manufacturing sector using for personal management, financial management, Production Management, Material Management, Marketing Management Application in Service Sector.
IV	Enterprise Resource Planning (ERP): EMS, ERP, Benefits implementation, EMS & MIS. Case Studies: Application of SAP technologies in manufacturing sector
V	Database and client server architecture, Data Warehouse: architecture to implementation, E-business Technology: Electronic payment systems, Web enabled business management, MIS in web environment.

Text/References:

1. Management Information Systems By W.S. Javadekar, T.M.H.
2. Management Information Systems By Laudon & Laudon, T.M.H.

3IT7 PROGRAMMING IN C++ (Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs.: 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1	To write a simple program for understanding of C++ program structure without any CLASS declaration. Program may be based on simple input output, understanding of keyword using.
2	Write a C++ program to demonstrate concept of declaration of class with public & private member, constructors, object creation using constructors, access restrictions, defining member functions within and outside a class. Scope resolution operators, accessing an object's data members and functions through different type of object handle name of object, reference to object, pointer to object, assigning class objects to each other.
3	Program involving multiple classes (without inheritance) to accomplish a task. Demonstrate composition of class.
4	Demonstration Friend function friend classes and this pointer.
5	Demonstration dynamic memory management using new & delete & static class members.
6	Demonstration of restrictions an operator overloading, operator functions as member function and/ or friend function, overloading stream insertion and stream extraction, operators, overloading operators etc.
7	Demonstrator use of protected members, public & private protected classes, multi-level inheritance etc.
8	Demonstrating multiple inheritance, virtual functions, virtual base classes, abstract classes

3IT8 DATA STRUCTURES LAB (Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1	Write a simple C program on a 32 bit compiler to understand the concept of array storage, size of a word. The program shall be written illustrating the concept of row major and column major storage. Find the address of element and verify it with the theoretical value. Program may be written for arrays upto 4-dimensions.
2	Simulate a stack, queue, circular queue and dequeue using a one dimensional array as storage element. The program should implement the basic addition, deletion and traversal operations.
3	Represent a 2-variable polynomial using array. Use this representation to implement addition of polynomials.
4	Represent a sparse matrix using array. Implement addition and transposition operations using the representation.
5	Implement singly, doubly and circularly connected linked lists illustrating operations like addition at different locations, deletion from specified locations and traversal.
6	Repeat exercises 2, 3 & 4 with linked structures.
7	Implementation of binary tree with operations like addition, deletion, traversal.
8	Depth first and breadth first traversal of graphs represented using adjacency matrix and list.
9	Implementation of binary search in arrays and on linked Binary Search Tree.
10	Implementation of insertion, quick, heap, topological and bubble sorting algorithms.

3IT9 ANALOG ELECTRONICS LAB (Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1	Plot V-I characteristic of P-N junction diode & calculate cut-in voltage, reverse Saturation current and static & dynamic resistances.
2	Plot V-I characteristic of zener diode and study of zener diode as voltage regulator. Observe the effect of load changes and determine load limits of the voltage regulator.
3	Plot frequency response curve for single stage amplifier and to determine gain bandwidth product.
4	Plot drain current - drain voltage and drain current – gate bias characteristics of field effect transistor and measure of I_{dss} & V_p
5	Application of Diode as clipper & clamper
6	Plot gain- frequency characteristic of two stages RC coupled amplifier & calculate its bandwidth and compare it with theoretical value.
7	Plot gain- frequency characteristic of emitter follower & find out its input and output resistances.
8	Plot input and output characteristics of BJT in CB, CC and CE configurations. Find their h-parameters.
9	Plot gain-frequency characteristics of BJT amplifier with and without negative feedback in the emitter circuit and determine bandwidths, gain bandwidth products and gains at 1kHz with and without negative feedback.
10	Plot and study the characteristics of small signal amplifier using FET.
11	Study Wein bridge oscillator and observe the effect of variation in R & C on oscillator frequency
12	Study transistor phase shift oscillator and observe the effect of variation in R & C on oscillator frequency and compare with theoretical value.
13	To plot the characteristics of UJT and UJT as relaxation.
14	To plot the characteristics of MOSFET and CMOS.

3IT10 DIGITAL ELECTRONICS LAB (Common to Comp. Engg. & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

S. No.	**List of Experiments**
1	To verify the truth tables of basic logic gates: AND, OR, NOR, NAND, NOR. Also to verify the truth table of Ex-OR, Ex-NOR (For 2, 3, & 4 inputs using gates with 2, 3, & 4 inputs).
2	To verify the truth table of OR, AND, NOR, Ex-OR, Ex-NOR realized using NAND & NOR gates.
3	To realize an SOP and POS expression.
4	To realize Half adder/ Subtractor & Full Adder/ Subtractor using NAND & NOR gates and to verify their truth tables.
5	To realize a 4-bit ripple adder/ Subtractor using basic Half adder/ Subtractor & basic Full Adder/ Subtractor.
6	To verify the truth table of 4-to-1 multiplexer and 1-to-4 demultiplexer. Realize the multiplexer using basic gates only. Also to construct and 8-to-1 multiplexer and 1-to-8 demultiplexer using blocks of 4-to-1 multiplexer and 1-to-4 demultiplexer
7	Design & Realize a combinational circuit that will accept a 2421 BCD code and drive a TIL -312 seven-segment display.
8	Using basic logic gates, realize the R-S, J-K and D-flip flops with and without clock signal and verify their truth table
9	Construct a divide by 2,4 & 8 asynchronous counter. Construct a 4-bit binary counter and ring counter for a particular output pattern using D flip flop.
10	Perform input/output operations on parallel in/Parallel out and Serial in/Serial out registers using clock. Also exercise loading only one of multiple values into the register using multiplexer. Note: As far as possible, the experiments shall be performed on bread board. However, experiment Nos. 1-4 are to be performed on bread board only.

4IT1 MICROPROCESSOR AND INTERFACES (Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction to Microprocessors, microcontroller; 8085 Microprocessor Architecture, pin description, Bus concept and organization; concept of multiplexing and demultiplexing of buses; concept of static and dynamic RAM, type of ROM, memory map.
II	Software architecture registers and signals, Classification of instruction, Instruction set, addressing modes, Assembly Language Programming and Debugging, Programming Technique, instruction Format and timing.
III	Advance Assembly Language Programming, Counter and time delay; types of Interrupt and their uses, RST instructions and their uses, 8259 programmable interrupt controller; Macros, subroutine; Stack- implementation and uses with examples; Memory interfacing.
IV	8085 Microprocessor interfacing:, 8255 Programmable Peripheral Interface, 8254 programmable interval timer, interfacing of Input/output device, 8279 Key board/Display interface.
V	Microprocessor Application: Interfacing scanned multiplexed display and liquid crystal display, Interfacing and Matrix Keyboard, MPU Design; USART 8251, RS232C and RS422A, Parallel interface- Centronics and IEEE 488 .

Text/References:

1. Microprocessor architecture, programming, and applications with the 8085 By Ramesh S. Gaonkar
2. Introduction to Microprocessor By Aditya P. Mathur, TMH
3. Microprocessor & Interfaceing By Douglas V. Hall,TMH
4. Microprocessor & Peripheral By A.K.Ray, K.M. Bhurchandi,TMH

4IT2 PRINCIPLES OF PROGRAMMING LANGUAGES

(Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Programming Language: Definition, History, Features. Issues in Language Design: Structure and Operation of computer, Programming Paradigms. Efficiency, Regularity. Issues in Language Translation: Syntax and Semantics.
II	Specifications and Implementation of Elementary and Structured Data Types. Type equivalence, checking and conversion. Vectors and Arrays, Lists, Structures, Sets, Files.
III	Sequence control with Expressions, Conditional Statements, Loops, Exception handling. Subprogram definition and activation, simple and recursive subprogram, subprogram environment.
IV	Scope – Static and Dynamic, Block structures, Local Data and Shared Data, Parameters and Parameter Transmission. Local and Common Environments, Tasks and Shared Data.
V	Abstract Data type, information hiding, encapsulation, type definition. Static and Stack-Based Storage management. Fixed and Variable size heap storage management, Garbage Collection.

Text/References:

1. Programming languages: design and implementation, Terrence W. Pratt.
2. Programming languages: concepts and constructs, Ravi Sethi, ISBN 9780201590654.
3. Programming Language Pragmatics, Scott, ELSEVIER

4IT3 DISCRETE MATHEMATICAL STRUCTURES

(Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3, Tutorial:1**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Language of Logic: Proposition, Compound Proposition, Conjunction, Disjunction, Implication, Converse, Inverse & Contrpositive, Biconditional Statements, tautology, Contradiction & Contingency, Logical Equivalences, Quantifiers, Arguments.
II	Proof Methods: Vacuous, Trivial, Direct, Indirect by Contrapositive and Contradiction, Constructive & Non-constructive proof, Counterexample. The Division Algorithm, Divisibilty Properties (Prime Numbers & Composite Numbers), Principle of Mathematical Induction, The Second Principle of Mathematical Induction, Fundamental Theorem of Arithmetic. Algorithm Correctness: Partial Correctness, Loop Invariant. Testing the partial correctness of linear & binary search, bubble & selection sorting.
III	Graph Theory: Graphs – Directed, Undirected, Simple,. Adjacency & Incidence, Degre of Vertex, Subgraph, Complete graph, Cycle & Wheel Graph, Bipartite & Complete Bipartite Graph, Weighed Graph, Union of Simple Graphs. Complete Graphs. Isomorphic Graphs, Path, Cycles & Circuits Euclerian & Hamiltonian Graphs. Planar Graph: Kuratowski's Two Graphs, Euler's Formula, Kuratowski's Theorem. Trees: Spanning trees- Kruskal's Algo, Finding Spanning Tree using Depth First Search, Breadth First Search, Complexity of Graph, Minimal Spanning Tree.
IV	Sets: Definition and types, Set operations, Partition of set, Cardinality (Inclusion-Exclusion & Addition Principles), Recursive definition of set. Functions: Concept, Some Special Functions (Polynomial, Exponential & Logarithmic, Absolute Value, Floor & Ceiling, Mod & Div Functions), Properties of Functions, Cardinality of Infinite Set, Countable & Uncountable Sets, The Pigeonhole & Generalized Pigeonhole Principles, Composition of Functions.
V	Relations: Boolean Matrices, Binary Relation, Adjacency Matrix of Relation, Properties of Relations, Operations on Relations, The Connectivity Relations, Transitive Closure-Warshall's Algorithm, Equivalence relations- Congruence Relations, Equivalence Class, Number of Partitions of a Finite Set, Partial & Total Orderings.

Text/References:

1. Discrete Mathematics with Applications, Koshy, ELSEVIER
2. Discrete Mathematical Structures By Lipschutz & Lipson, TMH
3. Discrete Mathematical Structures, Kolman et.al, Pearson

4IT4 STATISTICS & PROBABILITY THEORY (Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3, Tutorial:1**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction & Discrete random variables Sample space, events, algebra of events, Bernoulli's trials, Probability & Baye's theorem. Random variable & their event space, probability generating function, expectations, moments, computations of mean time to failure, Bernoulli & Poisson processes.
II	Discrete & continuous distributions Probability distribution & probability densities: Binomial, Poisson, normal rectangular and exponential distribution & their PDF's, moments and MGF's for above distributions.
III	Correlation & Regression Correlation & regression: Linear regression, Rank correlation, Method of least squares Fitting of straight lines & second degree parabola. Normal regression and correlation analysis.
IV	Queuing Theory Pure birth, pure death and birth-death processes. Mathematical models for M/M/1, M/M/N, M/M/S and M/M/S/N queues.
V	Discrete Parameter mark on chains: M/G/1 Queuing model, Discrete parameter birth-death process.

Text/References:

1. Probability, Statistics & Random Process By T. Veerajan, TMH
2. Fundamental of Mathematical Statistics By S.C.Gupta and V.K. Kapoor, Sultanchand & sons.
3. Statistics and Probability Theory By Jain & Rawat ,CBC
4. Statistics and Probability Theory By Schaum's, T.M.H.

4IT5 SOFTWARE ENGINEERING (Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	System Analysis: Characteristics, Problems in system Development, System Level project Planning, System Development Life cycle (SDLC), computer system engineering & system analysis, modeling the architecture, system specification.
II	Software & its characteristics: Software Development, Process Model, Prescriptive model, The water fall model, Incremental Process Modes, Evolutionary process model, specialized process model.
III	Requirement Analysis: Requirement analysis tasks, Analysis principles, Software prototyping and specification data dictionary finite state machine (FSM) models. Structured Analysis: Data and control flow diagrams, control and process specification behavioral modeling, extension for data intensive applications.
IV	Software Design: Design fundamentals, Effective modular design: Data architectural and procedural design, design documentation, coding – Programming style, Program quality, quantifying program quality, complete programming example
V	Object Oriented Analysis: Object oriented Analysis Modeling, Data modeling Object Oriented Design: OOD concepts and methods class and object definitions, refining operations, Class and object relationships, object modularization, Introduction to Unified Modeling Language

Text/References:

1. Software Engineering By Roger S. Pressman, TMH
2. Software Engineering Fundamental By Ali Behforooz, Frederick J Hudson, Oxford University Press

4IT6.1 ANALOG & DIGITAL COMMUNICATION
(Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	AMPLITUDE MODULATION: Frequency translation, Recovery of base band signal, Spectrum & power relations in AM systems. Methods of generation & demodulation of AM-DSB, AM-DSB/SC and AM-SSB signals. Modulation & detector circuits for AM systems. AM transmitters & receivers.
II	FREQUENCY MODULATION : Phase & freq. modulation & their relationship, Spectrum & band width of a sinusoidally modulated FM signal, phasor diagram, Narrow band & wide band FM. Generation & demodulation of FM signals. FM transmitters & receivers. Comparison of AM, FM & PM. Pre emphasis & de-emphasis. Threshold in FM, PLL demodulator.
III	PCM & DELTA MODULATION SYSTEMS : Uniform and Non-uniform quantization. PCM and delta modulation, Signal to quantization noise ratio in PCM and delta modulation. DPCM, ADM, T1 Carrier System, Matched filter detection. Error probability in PCM system.
IV	BASE BAND TRANSMISSION: Line coding(RZ,NRZ): Polar, Bipolar, Manchester, AMI. Inter symbol interference, Pulse shaping, Nyquist criterion, Raised cosine spectrum. PULSE ANALOG MODULATION: Practical aspects of sampling: Natural and flat top sampling. PAM, PWM, PPM modulation and demodulation methods, PAM-TDM.
V	DIGITAL MODULATION TECHNIQUES : Geometric interpretation of signals, Orthogonalization. ASK, BPSK, BFSK, QPSK, MSK modulation techniques and Coherent detection of these techniques. Calculation of error probabilities.

Text/References:

1. Principles of communication systems By Taub Schilling, T.M.H.
2. Fundamentals of communication systems By Proakis & Salehi, Pearson education
3. Analog & Digital Communication By Simon Haykin, John Wiley
4. Communication Systems (Analog and Digital) By R.P. Singh, S.D. Sapre, T.M.H.
5. Modern Digital & Analog Communication By B.P. Lathi, Oxford Publications
6. Digital & Analog Communication Systems By K.S. Shanmugam, John Wiley

4IT6.2 LINEAR INTEGRATED CIRCUITS (Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	OPERATIONAL AMPLIFIERS: Basic differential amplifier analysis, Single ended and double ended configurations ,Op-amp configurations with feedback, Op-amp parameters, Inverting and Non- Inverting configuration, Comparators, Adder.
II	OPERATIONAL AMPLIFIER APPLICATIONS: Integrator, Differentiator, Voltage to frequency & Frequency to voltage converters. Oscillators: Phase shift, Wien bridge, Quadrature, square wave, triangular wave, sawtooth oscillators. Voltage controlled oscillators.
III	ACTIVE FILTERS: Low pass, high pass, band pass and band reject filters,All pass filter, Switched capacitor filter, Butterworth filter design, Chebyshev Filter design.
IV	PHASE-LOCKED LOOPS: Operating Principles of PLL, Linear Model of PLL, Lock range, Capture range, Applications of PLL as FM detector, FSK demodulator, AM detector, frequency translator, phase shifter, tracking filter, signal synchronizer and frequency synthesizer, Building blocks of PLL, LM 565 PLL.
V	LINEAR IC's: Four quadrant multiplier & its applications, Basic blocks of linear IC voltage regulators, Three terminal voltage regulators, Positive and negative voltage regulators. The 555 timer as astable and monostable multivibrators. Zero crossing detector, Schmitt trigger.

Text/References:

1. Op-amp and Linear integrated circuits By Gayakwad, Pearson education
2. Operational amplifier and Linear integrated circuits By Coughlin & Driscoll, Pearson education
3. Integrated circuits By K.R. Botkar, Khanna Publishers

4IT6.3 LOGIC AND FUNCTIONAL PROGRAMMING
(Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	PROPOSITIONS AND PREDICATES: Evaluation of constant propositions, Evaluation of proposition in a state. Precedence rules for operators, Tautologies, Propositions a sets of states and Transforming English to propositional form. Introduction to first-order predicate logic, Quantifiers and Reasoning.
II	LOGIC PROGRAMMING USING PROLOG: Constants, Goals and Clauses, Facts, Rules, Semantics, Rules and Conjunction, Rules and Disjunction, Search strategy, Queries.
III	ADVANCED LOGIC PROGRAMMING USING PROLOG: - Unification, Recursion, Lists, Cut operator, and Sorting. Data structures, Text strings, Searching state space, Operators and their precedence, and Parsing in Prolog.
IV	FUNCTIONAL PROGRAMMING: Introduction to lambda calculus-Syntax and semantics, Computability and correctness, Lazy and Eager Evaluation Strategies, comparison of functional and imperative languages.
V	FUNCTIONAL PROGRAMMING USING HASKELL: Introduction, lists, User-defined data types, type classes, and arrays in Haskell. Input/Ouput in Haskell - type classes IO and Monad, Simple applications/programs in Haskell.

Text/References:

1. Logical foundations of functional programming By Gerard Huet, Addison-Wesley Longman Publishing Co.
2. Mathematical Logic for Computer Science By M. Ben- Ari, Prentice Hall
3. The Essence of Logic By John Kelly, Prentice-Hall of India

4IT7 MICROPROCESSOR LAB (Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs.: 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

S. No.	**List of Experiments**
1	Add the contents of memory locations XX00 &XX01 & place the result in memory location XX02.
2	Add the 16 bit numbers stored in memory location & store the result in another memory location.
3	Transfer a block of data from memory location XX00 to another memory location XX00 in forward & reverse order.
4	Write a program to Swap two blocks of data stored in memory.
5	Write a program to find the square of a number.
6	Write a main program & a conversion subroutine to convert Binary to its equivalent BCD.
7	Write a program to find largest & smallest number from a given array.
8	Write a program to Sort an array in ascending & descending order.
9	Write a program to multiply two 8 bit numbers whose result is 16 bit.
10	Write a program of division of two 8 bit numbers.
11	Generate square wave from SOD pin of 8085 & observe on CRO.
12	Write a program to perform traffic light control operation.
13	Write a program to control the speed of a motor.

4IT8 COMMUNICATION LAB (Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

S. No.	**List of Experiments**
1	Harmonic analysis of a square wave of modulated waveform Observe the amplitude modulated waveform and measures modulation index. Demodulation of the AM signal
2	To modulate a high frequency carrier with sinusoidal signal to obtain FM signal. Demodulation of the FM signal
3	To observe the following in a transmission line demonstrator kit : i. The propagation of pulse in non-reflecting Transmission line. ii. The effect of losses in Transmission line. iii. The resonance characteristics of al half wavelength long x-mission line.
4	To study and observe the operation of a super heterodyne receiver
5	To modulate a pulse carrier with sinusoidal signal to obtain PWM signal and demodulate it.
6	To modulate a pulse carrier with sinusoidal signal to obtain PPM signal and demodulate it.
7	To observe pulse amplitude modulated waveform and its demodulation.
8	To observe the operation of a PCM encoder and decoder. To consider reason for using digital signal x-missions of analog signals.
9	Produce ASK signals, with and without carrier suppression. Examine the different processes required for demodulation in the two cases
10	To observe the FSK wave forms and demodulate the FSK signals based on the properties of (a) tuned circuits (b) on PI.L.
11	To study & observe the amplitude response of automatic gain controller (AGC).

4IT9 ADVANCE OBJECT ORIENTED PROGRAMMING
(Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1.	Write a C++ Object Oriented Code for Huffman Coding & Decoding. The code must have implementation of Binary tree, binary Search, Scanning of Input Stream, Generation of Code. The input Stream and codes may be stored in files.
2.	Write a C++ Object Oriented Code for representing a graph using adjacency list. Perform depth first and breadth first search starting from any node. Also find the shortest path between single sources all destinations. Also carry out topological sorting.
3.	Create a C++ template for matrix. Include procedures for multiplication of 2 matrices. Use the same class for multiplication of more than two matrices.
4.	Create a C++ class for implementation of AVL tree to store a symbol table.
5.	Create a new string class say NewString. Define functions as defined in the system string class.

4IT10 COMPUTER AIDED SOFTWARE ENGINEERING LAB
(Common to Comp. Engg. & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

For the instructor: Assign any two projects two a group of exactly two students covering all of the experiments from given experiment list. Each group is required to prepare the following documents for projects assigned to them and develop the software using software engineering methodology.

1. Problem Analysis and Project Planning Thorough study of the problem- identify project scope, infrastructure.
2. Software Requirement Analysis- Describe the individual Phases/modules of the project deliverables.
3. Data Modeling Use work products – data dictionary, use case diagrams and activity diagrams, build and test lass diagrams, sequence diagrams and add interface to class diagrams.
4. Software Developments and Debugging.
5. Software Testing – Prepare test plan, perform validation testing coverage analysis, memory leaks, develop test case hierarchy, Site check and site monitor.
6. Describe: Relevance of CASE tools, high – end and low – end CASE tools, automated support for data dictionaries, DFD, ER diagrams.

S. No.	**List of Experiments**	**Software Required:**
1	Course Registration System	Case Tools: Rational Suite, Win runner, Empirix Languages: C/C++/JDK, JSDK, INTERNET EXPLORER UML Front End: VB, VC++, Developer 2000, .NET Back End: Oracle, MS – Access, SQL
2	Quiz System	
3	Online ticket reservation system	
4	Remote computer monitoring	
5	Students marks analyzing system	
6	Expert system to prescribe the medicines for the given symptoms	
7	Platform assignment system for the trains in a railway station	
8	Stock maintenance	
9	Student Marks Analyzing System	
10	Online Ticket Reservation System	
11	Payroll System	
12	Export System	

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT1 COMPUTER ARCHITECTURE (Common to Comp. Engg. & Info. Tech)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3, Tutorial: 1**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction to Computer Architecture and Organization. Von Neuman Architecture, Flynn Classification. Register Transfer and Micro operations: Register transfer language, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Bus and memory transfers. Computer Organization and Design: Instruction cycle, computer registers, common bus system, computer instructions, addressing modes, design of a basic computer
II	Central Processing Unit: General register organization, stack organization, Instruction formats, Data transfer and manipulation, program control. RISC, CISC characteristics. Pipeline and Vector processing: Pipeline structure, speedup, efficiency, throughput and bottlenecks. Arithmetic pipeline and Instruction pipeline.
III	Computer Arithmetic: Adder, Ripple carry Adder, carry look Ahead Adder, Multiplication: Add and Shift, Array multiplier and Booth Multiplier, Division: restoring and Non-restoring Techniques. Floating Point Arithmetic: Floating point representation, Add, Subtract, Multiplication, Division.
IV	Memory Organization: RAM, ROM, Memory Hierarchy, Organization, Associative memory, Cache memory, and Virtual memory: Paging and Segmentation.
V	Input-Output Organization: Input-Output Interface, Modes of Transfer, Priority Interrupt, DMA, IOP processor.

References:

1. Computer Organization and Architecture - William Stallings (Pearson Education Asia)

2. Computer Organization and Architecture -John P. Hayes (McGraw -Hill)

3. Computer Organization -V. Carl. Hamacher (McGraw-Hill)

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT2 Digital Signal Processing (Info. Tech.)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	INTRODUCTION: Discrete time signals and systems, properties of discrete time systems, Linear time invariant systems - discrete time. Properties of LTI systems and their block diagrams. Convolution, Discrete time systems described by difference equations.
II	Fourier Transform: Discrete time Fourier transform for periodic and aperiodic signals. Properties of DTFT. Z-transform: The region of convergence for the Z-transform. The Inverse Z-transform. Properties of Z transform.
III	SAMPLING: Mathematical theory of sampling. Sampling theorem. Ideal & Practical sampling. Interpolation technique for the reconstruction of a signal from its samples. Aliasing. Sampling in freq. domain. Sampling of discrete time signals.
IV	THE DISCRETE FOURIER TRANSFORMS (DFT): Properties of the DFT, Linear Convolution using DFT. Efficient computation of the DFT: Decimation–in-Time and Decimation-in frequency FFT Algorithms.
V	FILTER DESIGN TECHNIQUES: Structures for discrete-time systems- Block diagram and signal flow graph representation of LCCD (LCCD – Linear Constant Coefficient Difference) equations, Basic structures for IIR and FIR systems, Transposed forms. Introduction to filter Design: Butterworth & Chebyshev. IIR filter design by impulse invariance & Bilinear transformation. Design of FIR filters by Windowing: Rectangular, Hamming & Kaiser.

References:

1. Oppenheim, Discrete-Time Signal Processing, 2/e, Pearson Education
2. Proakis, Digital Signal Processing, 4/e, Pearson Education
3. S.K.Mitra, Digital Signal Processing, 2/e, Tata McGraw Hill

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT3 TELECOMMUNICATION FUNDAMENTALS (Common to Comp. Engg. & Info. Tech)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

I	Data Transmission: Terminology, Frequency, spectrum, bandwidth, analog and digital transmission, Transmission impairments, channel capacity including sampling theorem and Fourier series. Transmission Media: Transmission of signals through Twisted pair, Coaxial cable, optical fibre (SM, MM, Graded Index). Wireless Transmission: Antenna and antenna gain, introduction to terrestrial and satellite microwave, Propagation of wireless signals, free space loss for LOS communication. Review of Line Encoding Schemes. Concept of bit period, effect of clock skew, Synchronous and Asynchronous communication Network Reference Models (OSI/ISO and TCP/IP)
II	Data Link Layer: Functions performed by data link layer, Data link Layer design issues Error Control Coding: Error Detection, Two Dimensional Parity Checks, Internet Checksum. Polynomial Codes, Standardized polynomial codes, error detecting capability of a polynomial codes. Linear codes, performance of linear codes, error detection & correction using linear codes. Flow Control: Flow control in loss less and lossy channels using stop-and-wait, sliding window protocols. Performance of protocols used for flow control.
III	Data Link Control: HDLC & PPP including frame structures, MAC sublayer: Pure and slotted Aloha, CSMA, CSMA/CD, collision free multiple access. Throughput analysis of pure and slotted Aloha, delay & throughput analysis of CSMA and CSMA/CD
IV	Multiplexing: Frequency division, time division (Synchronous and statistical) multiplexing. ADSL, DS1 and DS3 carriers. Multiple Accesses: Performance of FDMA-FM-FDMA, Single channel per carrier. TDMA frame structure, TDMA Burst Structure, TDMA Frame efficiency, TDMA Superframe structure, Frame acquisition and synchronization, Slip rate and in digital terrestrial networks. Switching: Qualitative description of Space division, time division and space-time-space division switching.
V	Spread Spectrum Techniques :Direct sequence(DSSS) & frequency hopping(FHSS); Performance consideration in DSSS & FHSS; Code division Multiple access (CDMA) :frequency & channel specifications, forward & reverse CDMA channel, pseudo noise(PN) sequences, m-sequence, gold sequence, orthogonal code, gold sequences, Walsh codes synchronization, power control, handoff ,capacity of CDMA system , IMT-2000, WCDM

References:

1. Stallings, Data and computer communication, 8th ed. Pearson
2. Tri.T.Ha, Digital Satellite Communications, 2/e, Tata McGraw Hill
3. Alberto Leon-Garcia, Indra Widjaja, COMMUNICATION NETWORKS, 2nd ed., TMH
4. Wireless communications,2/e, Rappaport, PHI
5. Analysis of Computer and Communication Networks, ISBN: 0387744363, Fayez Gebali, 2008, Springer-Verlag, 1st Ed.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT4 DATABASE MANAGEMENT SYSTEMS (Common to Comp. Engg. & Info. Tech)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Introduction**: Applications, Purpose, File System v/s DBMS, Data Abstraction (views), Structure of a DBMS-Query Processor, Database Users and Administrator, Data Dictionary, Transaction Manager, Storage Manager. Data Models Introduction-Network Model, Hierarchical Model, Relational Model, Entity Relationship Model and Object Oriented Model. [1] **Entity Relationship Model**: Structure of RDMS and Database Schema, Entities, Attributes and Entity Sets, Relationship and Relationship Sets, Key Constraints, Participation Constraints (Mapping Cardinalities), Integrity Constraints, Weak Entity Set, Design issues, Extended Features- Aggregation, Generalization and Specialization, case study of an Enterprise. [1]
II	**Relational Algebra:** Operations: Selection, Projection, Set, Renaming, Joints, Division. Relational calculus- Tuple Relational Calculus, Domain Relational Calculus. [2] **Query Languages:** Procedural and Non Procedural, DDL, DCL and DML. SQL-Clauses, Nested Queries, SQL Functions- Single Row Function, Multigroup Functions, Set Operations, Aggregate Operators, Null Values, Embedded SQL, Dynamic SQL. [2]
III	**Schema Refinement And Normal Forms:** Introductions to Schema Refinement, Functional Dependencies, Boyce-Codd Normal Forms, Third Normal Form, Normalization-Decomposition into BCNF Decomposition into 3-NF, Denormalization, Triggers. [2] **Transaction Processing:** Introduction-Transaction State, Transaction properties, Concurrent Executions. Need of Serializability, Conflict vs. View Serializability, Testing for Serializability, Recoverable Schedules, Cascadeless Schedules. [2]
IV	**Concurrency Control:** Implementation of Concurrency: Lock-based protocols, Timestamp-based protocols, Validation-based protocols, Deadlock handling, [1] **Database Failure and Recovery:** Database Failures, Recovery Schemes: Shadow Paging and Log-based Recovery, Recovery with Concurrent transactions. [1]
V	**Indexing and Hashing**: Basic Concepts, Ordered Indices, B^+ -Tree Index Files, B-Tree Index Files, Multiple Key Access, Static Hashing, Dynamic Hashing, Comparison of Ordered Indexing and Hashing, Bitmap Indices, Index Definition in SQL. [1]

References:

Text/References:

1. H.f. Korth and Silberschatz: Database Systems Concepts, McGraw Hill
2. Almasri and S.B. Navathe: Fundamentals of Database Systems,
3. Ramakrishnan and Gehrke: Database Management System, McGraw Hill
4. C.J. Date: Data Base Design, Addison Wesley.
5. Hansen and Hansen : DBM and Design, PHI

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT5 OPERATING SYSTEMS (Common to Comp. Engg. & Info. Tech)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction and need of operating system, layered architecture/logical structure of operating system, Type of OS, operating system as resource manager and virtual machine, OS services, BIOS, System Calls/Monitor Calls, Firmware- BIOS, Boot Strap Loader. **Process management**- Process model, creation, termination, states & transitions, hierarchy, context switching, process implementation, process control block, Basic System calls- Linux & Windows. Threads- processes versus threads, threading, concepts, models, kernel & user level threads, thread usage, benefits, multithreading models.
II	**Interprocess communication**- Introduction to message passing, Race condition, critical section problem, mutual exclusion with busy waiting- disabling interrupts, lock variables, strict alteration, Peterson's solution, TSL instructions, busy waiting, sleep and wakeup calls, semaphore, monitors, classical IPC problems. **Process scheduling**- Basic concepts, classification, CPU and I/O bound, CPU scheduler- short, medium, long-term, dispatcher, scheduling:- preemptive and non-preemptive, Static and Dynamic Priority, Co-operative & Non-cooperative, Criteria/Goals/Performance Metrics, scheduling algorithms- FCFS, SJFS, shortest remaining time, Round robin, Priority scheduling, multilevel queue scheduling, multilevel feedback queue scheduling, Fair share scheduling.
III	**Deadlock**- System model, resource types, deadlock problem, deadlock characterization, methods for deadlock handling, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock. **Memory management**- concepts, functions, logical and physical address space, address binding, degree of multiprogramming, swapping, static & dynamic loading- creating a load module, loading, static & dynamic linking, shared libraries, memory allocation schemes- first fit, next fit, best fit, worst fit, quick fit. Free space management- bitmap, link list/free list, buddy's system, memory protection and sharing, relocation and address translation.
IV	**Virtual Memory**- concept, virtual address space, paging scheme, pure segmentation and segmentation with paging scheme hardware support and implementation details, memory fragmentation, demand paging, pre-paging, working set model, page fault frequency, thrashing, page replacement algorithms- optimal, NRU, FIFO, second chance, LRU, LRU- approximation clock, WS clock; Belady's anomaly, distance string; design issues for paging system- local versus global allocation policies, load control, page size, separate instruction and data spaces, shared pages, cleaning policy, TLB (translation look aside buffer) reach, inverted page table, I/O interlock, program structure, page fault handling, Basic idea of MM in Linux & windows.
V	**File System**- concepts, naming, attributes, operations, types, structure, file organization & access(Sequential, Direct ,Index Sequential) methods, memory mapped files, directory structures- one level, two level, hierarchical/tree, acyclic graph, general graph, file system mounting, file sharing, path name, directory operations, overview of file system in Linux & windows. Input/Output subsystems- concepts, functions/goals, input/output devices- block and character, spooling, disk structure & operation, disk attachment, disk storage capacity, disk scheduling algorithm- FCFS, SSTF, scan scheduling, C-scan schedule.

Text/Reference Books:

1. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.
2. Achyut S Godbole: Operating Systems, Tata McGraw Hill
3. Tanenbaum: Modern Operating System, Prentice Hall.
4. DM Dhamdhere: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
5. Charles Crowly: Operating System A Design – Oriented Approach, Tata McGraw Hill.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT6.1 ADVANCED DATA STRUCTURE (Common to Comp. Engg. & Info. Tech)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	ADVANCED TREES: Definition**s,** Operations on Weight Balanced Trees (Huffman Trees), 2-3 Trees and Red- Black Trees. Dynamic Order Statistics, Interval Tree; Dictionaries.
II	MERGEABLE HEAPS: Mergeable Heap Operations, Binomial Trees, Implementing Binomial Heaps and its Operations, 2-3-4. Trees and 2-3-4 Heaps. Amortization analysis and Potential Function of Fibonacci Heap, Implementing Fibonacci Heap.
III	GRAPH THEORY DEFINITIONS: Definitions of Isomorphic Components. Circuits, Fundamental Circuits, Cut-sets. Cut- Vertices Planer and Dual graphs, Spanning Trees, Kuratovski's two Graphs. GRAPH THEORY ALGORITHMS**:** Algorithms for Connectedness, Finding all Spanning Trees in a Weighted Graph, Breadth First and Depth First Search, Topological Sort, Strongly Connected Components and Articulation Point. Single Min-Cut Max-Flow theorem of Network Flows. Ford-Fulkerson Max Flow Algorithms.
IV	SORTING NETWORK**:** Comparison network, zero-one principle, bitonic sorting and merging network sorter. Priority Queues and Concatenable Queues using 2-3 Trees. Operations on Disjoint sets and its union-find problem, Implementing Sets.
V	NUMBER THEORITIC ALGORITHM: Number theoretic notions, Division theorem, GCD, recursion, Modular arithmetic, Solving Modular Linear equation, Chinese Remainder Theorem, power of an element, Computation of Discrete Logarithms, primality Testing and Integer Factorization.

References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.

2. Horowitz and Sahani: Fundamental of Computer algorithms.

3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley

4. Brassard : Fundamental of Algorithmics, PHI.

5IT6. 2 E-Commerce (Info. Tech.)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction: Motivation, Forces behind E-Commerce Industry Framework, Brief history of Ecommerce, Inter Organizational E-Commerce Intra Organizational ECommerce, and Consumer to Business Electronic Commerce, Architectural framework, Network Infrastructure for E-Commerce Network Infrastructure for ECommerce, Market forces behind I Way, Component of I way Access Equipment, Global Information Distribution Network, Broad band Telecommunication.
II	Mobile Commerce: Introduction to Mobile Commerce, Mobile Computing Application, Wireless Application Protocols, WAP Technology, Mobile Information Devices, Web Security, Introduction to Web security, Firewalls & Transaction Security, Client Server Network, Emerging Client Server Security Threats, firewalls & Network Security.
III	Encryption: World Wide Web & Security, Encryption, Transaction security, Secret Key Encryption, Public Key Encryption, Virtual Private Network (VPM), Implementation Management Issues.
IV	Electronic Payments: Overview of Electronics payments, Digital Token based Electronics payment System, Smart Cards, Credit Card I Debit Card based EPS, Emerging financial Instruments, Home Banking, Online Banking.
V	Net Commerce: EDA, EDI Application in Business, Legal requirement in E – Commerce, Introduction to supply Chain Management, CRM, issues in Customer Relationship Management.

References:

1. Electronic e-commerce II Edition: Pete Loshin, Paul A Murphy, Jaico book.

2. The Business of e-commerce: Paul May, Cambridge University Press.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT6.3 SATELLITE & MICROWAVE COMMUNICATION (Info. Tech.)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	WAVE GUIDES: Introduction of Microwaves and their applications. Rectangular Waveguides, Solution of Wave equation in TE and TM modes. Power transmission and Power losses. Excitation of modes in Rectangular waveguides, circular waveguides : Basic idea of TE and TM modes, field patterns, TEM mode of propagation.
II	WAVEGUIDE COMPONENTS : Scattering matrix representation of networks. Rectangular cavity and circular cavity resonators. Waveguide Tees, Magic Tees. Hybrid rings. Waveguide corners, Bends and twists. Directional couplers, Circulators and isolators. Broadband Wireless 802.16
III	Elements of satellite communication: Frequency bands, Transmission and multiplexing. Modulation, Multiple access techniques.
IV	Satellite orbit and description- orbital period and velocity, effects of orbital inclination, Azimuth and elevation, Coverage angle and slant range, Geostationary orbit,
V	Satellite description: Communications subsystems. Earth Station: Antenna, high-power amplifier, low-noise amplifier, up converter, down converter, monitoring and control, reliability. Satellite Link: basic link analysis.

References:

1. Liao, Microwave Devices and Circuits, 3/e, Pearson Education
2. Tri.T.Ha, Digital Satellite Communications, 2/e, Tata McGraw Hill
3. Communication Systems, Simon Haykin, John Wiley.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT7 DATABASE LAB (Common to Comp. Engg. & Info. Tech)

Class: V Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs.: 3	Examination Time = Four (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Stating a database design problem.
2. Preparing ER diagram
3. Finding the data fields to be used in the database.
4. Selecting fields for keys.
5. Normalizing the database including analysis of functional dependencies.
6. Installing and configuring the database server and the front end tools.
7. Designing database and writing applications for manipulation of data for a stand alone and shared data base including concepts like concurrency control, transaction roll back, logging, report generation etc.
8. Get acquainted with SQL.

In order to achieve the above objectives, it is expected that each students will chose one problem. The implementation shall being with the statement of the objectives to be achieved, preparing ER diagram, designing of database, normalization and finally manipulation of the database including generation of reports, views etc. The problem may first be implemented for a standalone system to be used by a single user.

All the above steps may then be followed for development of a database application to be used by multiple users in a client server environment with access control. The application shall NOT use web techniques.

One exercise may be assigned on creation of table, manipulation of data and report generation using SQL.

Suggested Tools:

For standalone environment, Visual FoxPro or any similar database having both the database and manipulation language may be used.

For multi-user application, MYSql is suggested. However, any other database may also be used. For front end, VB.Net, Java, VB Script or any other convenient but currently used by industry may be chosen.

Indicative List of exercises:

1. Student information system for your college.

2. Student grievance registration and redressal system.
3. A video library management system for a shop.
4. Inventory management system for a hardware/ sanitary item shop.
5. Inventory management system for your college.
6. Guarantee management system for the equipments in your college.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT8 ADVANCE COMMUNICATION LAB. (Info. Tech)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 2**	**Examination Time = Four (4) Hours** **Maximum Marks = 75** **[Sessional/Mid-term (45) & End-term (30)]**

S. No.	**List of Experiments**
1.	TDM of two band limited signals.
2.	ASK and FSK generation and detection
3.	PSK generation and detection
4.	DPSK generation and detection
5.	QPSK generation and detection
6.	PCM generation and detection using a CODEC Chip
7.	Measurement of losses in a given optical fiber (propagation loss, bending loss) and numerical aperture
8.	Analog and Digital (with TDM) communication link using optical fiber.
9.	Measurement of frequency, guide wavelength, power, VSWR and attenuation in a microwave test bench
10.	Measurement of directivity and gain of antennas: Standard dipole (or printed dipole), microstrip patch antenna and Yagi antenna (printed).
11	Determination of coupling and isolation characteristics of a stripline (or microstrip) directional coupler (a) Measurement of resonance characteristics of a microstrip ring resonator and determination of dielectric constant of the substrate. (b) Measurement of power division and isolation characteristics of a microstrip 3 dB power divider.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT9 OPERATING SYSTEMS SIMULATION LAB (Common to Comp. Engg. & Info. Tech)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

Objectives:

- Understand the basic functions of operating systems.
- In depth knowledge of the algorithms used for implementing the tasks performed by the operating systems.
- Understand & simulate strategies used in Linux & Windows operating systems.
- Develop aptitude for carrying out research in the area of operating system.

Suggested Tools:

Operating system simulator- MOSS preferably on Linux platform.

Recommended Excercises:

A. Exercises shall be given on simulation of algorithms used for the tasks performed by the operating systems. Following modules of the simulator may be used:
   - Scheduling
   - Deadlock
   - Memory Management Systems
   - File system simulator

Algorithms described in the text may be assigned. The simulation results such as average latency, hit & Miss Ratios or other performance parameters may be computed.

B. One exercise shall be on simulation of algorithms reported in the recent conferences/ journals and reproducing the results reported therein.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

5IT10 DIGITAL HARDWARE DESIGN LAB (Common to Comp. Engg. & Info. Tech)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 75** **[Sessional/Mid-term (45) & End-term (30)]**

Objectives: At the end of course, the students shall be able to

- Should be able to design datapath for digital systems
- Create a digital system using discrete digital ICs
- Design a hard wired / micro-programmed control circuit
- Simulate a digital datapath in Hardware Description Language
- Understand IC descriptions and select proper IC in a given circuit based on its timing characteristics

Suggested Methodology and tools: Hardware description language like verilog /VHDL can be used for simulation.

The exercise shall involve design of datapath, its simulation and finally realization on breadboard. Library of digital ICs have to be built. Similarly, manuals of Digital IC families have to be placed in the laboratories for reference by students.

Suggested Exercises

- Create a microprocessor from ALU 74181. For this, the students may design a small instruction set and attach necessary registers and suitable control unit to realize a microprocessor.
- Simulate and realize a Cordic calculator.
- Simulate & realize a Four bit Adder
    - Design and simulation of a 4-bit Adder
    - VHDL/verilog HDL (Hardware description language)
    - Interfacing 7-segment decoder
- Combinational Multiplier
    - 4x4-bit multiplier
    - Binary-to-BCD conversion
    - Timing Constraints
- CRC checksum generator & verifier
- Realizing a carry look ahead adder

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT1 COMPUTER NETWORKS (Common to Comp. Engg. & Info. Tech)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

NOTE: The first 2 lectures shall be devoted to review of the basis architectures and responsibilities of different layers.

Units	**Contents of the subject**
I	Network layer- Network layer design issue, routing algorithms: Optimally principle short path, flooding, Distance vector, link state, hierarchical, Broadcast routing. Congestion control: General principle of congestion control, congestion prevention policies, congestion control in Datagram subnets, load shedding, jitter control Quality of service: requirements and techniques.
II	Internetworking: Differences in networks, connecting networks, concatenated virtual circuit, connectionless internetworking, Tunneling, Internetwork routing, Fragmentation Network layer in the Internet: IPV4, IP addressing including Subnet addressing CIDR, NAT, ICMP, OSPF, BGP, IGMP, ARP, RARP, BOOTP, DHCP(only working and purpose, packet headers etc. not included), Differences in IPV6 over IPV4
III	Transport layer: Services provided, Transport service primitives. Elements of Transport protocols: addressing, connection Establishment, connection release, Flow control & Buffering, Multiplexing, Crash Recovery, UDP, RPC, RTP. Principles of Reliable Data Transfer: Reliable data transfer over a perfectly reliable channel, Channel with bit errors and Lossy Channel with bit errors.
IV	Transport Layer in the Internet: Introduction to TCP, TCP service Model, TCP Header and segment structure, TCP connection establishment and release, transmission policy, timer management, Transactional TCP. TCP Congestion Control: Fairness, TCP delay modeling.
V	Application Layer: Service needs. Domain Name System: Name Space, resource record, name servers, resolution process, introduction to DNS poisoning. Electronic Mail: Architecture and services, MIME message formats, SMTP, POP3, IMAP. World Wide Web: Architecture, responsibilities of client and server sides, HTTP, performance enhancement. P2P File Sharing: Centralized Directory, Query flooding, exploiting heterogeneity.

References:

1. Tanenbaum; Computer Network, 4th Ed., Pearson.
2. Kurose; Computer Networking, 3rd Ed., Pearson.
3. Peterson, Davie; Computer Networks, 4th Ed., ELSEVIER

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT 2 DESIGN AND ANALYSIS OF ALGORITHMS (Common to Comp. Engg. & Info. Tech)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	BACKGROUND: Review of Algorithm Complexity, Order Notations: definitions and calculating complexity. DIVIDE AND CONQUER METHOD: Binary Search, Merge Sort, Quick sort and strassen's matrix multiplication algorithms. GREEDY METHOD: Knapsack Problem, Job Sequencing, Optimal Merge Patterns and Minimal Spanning Trees.
II	DYNAMIC PROGRAMMING: Matrix Chain Multiplication. Longest Common Subsequence and 0/1 Knapsack Problem. BRANCH AND BOUND: Traveling Salesman Problem and Lower Bound Theory. Backtracking Algorithms and queens problem.
III	PATTERN MATCHING ALGORITHMS: Naïve and Rabin Karp string matching algorithms, KMP Matcher and Boyer Moore Algorithms. ASSIGNMENT PROBLEMS: Formulation of Assignment and Quadratic Assignment Problem.
IV	RANDOMIZED ALGORITHMS. Las Vegas algorithms, Monte Carlo algorithms, randomized algorithm for Min-Cut, randomized algorithm for 2-SAT. Problem definition of Multicommodity flow, Flow shop scheduling and Network capacity assignment problems.
V	PROBLEM CLASSES NP, NP-HARD AND NP-COMPLETE: Definitions of P, NP-Hard and NP-Complete Problems. Decision Problems. Cook's Theorem. Proving NP-Complete Problems - Satisfiability problem and Vertex Cover Problem. Approximation Algorithms for Vertex Cover and Set Cover Problem.

References:

1. Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.
2. Horowitz and Sahani: Fundamental of Computer algorithms.
3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, AddisonWesley
4. Brassard : Fundamental of Algorithmics, PHI.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT3 THEORY OF COMPUTATION (Common to Comp. Engg. & Info. Tech)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3, Tutorial:1**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Finite Automata & Regular Expression: Basic Concepts of finite state system, Deterministic and non-deterministic finite automation and designing regular expressions, relationship between regular expression & Finite automata minimization of finite automation mealy & Moore Machines.
II	Regular Sets of Regular Grammars**:** Basic Definition of Formal Language and Grammars. Regular Sets and Regular Grammars, closure proportion of regular sets, Pumping lemma for regular sets, decision Algorithms for regular sets, Myhell_Nerod Theory & Organization of Finite Automata.
III	Context Free Languages& Pushdown Automata: Context Free Grammars – Derivations and Languages – Relationship between derivation and derivation trees – ambiguity – simplification of CEG – Greiback Normal form – Chomsky normal forms – Problems related to CNF and GNF Pushdown Automata: Definitions – Moves – Instantaneous descriptions – Deterministic pushdown automata – Pushdown automata and CFL - pumping lemma for CFL - Applications of pumping Lemma.
IV	Turing Machines: Turing machines – Computable Languages and functions – Turing Machine constructions – Storage in finite control – multiple tracks – checking of symbols – subroutines – two way infinite tape. Undecidability: Properties of recursive and Recursively enumerable languages – Universal Turing Machines as an undecidable problem – Universal Languages – Rice's Theorems.
V	Linear bounded Automata Context Sensitive Language: Chomsky Hierarchy of Languages and automata, Basic Definition & descriptions of Theory & Organization of Linear bounded Automata Properties of context-sensitive languages

References

1. Aho, Hopcropt and Ullman, Introduction to Automata Theory, Formal Languages and Computation, Narosa
2. Cohen, Introduction to Computer Theory, Addison Wesley.
3. Papadimitriou, Introduction to Theory of Computing, Prentice Hall.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT4 PROGRAMMING IN JAVA (Common to Comp. Engg. & Info. Tech)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	JAVA: Introduction to Object Orientated Programming, Abstraction, Object Oriented Programming Principles, Features of JAVA, Introduction to Java byte code, Java Virtual machine. PROGRAM ELEMENTS: Primitive data types, variables, assignment, arithmetic, short circuit logical operators, Arithmetic operators, bit wise operators, relational operators, Boolean logic operators, the assignment operators, operator precedence, Decision and control statements, arrays.
II	CONTROL STATEMENTS: Java's Selection Statements, if statement, switch statement, Iteration Statements, while, do-while, for, for-each, Nested Loops, Jump Statements, Using break, Using continue, return. OBJECTS AND CLASSES: Objects, constructors, returning and passing objects as parameter, Nested and inner classes, Single and Multilevel Inheritance, Extended classes, Access Control, usage of super, Overloading and overriding methods, Abstract classes, Using final with inheritance.
III	PACKAGE AND INTERFACES: Defining package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces. STRING HANDLING: String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class.
IV	EXCEPTION HANDLING: Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally FILE HANDLING: I/O streams, File I/O.
V	CONCURRENCY: Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, Synchronization. APPLET: Applet Fundamentals, using paint method and drawing polygons.

References

1. Herbert Schildt: JAVA 2 - The Complete Reference, TMH, Delhi
2. Deitel: How to Program JAVA, PHI
3. U.K. Chakraborty and D.G. Dastidar: Software and Systems – An Introduction, Wheeler Publishing, Delhi.
4. Joseph O'Neil and Herb Schildt: Teach Yourself JAVA, TMH, Delhi.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT5 INFORMATION THEORY & CODING (Info. Tech)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction to information theory. Uncertainty, Information and Entropy, Information measures for continuous random variables, source coding theorem. Discrete Memory less channels, Mutual information, Conditional entropy.
II	Source coding schemes for data compaction: Prefix code, Huffman code, Shanon-Fane code & Hempel-Ziv coding channel capacity. Channel coding theorem. Shannon limit.
III	Linear Block Code: Introduction to error connecting codes, coding & decoding of linear block code, minimum distance consideration, conversion of non systematic form of matrices into systematic form.
IV	Cyclic Code: Code Algebra, Basic properties of Galois fields (GF) polynomial operations over Galois fields, generating cyclic code by generating polynomial, parity check polynomial. Encoder & decoder for cyclic codes.
V	Convolutional Code: Convolutional encoders of different rates. Code Tree, Trllis and state diagram. Maximum likelihood decoding of convolutional code: The viterbi Algorithm fee distance of a convolutional code.

References

1. Digital Communication, Simon Haykin,

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT6.1 ADVANCE TOPICS IN OPERATING SYSTEMS (Common to Comp. Engg. & Info.

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Tech)

Units	Contents of the subject
I	**Operating system structures** – policies & mechanism, Structures- monolithic, layered, virtual machines, micro kernel, exokernels, client- server model. Examples from Linux & Windows. **Threads Advance Concepts**– Libraries- Pthreads, win32 threads, Java threads, Introduction to threading issues, system calls, cancellation, signal handling, thread pool, thread specific data, window threads, Linux threads, Solaris Threads. **Massage Passing System** – Need of Message Passing Systems, design issues, naming, synchronization, Implementation–buffering and delivery; mailboxes; RPC & RMI. Examples Systems – Linux, Windows.
II	**File System**- file system layouts, file system implementation, contagious allocation, link list allocation, indexed allocation, file allocation table, virtual file system, directory implementation- linear list and hash table. File System reliability and integrity. **I/O system**: device drivers/ controllers, busses and interfaces- USB, IDE, SCSI, IEEE1394, RAID system, disk caching and buffering, disk management-disk formatting, RAID Structure, boot block, bad block, swap-space management. **System Security:** Security Problems, Program Threats, System Network Threats, Cryptography as a Security Tool, User Authentication, Implementing Security Defenses, Firewalling to Protect Systems and Network, Computer Security Classifications. Overview of security in Windows. [4]
III	**The Linux OS:** Unix Vs Linux, Design Principles, Kernel Structure, components Kernel Modules, Shell- usage, types; An overview of- Process Management, Thread Management and Scheduling, Memory Management, Process Scheduling in Linux, File System structure & implementation, I/O Management, Network File System, Inter-process Communications, Booting and login process, security.[3]
IV	**The Window OS:** Design Principles, System Components- Hardware Abstraction layer, Kernel, Executives; Environmental Subsystems- MS-DOS Environment, 16-bit Windows Environment, Win32 API, POSIX subsystem; Exception and Interrupts; An overview of-memory management, process management and thread; Process Scheduling in Windows; File Systems: Internal Layout, recovery, Volume Management and Fault Tolerance, FAT and NTFS, Security features, window registry, OS organizations.[3]
V	**Multiprocessor Operating Systems:** Architecture of Multiprocessor Systems,

	Overview of Multiprocessor OS, Kernal Structure and Multiprocessing support in Linux & Windows, Process Synchronization- Queued Lock, Spin Lock, Sleep Lock; Process Scheduling. **Multimedia Operating System**- Introduction to Multimedia & Data Compression- concepts, common graphics file formats, common audio file formats; Video server, Process management- real time scheduling; Multimedia file systems, Multimedia file storage mechanisms, Video sever organization.[2] **Mobile Operating System**- Windows CE, Palm OS, Symbian OS, JAVA card, Multos.

Text/Reference Books:

1. DM Dhamdhere: Operating Systems – A Concepts Based Approach, Tata McGraw Hill
2. Achyut S Godbole: Operating Systems, Tata McGraw Hill
3. Tanenbaum: Modern Operating System, Prentice Hall
4. A. Silberschatz and Peter B Galvin: Operating System Principals, Wiley India Pvt. Ltd.
5. Charles Crowly: Operating System A Design – Oriented Approach, Tata McGraw Hill.
6. Bach, Design of Unix Operating Systems.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT6.2 BIO INFORMATICS (Info. Tech)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Principles of mass and energy conservation. Thermodynamic properties of pure substances. Equations of state. Correlations for physical and transport properties. Material and energy balances for steady state processes involving single and multiphase systems. Reactive and non-reactive processes.
II	Energy flow in biological systems. Energetic of metabolic path ways. Coupled reactions, microbial growth kinetics, Stoichiometry and energetic analysis of cell growth and product formation. Yield and maintenance coefficients. Oxygen consumption and heat evolution in aerobic cultures. Thermodynamic efficiency of growth.
III	Introduction to fermentation, Design of a an industrial fermented, Process calculations for design of typical industrial fermentation processes. Medium formulation. Batch and continuous heat sterilisation of liquid media. Requirements for process utilities (compressed air, cooling water, steam etc.). Material and energy balances for downstream processing and waste water treatment processes, Bioremediation.
IV	Introduction to industrial bio-process: A historical overview of industrial fermentation processes and products. Role of a bio-process engineer in the biotechnology industry. Outline of the various unit operations involved in an integrated bio-process. Process flow sheeting. A brief survey of organisms, processes products and market economics relating to modern industrial bio-technology. Raw materials for fermentation process: Isolation, preservation and improvement of industrial micro-organisms for overproduction of primary and secondary metabolites. Medium requirements for fermentation process carbon, nitrogen, minerals, vitamins and other nutrients. Examples of simple and complex media. Production of primary metabolites: A brief outline of processes for the production of some commercially important organic acids (e.g. citric acid, itaconic acid, lactic acid, acetic acid, gluconic acid etc.), amino acids (glutamic acid, lysine, aspartic acid, phenylalanine etc.) and alcohols (ethanol 2.3, butanediol etc.)
V	Production of secondary metabolites: Study of production processes for various classes of low molecular weight secondary metabolites. Antibiotics-beta-lactams (penicillins, cephalosporins etc.), aminoglycosides (streptomycin, kanamycin etc.), macrolides (erythromycin), quinines, aromatics etc. Vitamins and steroids. Production of commercially important enzymes and recombinant proteins: Proteases, amylases, lipases, cellulases, pectinases, isomerases and other commercially important enzymes for the food and pharmaceutical industries. Production of recombinant poteins having therapeutic and diagnostic applications. Production of vaccines.

References

1. Bryan Bergerson, Bioinformatics Computing, Pearson Education.

2. Pierre Baldi, Bioinformatics: The Machine Learning Approach, Second Edition (Adaptive Computation and Machine Learning), MIT Press
3. David W. Mount, Bioinformatics: Sequence and Genome Analysis, Cold Spring Harbor Laboratory
4. Warren J. Ewens & Gregory R. Grant, Statistical Methods in Bioinformatics, Springer Verlag
5. Andreas D. Baxevanis & B. F. Francis Ouellette, Bioinformatics: A Practical Guide to the Analysis of Genes and Proteins, Wiley Interscience

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT6.3 HUMAN COMPUTER INTERFACE (Common to Comp. Engg. & Info. Tech)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	The Human: input-output channels, Human memory, thinking, emotions, individual differences, psychology and the design of interactive systems. The Computer: Text entry devices with focus on the design of key boards, positioning, pointing and drawing, display devices. The Interaction: Models of interaction, ergonomics, interaction styles, elements of WIMP interfaces, interactivity, experience, engagement and fun. Paradigms for Interaction.
II	Design Process: The process of design, user focus, scenarios, navigation design screen design and layout, iteration & prototyping. Usability Engineering Design rules: Principles to support usability, standards, guidelines, rules and heuristics, HCI patterns.
III	Evaluation Techniques: Definition and goals of evaluation, evaluation through expert analysis and user participation, choosing an evaluation method. User support, requirement, approaches, adaptive help systems, designing user support systems
IV	Cognitive methods: Goals and task hierarchies, linguistic models, challenges of display based systems, physical and device models, cognitive architectures.
V	Communications and collaborations models: Face to Face communication, conversations, Text based communication, group working. Task Analysis: Differences between task analysis and other techniques, task decomposition, knowledge based analysis, ER based analysis, sources of information and data collection, use of task analysis.

References:

1. Human Computer Interaction; Alan Dix et.al, 3rd ed., Pearson

6IT7 JAVA PROGRAMMING LAB (Info. Tech)

Class: VI Sem. B.Tech.	Evaluation
Branch: I.T. Schedule per Week Practical Hrs.: 3	Examination Time = Five (4) Hours Maximum Marks = 100 [Sessional/Mid-term (60) & End-term (40)]

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. **Develop an in depth understanding of programming in Java**: data types, variables, operators, operator precedence, Decision and control statements, arrays, switch statement, Iteration Statements, Jump Statements, Using break, Using continue, return.
2. **Write Object Oriented programs in Java**: Objects, Classes constructors, returning and passing objects as parameter, Inheritance, Access Control, Using super, final with inheritance Overloading and overriding methods, Abstract classes, Extended classes.
3. **Develop understanding to developing packages & Interfaces in Java:** Package, concept of CLASSPATH, access modifiers, importing package, Defining and implementing interfaces.
4. **Develop understanding to developing Strings and exception handling:** String constructors, special string operations, character extraction, searching and comparing strings, string Buffer class. Exception handling fundamentals, Exception types, uncaught exceptions, try, catch and multiple catch statements. Usage of throw, throws and finally.
5. **Develop applications involving file handling**: I/O streams, File I/O.
6. **Develop applications involving concurrency**: Processes and Threads, Thread Objects, Defining and Starting a Thread, Pausing Execution with Sleep, Interrupts, Joins, and Synchronization.
7. **Develop applications involving Applet:** Applet Fundamentals, using paint method and drawing polygons.

It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives

Indicative List of exercises:

1. Programs to demonstrate basic concepts e.g. operators, classes, constructors, control & iteration statements, recursion etc. such as complex arithmetic, matrix arithmetic, tower of Hanoi problem etc.
2. Development of programs/projects to demonstrate concepts like inheritance, exception handling, packages, interfaces etc. such as application for electricity department, library management, ticket reservation system, payroll system etc.
3. Development of a project to demonstrate various file handling concepts.
4. Development of a project to demonstrate various applet concepts.

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT8 GUI DESIGN LAB. (Info. Tech)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1.	Adding buttons, edit fields, and other child-window components
2.	Implement the CObject debugging ability and Common MFC problems
3.	Implement GDI Functions, and the CDC class (Text, Drawing shapes, Bitmaps)
4.	Implementing View class functions I. Interacting with the user II. Event Handling III. Responding to events from different control types
5.	Implementing View class functions I. GDI Functions, and the CDC class II. Text III. Drawing shapes IV. Bitmaps
6.	Implementing Dialog Block class Creating a Dialog box Invoking and displaying Setting and retrieving values from a dialog box
7.	Implementing Dialog Boxes, Completion Database Classes I. ODBC vs. DAO II. Databases and Record sets III. Queries (filtering and ordering)
8.	Printing and Print Preview I. Database-style reports II Common Dialog interface

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT9 SHELL PROGRAMMING LAB (Common to Comp. Engg. & Info. Tech)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 2**	**Examination Time = Four (4) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

S. No.	List of Experiments
1.	Use of Basic Unix Shell Commands: *ls, mkdir, rmdir, cd, cat, banner, touch, file, wc, sort, cut, grep, dd, dfspace, du, ulimit*.
2.	Commands related to inode, I/O redirection and piping, process control commands, mails.
3.	Shell Programming: Shell script exercises based on following (i) Interactive shell scripts (ii) Positional parameters (iii) Arithmetic (iv) if-then-fi, if-then-else-fi, nested if-else (v) Logical operators (vi) else + if equals elif, case structure (vii) while, until, for loops, use of break (viii) Metacharacters (ix) System administration: disk management and daily administration
4.	Write a shell script to create a file in $USER /class/batch directory. Follow the instructions (i) Input a page profile to yourself, copy it into other existing file; (ii) Start printing file at certain line (iii) Print all the difference between two file, copy the two files at $USER/CSC/2007 directory. (iv) Print lines matching certain word pattern.
5.	Write shell script for- (i) Showing the count of users logged in, (ii) Printing Column list of files in your home directory (iii) Listing your job with below normal priority (iv) Continue running your job after logging out.
6.	Write a shell script to change data format .Show the time taken in execution of this script
7.	Write a shell script to print files names in a directory showing date of creation & serial number of the file.
8.	Write a shell script to count lines, words and characters in its input(do not use wc).
9.	Write a shell script to print end of a Glossary file in reverse order using Array. (Use awk tail)
10.	Write a shell script to check whether Ram logged in, Continue checking further after every 30 seconds till success.
11.	Write a shell script to compute gcd lcm & of two numbers. Use the basic function to find gcd & lcm of N numbers.
12.	Write a shell script to find whether a given number is prime. Take a large number such as 15 digits or higher and use a proper algorithm.

Ref: **UNIX Shell programming, By Stephen G. Kochan, Patrick H. Wood**

RAJASTHAN TECHNICAL UNIVERSITY
Detailed Syllabus B.Tech. (Info. Tech.) V-VI Sem. 2010-11

6IT10 DESIGN AND ANALYSIS OF ALGORITHMS (Common to Comp.

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

Engg. & Info. Tech)

Objectives: Upon successful completion of this course, students should be able to:

- Prove the correctness and analyze the running time of the basic algorithms for those classic problems in various domains;
- Apply the algorithms and design techniques to solve problems;
- Analyze the complexities of various problems in different domains.

Suggested Tools: For implementation and estimation of running time on various sizes of input(s) or output(s) as the case may be, Linux platform is suggested.

Suggested Exercises:

A. It is expected that teachers will assign algorithms to the students for estimation of time & space complexity. Algorithms reported in various research journals may be chosen by the teachers.

B. Problem on designing algorithms to meet complexity constraints may be assigned. For example, a problem on design, analysis and implementation for transposing a sparse matrix requiring not more than one pass from the original matrix may be assigned.

C. **A guide to such problems is given below:**

1. **Exploring a Binary Heap:** Consider a binary heap containing n numbers (the root stores the greatest number). You are given a positive integer $k < n$ and a number x. You have to determine whether the k^{th} largest element of the heap is greater than x or not. Your algorithm must take $O(k)$ time. You may use $O(k)$ extra storage.

2. **Merging two search trees**: You are given two height balanced binary search trees T and T', storing m and n elements respectively. Every element of tree T is smaller than every element of tree T'. Every node u also stores height of the subtree rooted at it. Using this extra information how can you merge the two trees in time $O(\log m + \log n)$ (preserving both the height balance and the order)?

3. **Complete binary tree as an efficient data-structure:**
   You are given an array of size n (n being a power of two). All the entries of the array are initialized to zero. You have to perform a sequence of the following online operations :
   1. **(i)** *Add(i,x)* which adds x to the entry A[i].

2. **(ii)** Report *sum(i,j)* = sum of the entries in the array from indices *i* to *j* for any *0 < i < j <= n*.

It can be seen easily that we can perform the first operation in *O(*1*)* time whereas the second operation may cost *O(n)* in worst case. Your objective is to perform these operations efficiently. Give a data-structure which will guarantee *O(log n)* time per operation.

4. Problems on Amortized Analysis

a. Delete-min in constant time !!! Consider a binary heap of size *n* , the root storing the smallest element. We know that the cost of insertion of an element in the heap is *O(* log *n)* and the cost of deleting the smallest element is also *O(* log *n)*. Suggest a valid potential function so that the amortized cost of insertion is *O(* log *n)* whereas amortized cost of deleting the smallest element is *O(* 1*)*.

b. Implementing a queue by two stack

c. Show how to implement a queue with two ordinary stacks so that the amortized cost of each Enqueue and each Dequeue operation is O(1).

5. **Computing a spanning tree having smallest value of largest edge weight:** Describe an efficient algorithm that, given an undirected graph *G*, determines a spanning tree of *G* whose largest edge weight is minimum over all spanning trees of *G*.

6. **Shortest Path Problems:**

i. From a subset of vertices to another subset of vertices

a. Given a directed graph G(V,E), where edges have nonnegative weights. S and D are two disjoint subsets of the set of vertices. Give an O(|V| log |V| + |E|) time algorithm to find the shortest path among the set of paths possible from any node in S to any node in D.

ii. Paths in Directed Acyclic Graph

a. Counting the number of paths

Given two nodes *u,v* in a directed acyclic graph *G(V,E)*. Give an *O(|E|)* time algorithm to count all the paths from *u* to *v*.

b. **Path passing through a subset of nodes**

Given two nodes *u,v* and a set of vertices $w_1, w_2,...,w_k$ in a directed acyclic graph *G(V,E)*. Give an *O(|E|)* time algorithm to output a path(if exists) from *u* to *v* which passes through each of the nodes $w_1,...,w_k$. If there is no such path then your algorithm must report that *"no such path exists"*.

7. **Searching for a friend:**

You are standing at a crossing from where there emerge four roads extending to infinity. Your friend is somewhere on one of the four roads. You do not know on which road he is and how far he is from you. You have to walk to your friend and the total distance traveled by

you must be at most a constant times the actual distance of your friend from you. In terminology of algorithms, you should traverse *O(d)* distance, where *d* is the distance of your friend from you.

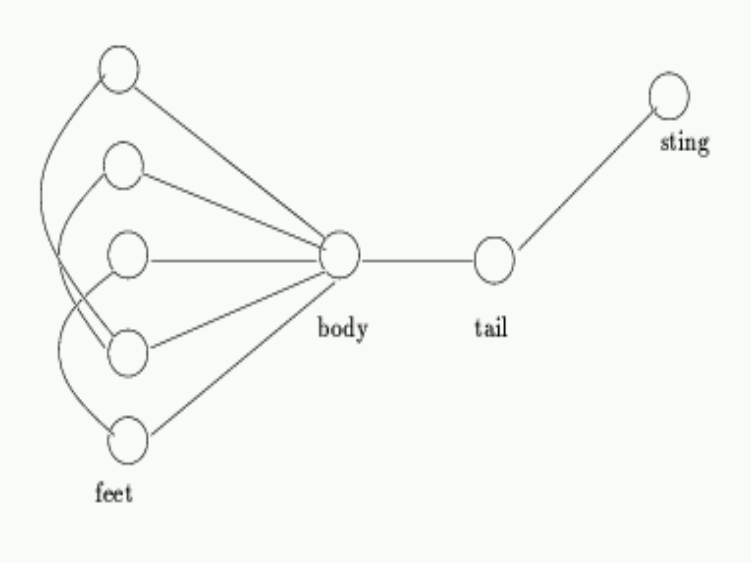
8. **A simple problem on sorted array:** Design an *O(n)*-time algorithm that, given a real number *x* and a sorted array *S* of *n* numbers, determines whether or not there exist two elements in *S* whose sum is exactly *x* .

9. **Finding the decimal dominant in linear time**: You are given *n* real numbers in an array. A number in the array is called a decimal dominant if it occurs more than *n/10* times in the array. Give an *O(n)* time algorithm to determine if the given array has a decimal dominant.

10. **Finding the first one**: You are given an array of infinite length containing zeros followed by ones. How fast can you locate the first one in the array?

11. **Searching for the Celebrity:** Celebrity is a person whom everybody knows but he knows nobody. You have gone to a party. There are total *n* persons in the party. Your job is to find the celebrity in the party. You can ask questions of the form Does Mr. *X* know Mr. *Y* ?. You will get a binary answer for each such question asked. Find the celebrity by asking only *O(n)* questions.

12. **Checking the Scorpion**: An *n*-vertex graph is a *scorpion* if it has a vertex of degree 1(the sting) connected to a vertex of degree two (the tail) connected to a vertex of degree *n-2* (the body) connected to the other *n-3* (the feet). Some of the feet may be connected to other feet. Design an algorithm that decides whether a given adjacency matrix represents a scorpion by examining only *O(n)* entries.



13. **Endless list:** You are having a pointer to the head of singly linked list. The list either terminates at null pointer or it loops back to some

previous location(not necessarily to the head of the list). You have to determine whether the list loops back or ends at a null location in time proportional to the length of the list. You can use at most a constant amount of extra storage.

14. **Nearest Common Ancestor**:
    Given a rooted tree of size *n*. You receive a series of online queries: "Give nearest common ancestor of *u, v* ". Your objective is to preprocess the tree in *O(n)* time to get a data structure of size *O(n)* so that you can answer any such query in *O(log n)* time.

7IT1 SOFTWARE PROJECT MANAGEMENT (Common to Comp. Engg. & Info. Tech)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Project Management: The management spectrum, the people, the product, the process, the project, the W^5HH principle, critical practices Metrics for Process and Project: Metrics in the process and project Domains, software measurements, metrics for software quality, integrating metrics within software process, metrics for small organizations, establishing a software metrics program.
II	Estimation: Observations, Project planning Process, software scope and feasibility, resources, software project estimation, decomposition techniques, empirical estimation models, estimation for object oriented projects, estimation for Agile development and web engineering projects, the make/buy decision.
III	Project Scheduling: Basic concepts, project scheduling, defining a task set and task network, scheduling, earned value analysis. Risk Management: Reactive V/S proactive Risk Strategies, software risks, Risk identification, Risk projection, risk refinement, risk mitigation, monitoring and management, the RMMM plan **Quality Planning.**: Quality Concepts, Procedural Approach to Quality Management, Quantitative Approaches to Quality Management, Quantitative Quality Management Planning, Setting the Quality Goal, Estimating Defects for Other Stages, Quality Process Planning, Defect Prevention Planning.
IV	Quality Management: Quality Concepts, Software Quality assurances, software reviews, formal technical reviews, Formal approaches to SQA, Statistical Software Quality assurances, Change Management: software Configuration Management, The SCM repository, SCM Process, Configuration Management for Web Engineering
V	**Project Execution And Closure:** **Reviews.** The Review Process, Planning, Overview and Preparation, Group Review Meeting, Rework and Follow-up, One-Person Review, Guidelines for Reviews in Projects, Data Collection, Analysis and Control Guidelines, Introduction of Reviews and the NAH Syndrome. **Project Monitoring and Control:** Project Tracking, Activities Tracking, Defect Tracking, Issues Tracking, Status Reports, Milestone Analysis, Actual Versus Estimated Analysis of Effort and Schedule, Monitoring Quality, Risk-Related Monitoring. **Project Closure:** Project Closure Analysis, The Role of Closure Analysis, Performing Closure Analysis.

References:

1. R. S. Pressman, Software Engineering
2. Pankaj Jalote, Software project management in practice, Addison-Wesley
3. B. Hughest & M. Cotterell, Software Project Management.

7IT2 WIRELESS COMMUNICATION & NETWORKS (Common to Comp. Engg. & Info. Tech.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Introduction to Wireless Communication Systems:** Evolution of mobile Radio Communications, Applications of mobile communication, Mobile Radio Systems Around the World, Example of Wireless Communication Systems, Second Generation(2G) Cellular Networks, Third Generation(3G) Wireless Networks, Frequency Reuse, Channel Assignment Strategies, Handoff Strategies, Interference and System Capacity, Improving Coverage and Capacity in Cellular Systems [3].Frequencies for radio transmission & regulations [1]. Introduction to signals, analog & digital data transmission, transmission impairments, effect of multipath propagation, type of fading & error compensation [2].
II	**Medium access control:** need for specialized MAC, hidden and exposed terminal, near and far terminals, MAC schemes: Fixed TDMA, Aloha, CSMA, DAMA, PRMA, reservation TDMA, MACA, polling, ISMA, CDMA- SAMA, comparisons [1]. **Telecommunication systems:** GSM: mobile services, system architecture, radio interface, protocols, localization and calling, handover, security, new data services-HSCSD, introduction to GPRS [1,3].
III	**Wireless LAN:** advantages, disadvantages and design goals, infra red v/s radio transmission, infrastructure and ad-hoc network, IEEE 802.11: System architecture, protocol architecture, physical layer, medium access control layer, MAC management and functions, brief idea of - 802.11b, 802.11a, newer developments [1]. **HIPERLAN:** HIPERLAN 1, Bluetooth: user scenarios, architecture, radio layer, base band layer, link manager protocol, L2CAP, security, SDP, profiles, IEEE 802.15 [1].
IV	**Mobile network layer:** mobile IP - Goals, assumptions and requirements, entities and terminology, IP packets delivery, agent discovery, registration, tunneling and encapsulation, optimizations, reverse tunneling, DHCP. Mobile Ad hoc network – usage & routing- global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA) [1]. **Mobile transport layer:** Implications of mobility in Traditional TCP, classical TCP improvements: indirect TCP, snooping TCP, mobile TCP, fast retransmit/fast recovery, transmission/time-out freezing, selective retransmission, transaction-oriented TCP [1].
V	**Support for mobility:** File systems - Introduction to coda, little work, Ficus, MIo-NFS, rover. World wide web - hypertext transfer protocol, hypertext language, system architecture. Wireless Application Protocol - architecture, wireless datagram protocol, wireless transport layer security, wireless transaction protocol, wireless session protocol, wireless application environment, wireless markup language, WML Script, wireless telephony application, push architecture, push/pull services, example stacks with WAP1.x [1].

Text Books & References:

1. Mobile Communications, Schiller, 2nd Ed., Pearson.
2. Wireless Communications, Theodore S. Rappaport, 2nd Ed., PHI.
3. Wireless Communications, William Stallings, Prentice Hall
4. WIRELESS COMMUNICATIONS & NETWORKING, Vijay Garg, The Morgan Kaufmann Series in Networking

7IT3 DATA MINING & WARE HOUSING (Info. Tech.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Overview, Motivation(for Data Mining),Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data, (Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction:-Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.
II	**Concept Description:** Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Graph Displays of Basic Statistical class Description, Mining Association Rules in Large Databases, Association rule mining, mining Single-Dimensional Boolean Association rules from Transactional Databases– Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi- Dimensional Association rules from Relational Databases.
III	What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed-forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbour classifiers, Genetic Algorithm. Cluster Analysis: Data types in cluster analysis, Categories of clustering methods, Partitioning methods. Hierarchical Clustering- CURE and Chameleon. Density Based Methods-DBSCAN, OPTICS. Grid Based Methods- STING, CLIQUE. Model Based Method –Statistical Approach, Neural Network approach, Outlier Analysis
IV	**Data Warehousing:** Overview, Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture, Data Mining.
V	Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery, Tuning Data Warehouse, Testing Data Warehouse.

Text Books & References:

1. Data Warehousing in the Real World – Anahory and Murray, Pearson Education.
2. Data Mining – Concepts and Techniques – Jiawai Han and Micheline Kamber.
3. Building the Data Warehouse – WH Inmon, Wiley.

7IT4 INTERNET PROGRAMMING (Info. Tech.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Introduction , Editing XHTML , First XHTML Example , W3C XHTML Validation service , Headings, Linking , Images , Special Characters and horizontal rules, Lists, Tables, forms, Internet linking, web resources. Cascading Style Sheets Introduction , Inline Styles, Embedded Style Sheets, Conflicting Styles , Linking External Style Sheets, Positioning Elements , Backgrounds , Element Dimensions , Box Model and Text Flow Media types, Building a CSS drop-down menu, User Style Sheets ,CSS3, Web Resources
II	JavaScript: Introduction to Scripting, Control Structures, Functions, Arrays, Objects, and Document object model (DOM): Objects and Collections, Events. XML and RSS: Introduction, XML basics, structuring data, XML namespaces, document type definitions (DTDs), W3C XML schema documents ,XML vocabularies, Extensible style sheet language and XSL transformations, Document object model(DOM),RSS
III	Ajax-enabled rich internet applications: introduction , traditional web applications vs Ajax application , rich internet application (RIAs)with Ajax, history of Ajax, "Raw" Ajax example using the XMLHttpRequest object , using XML and the DOM, creating a full-scale Ajax –enabled application ,dojo toolkit Web Servers (IIS and Apache): introduction, HTTP transactions , multi tier application architecture ,client-side scripting versus server-side scripting ,accessing web servers, Microsoft internet information services(IIS), Apache HTTP server, requesting documents.
IV	PHP: Introduction, PHP basics, string processors and regular expressions , form processing and business logic, connecting to a database, using cookies, dynamic content, operator precedence chart ASP.NET 2.0 and ASP.NET Ajax: introduction, creating and running a simple web form example, web controls, session tracking case study : connecting to a database in ASP.NET
V	Java Server Faces Web applications: introduction, java web technologies, creating and running a simple application in NetBeans, JSF components , session tracking

References

1. Internet & WWW, How to program, DEITEL P.J., H.M., Prentice Hall

7 IT 5 COMPUTER GRAPHICS & MULTIMEDIA TECHNIQUES (Common to Comp. Engg. & Info. Tech.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Introduction:** Introduction to Raster scan displays, Storage tube displays, refreshing, flicking, interlacing, color monitors, display processors, resolution, Introduction to Interactive. Computer Graphics: Picture analysis, Overview of programmer's model of interactive graphics, Fundamental problems in geometry. Scan Conversion: point, line, circle, ellipse polygon, Aliasing, and introduction to Anti Aliasing (No anti aliasing algorithm).
II	**2D & 3D Co-ordinate system:** Homogeneous Co-ordinates, Translation, Rotation, Scaling, Reflection, Inverse transformation, Composite transformation. Polygon Representation, Flood Filling, Boundary filling. Point Clipping, Cohen-Sutherland Line Clipping Algorithm, Polygon Clipping algorithms.
III	**Hidden Lines & Surfaces**: Image and Object space, Depth Buffer Methods, Hidden Facets removal, Scan line algorithm, Area based algorithms. **Curves and Splines**: Parametric and Non parametric Representations, Bezier curve, B-Spline Curves.
IV	**Rendering:** Basic illumination model, diffuse reflection, specular reflection, phong shading, Gourand shading, ray tracing, color models like RGB, YIQ, CMY, HSV
V	**Multimedia:** Multimedia components, Multimedia Input/Output Technologies: Storage and retrieval technologies, Architectural considerations, file formats. **Animation:** Introduction, Rules, problems and Animation techniques.

Text/References:

1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice, Pearson
2. Hearn and Baker: Computer Graphics, PHI
3. Multimedia Systems Design, Prabhat Andleigh and Thakkar, PHI.
4. Multimedia Information Networking, N.K.Sharda, PHI..

7IT6.1 ADVANCE DATABASE MANGEMENT SYSTEMS (Common to Comp. Engg. & Info. Tech.)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Query Processing and Optimization**: Overview of Relational Query Optimization, System Catalog in a Relational DBMS, Alternative Plans, Translating SQL, Queries into Algebra, Estimating the Cost of a Plan, Relational Algebra Equivalences, Enumeration of Alternative Plans. [2]
II	**Object Database Systems**: Motivating Examples, Structured Data Types, Operations On Structured Data, Encapsulation and ADT's, Inheritance, Objects, OIDs and Reference Types, Database Design for an ORDBMS, ORDBMS Implementation Challenges, ORDBMS, Comparing RDBMS, OODBMS, and ORDBMS.
III	**Parallel and Distributed Databases**: Architectures for Parallel, Databases, Parallel Query Evaluation, Parallelizing Individual Operations, Parallel Query Optimization, Distributed DBMS Architectures, Storing Data in a Distributed DBMS, Distributed Catalog Management, Distributed Query Processing, Updating Distributed Data, Introduction to Distributed Transactions, Distributed Concurrency Control, Distributed Recovery. [2]
IV	**Database Security and Authorization**: Introduction to Database Security, Access Control, Discretionary Access Control- Grant and Revoke on Views and Integrity Constraints, Mandatory Access Control- Multilevel Relations and Polyinstantiation, Covert Channels, DoD Security Levels, Additional Issues Related to Security- Role of the Database Administrator, Security in Statistical Databases, Encryption. [2]
V	**POSTGES**: POSTGRES user interfaces, sql variations and extensions, Transaction Management, Storage and Indexing, Query processing and optimizations, System Architectures. **XML:** Motivation, Structure of XML data, XML Document Schema, Querying and Transformation, Application Program Interface to XML, Storage of XML Data, XML applications. [2]

Text/References

1. Elmasri R and Navathe SB, Fundamentals of Database Systems, 3rd Edition, Addison Wesley, 2000.
2. Connolly T, Begg C and Strachan A, Database Systems, 2nd Edition, Addison Wesley, 1999
3. Ceri Pelagatti , Distributed Database: Principles and System - (McGraw Hill)
4. Simon AR, Strategic Database Technology: Management for the Year 2000, Morgan Kaufmann, 1995
5. A. Silversatz, H. Korth and S. Sudarsan: Database Cocepts 5th edition, Mc-Graw Hills 2005.

7 IT 6.2 INTELLIGENT SYSTEMS (Info. Tech)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Introduction, Problems & Heuristic Search:** The AI Problems and assumption, AI Technique, Problem, Problem space, Production System & characteristics, Problem characteristics, **Heuristics search Technique**- Generate and test, Hill Climbing, BFS, Problem Reduction, constraint satisfaction, Means-ends analysis.
II	**Knowledge Representation:** Representation and Mapping, approaches, Issue, Predicate Logic-Representation of Simple facts in logic, instance and ISA representation, computable functions and predicates, Resolution, natural deduction. Representing Knowledge Using Rules- Procedural v/s Declarative Knowledge, Forwarded v/s Backward Reasoning, Logic Programming, and Matching.
III	**Game playing-** Introduction**,** Minimax Search Procedure, adding Alpha Beta Cutoff, additional refinements, Iterative Deepings, reference on specific games. **Planning-** Component of Planning System, Goal Stack Planning, Nonlinear Planning, Hierarchical Planning and Reactive System. Understanding.
IV	**Learning-** Introduction, role of learning, learning in problem solving, example and explanation based learning, discovery, analogy, formal learning theory. **Connectionist model-** Introduction to neural networks, hopfield networks, learning in Neural Network application of neural network, recurrent network.
V	**Expert system**- Introduction, representing using domain knowledge, expert system shell, explanation and knowledge acquisition. **Fuzzy Logic System-** Introduction, Crisp Sets, Fuzzy Sets, Fuzzy Terminology, Fuzzy Logic Control, Fuzzy Inference Processing. **Genetic algorithms**- Introduction, significance of genetic operators, termination parameters, niching & speciation, evolving neural networks, ANT algorithms.

Text Books & References:

1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. Introduction to AI & Expert System: Dan W. Patterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)
4. Russel & Norvig, Artificial Intelligence: A Modern Approach, Prentice-Hall

7IT 6.3 SPEECH PROCESSING (Info. Tech)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	**The speech chain**: current capabilities in synthesis and recognition. Acoustic phonetics. Vocal tract physiology: voiced excitation, unvoiced excitation (bursts, frication). Acoustics of uniform tubes, of two- and three-tube models. Comparison to speech data.
II	**Synthesis**: Formant synthesis (series, parallel), Articulatory synthesis, Concatenative Synthesis, Text-to-Speech (normalisation, linguistic units, rules). Articulatory parameters, shape-to-sound transformation, vocal tract imaging, revising the acoustic model.
III	**Letter-sound relations**, phonology; prosody, intelligibility, quality assessment. Ear physiology. Auditory perception. Speech perception.
IV	**Recognition**: Template matching. (Training, distance measures, dynamic time warping), Stochastic models. (Hidden Markov models, Baum-Welch and Forward-Backward algorithms). Large-Vocabulary Recognition. (Phonemic baseforms, language models), Artificial Neural Networks. (Overview, hybrid systems).
V	**Assessing recognition performance**; improving recognition performance; Knowledge-based approaches, auditory models.

References:

1. J N Holmes and W. Holmes, Speech Synthesis and Recognition, 2nd ed., Taylor and Francis, 2001.
2. B. Gold and N. Morgan, Speech and Audio Signal Processing, Wiley and Sons, 2000.
3. G. Childers, Speech Processing and Synthesis Toolboxes, Wiley and Sons, 2000.
4. J. R. Deller, J. R. Proakis, J. H. L. Hansen, Discrete-Time Processing of Speech Signals, Prentice-Hall 1993.
5. P. B. Denes and E. N. Pinson, The Speech Chain, W. H. Freeman & Co 1993.
6. S Furui, Digital Speech Processing, Synthesis and Recognition, Marcel Dekker Inc 1989.
7. D O'Shaughnessy, Speech Communications: Human & Machine, IEEE Press 1999.
8. L R Rabiner and R W Schafer, Digital Processing of Speech Signals, Prentice-Hall 1978.
9. K. N. Stevens, Acoustic Phonetics, MIT

7IT7 COMPUTER GRAPHICS & MULTIMEDIA LAB (Common to Comp. Engg. & Info. Tech)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech. **Schedule per Week** **Practical Hrs.: 2**	**Examination Time = Four (4) Hours** **Maximum Marks = 50** **[Sessional /Mid-term (30) & End-term (20)]**

Objectives:

At the end of the semester, the students should have clearly understood and implemented the following:

1. To produce a single pixel and pre specified pattern on screen:
2. To implement features like changing background color, foreground color, resizing of window, repositioning of window:
3. To implement mid point algorithm to draw circle and ellipse:
4. Use the line drawing & circle drawing programs to draw composite objects containing only circle & lines. You can take shapes like a cart, car etc.
5. To Implement Clipping (various algorithms).
6. Simple fonts, graphical fonts, scalable fonts.
7. Input a polygon by drawing lines, use appropriate methods for filling and filling convex & concave polygons.

Suggested Platform/Tools:

1. For this lab, the students can choose any platform either Microsoft Windows or Linux.
2. Compilers & Libraries: Microsoft Platform- Visual Studio.Net, Linux – Xlib.
3. No turbo C/C++. No library function except the one required to put a single pixel on the screen.

Indicative List of Experiments:

1. Programs to produce a single pixel produce a pre specified pattern with features like changing background color, foreground color, resizing of window, repositioning of window must be demonstrated.
2. Use Mid Point algorithm to draw line between two points. The program must be independent of the slope i.e. lines of all slopes must be drawn.
3. Use Mid Point algorithm to draw ellipse. Implement circle drawing as a special case of ellipse. Extend this to draw arcs between points.
4. Programs to draw composite objects containing circles & lines, drawing lines thicker than one pixel, you can take shapes like a cart, car etc.
5. Programs to demonstrate text generation e.g. simple fonts, graphical fonts, and scalable fonts.
6. Programs to demonstrate filling algorithms eg. filling convex & concave polynomials. The program must be able to (i) input a polynomial by drawing lines (ii) determine whether convex or concave (iii) use appropriate methods for filling.
7. Programs to demonstrate clipping algorithms eg. program to clip a (i) line and (ii) polygon using Cohen-Sutherland Clipping algorithm(s), clipping lines, circles against a rectangular clip area.
8. Programs to demonstrate presentation of geometrical objects e.g.circle and rectangle with audio description i.e. size, color of boundary and interior etc. played synchronously one after another.

7 IT 8 UML Lab (Info. Tech)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info.Tech. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (60) & End-term (40)]**

Objectives:

1. The students shall be able to use following modules of UML for system description, implementation and finally for product development.

   - Capture a business process model.
   - The User Interaction or Use Case Model - describes the boundary and interaction between the system and users. Corresponds in some respects to a requirements model.
   - The Interaction or Communication Model - describes how objects in the system will interact with each other to get work done.
   - The State or Dynamic Model - State charts describe the states or conditions that classes assume over time. Activity graphs describe the workflows the system will implement.
   - The Logical or Class Model - describes the classes and objects that will make up the system.
   - The Physical Component Model - describes the software (and sometimes hardware components) that make up the system.
   - The Physical Deployment Model - describes the physical architecture and the deployment of components on that hardware architecture.

The students are expected to use the UML models, prepare necessary documents using UML and implement a system. Some hardware products like digital clock, digital camera, washing machine controller, air conditioner controller, an electronic fan regulator, an elementary mobile phone etc. may also be chosen.

The students shall be assigned one problem on software based systems and another involving software as well as hardware.

7 IT 9 INTERNET PROGRAMMING LAB (Info. Tech)

Class: VII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech. **Schedule per Week** **Practical Hrs : 2**	**Examination Time = Four (4) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

Objectives: At the end of the semester, the students should have clearly understood and implemented the following:

1. Develop basic understanding of HTML script: overview of HTML, basic HTML tags, title, head and body.
2. Write web pages in HTML: formatting text in HTML, inserting photographs on the page, drawing tables, creating hyperlinks-internal and external, creating hyperlinks of external web sites.
3. Develop understanding of creating standard view of web site: displaying multiple pages over a single page, displaying it as standard view like header and footer, creating standard text formatting over the web site.
4. Develop understanding common formation over a web site: creating and using css, understanding importance of common text formatting over a website.
5. Develop understanding of server side scripting language: basic concepts of scripting language, client side and server side scripting, introduction to php, variable, control statements, loops .
6. Develop applications using php and MySQL: using php to access database, mysql database selection, create, update and delete script in php.

It is expected that each laboratory assignments to given to the students with an aim to In order to achieve the above objectives

Indicative List of Experiments:

1. Develop a static html page using style sheet to show your own profile. Add pages one by one to show 5 photos, to show your academics in tabular format, a page containing 5 links to your favorite website, navigational links to all above pages (menu), header, footer, left-sidebar, right sidebar etc.
2. Use Cascading Style Sheets to format your all pages in a common format.
3. Write a simple "hello word" program using php.
4. Write a program to accept two strings (name and age) from user. Print welcome statement e.g. “Hi Ram, your age is 24."
5. Write a program to create a calculator, which can support addition, subtraction, multiply and division operations.
6. Write a program to take input parameters for a table (no. of rows and no. of columns) and create the desired table.
7. Create a "Contact Me" page -Ask user to enter his name, email ID, Use Java-Script to verify entered email address. Store submitted value in a MySql database. Display latest 5 submitted records in contact me page. Display above record with navigation support. e.g. (next, previous, first, last)

8 IT 1 SOFTWARE TESTING & VALIDATION (Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Software Verification and Validation**- Introduction, Verification, Method of Verification, Validation, Level of Validation, Principle of testing, context of testing in producing software, White Box testing- Definition, Static testing, Structural testing, , Black box testing,
II	**Integration Testing**- Scenario Testing, Defect bash, System and acceptance testing- functional, non-functional testing, Performance testing- methodology, tools & Process
III	**Regression Testing, Internationalization Testing**-Introduction, Test Phases of Internationalization testing, Enabling testing, Locale Testing, Language testing, Localization testing, Ad-hoc testing- Overview, Buddy testing, Pair Testing, Exploratory Testing, Iterative testing Agile and Extreme Testing
IV	**Testing Of Object-oriented systems:** Introduction, Primer on object –oriented software, Differences in OO testing. **Usability And Accessibility Testing**- what is usability testing, approach to usability, when to do usability testing, how to achieve usability, quality factors for usability, accessibility testing, tools for usability,
V	Test planning, Test Management, Test Process and reporting, Software Test Automation- Scope of Automation, Design and Architecture of automation, Process Model for Automation, Test matrices and measurement- Type of Metrics, Project Metrics, Productivity Metrics, Progress Metrics, Release Metrics

Text Books & References:

1. Software testing, Srinivasan D., Gopalswami R. Pearson Education

2. Software Testing M G Limaye TMH

3 .Software Engineering Sommerville Pearson Education

8 IT 2 INFORMATION SYSTEM SECURITY (Common to Comp. Engg. & Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech. **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Elements of Number Theory: Divisibility and Euclid Algorithm, Primes and the Sieve of Eratosthenes, testing for primes, Prime Number Theorem, Euler's, Fermat's Little theorems, Congruences, Computing Inverse in Congruences, Legendre and Jacobi Symbols, Chinese Remainder Theorem, Algebraic Structures in Computing (Definitions, properties and Elementary Operations Only): Groups, subgroup, order of group, cyclic group, ring, field, division algorithm, polynomial over a field. Galois Field Elements of Information Theory: Entropy, redundancy of language, Key Equivocation & Unicity Distance, equivocation of a simple cryptographic system
II	Security Attacks: Active V/S Passive, Security Services, Security Mechanisms. Symmetric Cipher Model, Types of attacks on Encrypted messages. Classical Cipher Techniques: Caeser, Affine, Mono-alphabetic, Transposition, Poly-alphabetic Ciphers Private Key Cryptosystems: Block Cipher Principles, Fiestel Cipher, Concept of 'Confusion' and "Diffusion' in block ciphers, Product Ciphers, Lucifer Algorithm. DES Algorithm, DES modes of operations, IDEA. Differential & Linear Cryptanalysis (Introduction Only). S-box theory: Boolean Function, S-box design criteria, Bent functions, Propagation and nonlinearity, construction of balanced functions, S-box design. Link Vis End-to-End Encryption, Key Distribution in Symmetric Encryption
III	Public Key Cryptosystems: Principles of Public Key Cryptosystems, Factorization, RSA Algorithm, security analysis of RSA, Exponentiation in Modular Arithmetic. Key Management in Public Key Cryptosystems: Distribution of Public Keys, Distribution of Secret keys using Public Key Cryptosystems. Discrete Logarithms, Diffie-Hellman Key Exchange.
IV	Message Authentication & Hashing: Birthday Paradox and General case of Duplications, Basic functions of Message Authentication and Hashing, Introduction to Hash & MAC algorithms. Digital Signatures: RSA Based, ElGamal Signatures, Undeniable Signatures. Authentication: Model of Authentication Systems, Impersonation, Substitution and spoofing games, Authentication schemes for mutual authentication based on shared secret, two-way public key, one-way public key, Mediated Authentication, One way Authentication.
V	X.509 Authentication Service: Certificates, Authentication Procedure, X.509 Version 3. E-Mail Security: PGP including management of keys in PGP, S/MIME. Network Security: IPSec, AH & ESP in Transport and Tunnel mode with multiple security associations (Key Management not Included). SSL (Protocols Only) Intrusion Detection: Audit Reports, Statistical Anomaly Detection, Rule based detection, honeypots, intrusion detection exchange formats. Password Protection: Lamport Hash, EKE Protocol.

Text/References:

1. Stalling Williams: Cryptography and Network Security: Principles and Practices, 4th Edition, Pearson Education, 2006.
2. Kaufman Charlie et.al; Network Security: Private Communication in a Public World, 2nd Ed., PHI/Pearson.
3. Pieprzyk Josef and et.al; Fundamentals of Computer Security, Springer-Verlag, 2008.
4. Trappe & Washington, Introduction to Cryptography, 2nd Ed. Pearson.

8 IT 3 Data Compression Techniques (Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Compression Techniques: Lossless, lossy, measure of performance, modeling & coding. Lossless compression: Derivation of average information, data models, uniquely decodable codes with tests, prefix codes, Kraft-Mc Millan inequality. Huffman coding: Algorithms, minimum variance Huffman codes, optimality, length extended codes, adaptive coding, Rice codes, using Huffman codes for lossless image compression.
II	Arithmetic coding with application to lossless compression. Dictionary Techniques: LZ77, LZ78, LZW Predictive coding: Burrows-Wheeler Transform and move-to-front coding, JPEG-LS Facsimile Encoding: Run length, T.4 and T.6
III	Lossy coding- Mathematical preliminaries: Distortion criteria, conditional entropy, average mutual information, differential entropy, rate distortion theory, probability and linear system models. Scalar quantization: The quantization problem, uniform quantizer, Forward adaptive quantization, non-uniform quantization-Formal adopting quantization, companded Quantization Vector quantization: Introduction, advantages, The Linde-Ruzo-Grey algorithm, lattice vector quantization.
IV	Differential encoding – Introduction, Basic algorithm, Adaptive DPCM, Delta modulation, speech and image coding using delta modulation. Sampling in frequency and time domain, z-transform, DCT, DST, DWHT, quantization and coding of transform coefficient.
V	Sub band coding: Introduction, Filters, Basic algorithm, Design of Filter banks, G.722, MPEG. Wavelet based compression: Introduction, wavelets multi-resolution analysis and the scaling function implementation using filters.

References:

1. Sayood K: Introduction to Data Compression: ELSEVIER 2005.

8 IT 4.1 MOBILE COMPUTING (Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	**Mobile computing:** Definitions, adaptability issues (transparency, Environmental Constraints, application aware adaptation), mechanisms for adaptation and incorporating adaptations. **Mobility management:** mobility management, location management principle and techniques, Energy efficient network protocols, PCS location management Scheme, Energy efficient indexing on air and algorithm.
II	Data dissemination and management: challenges, Data dissemination, bandwidth allocation for publishing, broadcast disk scheduling, mobile cache maintenance schemes, Mobile Web Caching. Introduction to mobile middleware, Middleware for application development: adaptation. Mobile Agents- introduction, mobile agent computing, model, technologies, application to DBMS, Mobile Agent Security and Fault Tolerance using Distributed Transactions, Reliable Agent Transfer, Architecture of a Secure Agent System, Network Security Testing Using Mobile Agents, Network Security Testing Using Mobile Agents.
III	**Service Discovery Middleware:** Service Discovery & standardization Methods (Universally Unique Identifiers, Textual Description & using interfaces), unicast Discovery, Multicast Discovery & advertisement, service catalogs, Garbage Collection, Eventing, security. Universal Plug and Play, Jini, Salutation.
IV	**Pervasive computing:** Introduction, Principles–Decentralization, Diversification, Connectivity, Simplicity, Pervasive Information Technology, Mobile Devices – Classification, Characteristics, Limitations, Smart Identification – Smart Card, Smart Label, Smart Tokens, Smart Sensors and Actuators, Smart Home.
V	Web Services, Web Service Architecture, WSDL, UDDI, SOAP, Web Service Security, Web Services for Remote Portals. Internet Portals – Functional Overview, Type – B2E Portals, Portal Infrastructure. **Standards:** DECT, TETRA, UMTS, IMT-2000, IrDA-Architecture & protocol stacks.

References:

1. Frank Adelstein, Sandeep Gupta, Golden Richard III, Loren Schwiebert, Fundamentals of Mobile and Pervasive Computing, TMH.
2. Principles of mobile computing Hansmann & Merk., Springer
3. Mobile communications Jochen Schiller , Pearson
4. 802.11 wireless networks Matthew S.Gast, O'REILLY.
5. Wireless LANs: Davis & McGuffin, McGraw Hill

8 IT 4.2 Network Management (Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	Contents of the subject
I	**Foundation of policy management:** introduction, definition of policy management, motivation for policy management, need for a new shared information model, benefits of PBNM. **Policy Management Fundamentals :** The need for object-oriented analysis, design, and modeling in PBNM systems, Conceptual policy model, Definition of PBNM system, Policy terminology, Essential terminology for PBM system, new terminology not covered in RFC198, Definition of policy-based management & network management.
II	**Policy Management and the Sharing of Data :** introduction- The need to express information in a common way, How to solve current in sharing and reusing data, Existing approaches to sharing information, How to express information in a common way, The new DEN-ng approach,
III	**Policy Operation in a PBNM System :** Policy communication, General management issues, Policy operation, Musings on implementation
IV	**Representing High-Level Policies :** Introduction- High-level policy specification, Basic policies for specifying business-driven behavior, DEN-ng additions to the ponder framework of basic, Composite policies, Use of high-level policies example
V	Components of PBNM: Requirements of Different Policies, Life of a Policy, Building Blocks of PBNM, Architecture of PBNM.

References:

Strassner, Policy Based Network Management: Solutions for the Next Generation, ELSEVIER

8 IT 4.3 DIGITAL IMAGE PROCESSING (Common to Comp. Engg. & Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech **Schedule per Week** **Lectures: 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 100** **[Mid-term (20) & End-term (80)]**

Units	**Contents of the subject**
I	Image Representation, Two-Dimensional Systems, Two-Dimensional Fourier Transform, Image Stochastic Characterization, Psychophysical Vision Properties, Light Perception, Eye Physiology, Visual Phenomena, Monochrome Vision Model, Color Vision Model, photometry.
II	Image Sampling and Reconstruction Concepts, Image Sampling Systems, Image Reconstruction Systems, Discrete Image Mathematical Representation, Vector-Space Image Representation, Generalized Two-Dimensional Linear Operator, Image Statistical Characterization, Image Probability Density Models, Linear Operator Statistical Representation, Image Quantization, Scalar Quantization, Processing Quantized Variables, Monochrome Image Quantization.
III	Superposition and Convolution: Finite-Area Superposition and Convolution, Sampled Image Superposition and Convolution, Superposition and Convolution Operator Relationships, 8 Unitary Transforms, General Unitary Transforms, Fourier Transform, Cosine, Sine, and Hartley Transforms, Hadamard, Haar, Linear Processing Techniques, Transform Domain Processing, Transform Domain Superposition.
IV	IMAGE IMPROVEMENT: Image Enhancement, Contrast Manipulation, Histogram Modification, Noise Cleaning, Edge Crispening, Image Restoration Models, General Image Restoration Models, Optical Systems Models, Photographic Process Models, Discrete Image Restoration Models, Point and Spatial Image Restoration Techniques, Sensor and Display Point Nonlinearity Correction, Continuous Image Spatial Filtering Restoration, Statistical Estimation Spatial Image Restoration, Geometrical Image Modification, Translation, Minification, Magnification, and Rotation, Perspective Transformation, Camera Imaging Model,
V	Morphological Image Processing, Binary Image Connectivity, 6 Gray Scale Image Morphological Operations, Edge Detection, Edge, Line, and Spot Models, First-Order Derivative Edge Detection, Second-Order Derivative Edge Detection, Image Feature Extraction: Image Feature Evaluation, Amplitude Features, Transform Coefficient Features, Texture Definition, Image Segmentation , Amplitude Segmentation Methods, Clustering Segmentation Methods, Region Segmentation Methods, Boundary Detection,

References

1. DIGITAL IMAGE PROCESSING: PIKS Inside, Third Edition, WILLIAM K. PRATT, PixelSoft, Inc., Los Altos, California, ISBN: 9780471374077
2. Anil Jain: Digital Image Processing,
3. Gonzalez Woods: Image Processing

8 IT 5 Software Testing Lab. (Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Info.Tech. **Schedule per Week** **Practical Hrs.: 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 75** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1	Hands on Software Engineering principles Infrastructure.
2.	usage of Front-end and Back-end technologies and packages Prepare the following documents for three of the experiments listed below using software engineering methodology. 1. Program Analysis and Project Planning. 2. Thorough study of the problem – Identify project scope, Objectives, 3. Software requirement Analysis
3	Describe the individual Phases / Modules of the project, Identify deliverables
4	Software Design a. Use work products – Data dictionary, Use case diagrams and activity diagrams, build and test class diagrams, b. Sequence diagrams and add interface to class diagrams, DFD, ER diagrams c. Software Development and Debugging using any Front end and Back end tool d. Software Verification and Validation procedures

8IT6 DATA COMPRESSION LAB (Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Info.Tech. **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Four (4) Hours** **Maximum Marks = 75** **[Sessional/Mid-term (60) & End-term (40)]**

S. No.	**List of Experiments**
1	Compress a file (bitmap format) having some diagram in it. Transfer the file to another system & decompress to display the original file.
2	Compress an audio file. Transfer the file to another system & decompress to display the original file.
3	Compress a video file. Transfer the file to another system & decompress to display the original file.
4	Implement Huffman coding with minimum variance, optimal, non-binary, extended, adaptive.
5	Implement Applications and limitations of Huffman codes (Run length encoding, Arithmetic coding, Predictive coding)
6	Implement Lossy Compression Techniques – JPEG and its application Error detection and correction: Parity, 1,2,n dimensions, Hamming codes, p-out-of-q codes
7	Implement Dictionary based compression - Lempel-Ziv-Welch, LZ77 and LZ-78 Quantization – Scalar and Vector Quanitization.
8	Implement Shannon Fano Algorithm

8IT7: Data Mining & Ware Housing 0L+2P MM:50

Lab Exercises

EXPERIMENT-1

To perform various commands given in PL/SQL in Oracle 8.0(For brushing up.)

EXPERIMENT-2

To perform multi-dimensional data model using SQL queries. E.g. Star, snowflake and Fact constellation schemas

EXPERIMENT-3

To perform various OLAP operations such slice, dice, roll up, drill up, pivot etc.

EXPERIMENT-4

To perform the text mining on the given data warehouse

EXPERIMENT-5

To perform the correlation ship analysis between for the given data set.

EXPERIMENT-6

To perform the attribute relevance analysis on the given data.

EXPERIMENT-7

To perform the information gain for a particular attribute in the given data.

EXPERIMENT-8

To perform the experiment to predict the class using the Bayesian classification

EXPERIMENT-9

Write a program to find out a weight or bias updating using the back propagation in Neural Network

EXPERIMENT-10

To perform various data mining algorithms on the give data base using Clementine

8IT8 Seminar on Information Technology Acts (Common to Comp. Engg. & Info. Tech)

Class: VIII Sem. B.Tech.	**Evaluation**
Branch: Info. Tech. **Schedule per Week** **Practical Hrs : 2**	**Examination Time = Four (2) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

Course Objectives:

1. Study the acts dealing with the cyber crimes in different countries viz., India, USA, European Union.
2. Study the Intellectual Property Rights and the acts dealing with these rights.
3. Study the Copyright acts with reference to publishing the material on the web.

Students are expected to prepare reports on:

- Various acts dealing with cyber crimes in the countries.
- What constitutes a cyber crime in the country?
- Definitions of electronic documents, evidences, the approved algorithms etc.
- Investigation methods.
- Intellectual Property, rights of the creator of the property and legal framework dealing with these rights.
- Similarly on Copyright acts.

Further, every student is required to deliver a seminar on a case study involving cyber crimes/ Intellectual Property, Copyright acts. The seminar shall focus on the "methodology and tools used in the investigation, and enforcement of the applicable acts.". The seminar may also be presented on new ways of committing cyber crimes particularly Phishing, botnet etc.

The corresponding acts are the reference material.