3IT1A- ELECTRONIC DEVICES & CIRCUITS (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.		**Evaluation**
Branch: Information Technology **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.

3IT2A- DATA STRUCTURES & ALGORITHMS (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Information Technology **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, Galgotia
3. Data Structures in C/C++, Tanenbaum, Pearson
4. Data Structures in C++, Weiss, Parson

3IT3A- DIGITAL ELECTRONICS (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Information Technology **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, TMH
2. Digital Logic and Computer Design By M. Morris Mano, Pearson

3. Modern Digital Electronics By R.P. Jain, TMH
4. Fundamentals of Digital circuits By A. Anand kumar, PHI
5. Digital circuit design By S. Salivahanan, Sarivazhagan, Vikas publications

3IT4A- OBJECT ORIENTED PROGRAMMING (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Information Technology **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

Object Oriented Design & Modelling, Rambaugh, Pearson

3IT5A- LINUX AND SHELL PROGRAMMING

Class: III Sem. B.Tech.	**Evaluation**
Branch: Information Technology **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
4. Harley Hahn: Guide to Unix & Linux, TMH
5. Blum, Bresnahan, Linux Command and Shell Scripting Bible, Wiley India, 2nd Ed.

3IT6A- Advanced Engineering Mathematics (Common to Computer Science and Engineering & Info. Tech)

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

Engineering& Info. Tech)

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, Simplex Method. Duality in Linear Programming and Transportation Problems.
III	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
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, central, shift and average operators and relation between them. Newton's and Gauss forward and backward interpolation formula for equal interval, Stirling's formula for central difference. Lagrange's Interpolation formula and Inverse Interpolation. Numerical differentiation by Newton's, 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 Picard's method, Euler's and modified Euler's method, Milne's method and Runga-Kutta fourth order method. Solution of difference equation.

Text/References:

1. Elementary Number Theory with applications: Thomas Koshy, 2nd Ed., Elsevier.
2. Operation Research By Kanti Swaroop, P. K. Gupta & Manmohan, Sultan chand & sons
3. Integral Transform By Dr. R.K. Gupta, A.R. Vashishtha, Krishna Prakashan Mandir Meerut

4. Calculus of Finite Differences & Numerical Analysis By Dr. Gupta & Malik Krishna Prakashan Mandir Meerut
5. Engineering Mathematics III By Jain and Rawat, CBC
6. Engineering Mathematics III By Prof. K.C. Sarangi and others, Genius publications

3IT7A- ELECTRONIC DEVICES LAB (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Information Technology **Schedule per Week** **Practical Hrs : 3**	**Examination Time = Three (3) Hours** **Maximum Marks = 75** **[Sessional/Mid-term (45) & End-term (30)]**

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.

3IT8A- DATA STRUCTURES LAB (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Information Technology **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.

3IT9A- DIGITAL ELECTRONICS LAB (Common to Computer Science and Engineering & Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Information Technology **Schedule per Week** **Practical Hrs : 2**	**Examination Time = Three (3) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

Info. Tech)

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.

3IT10A- C++ PROGRAMMING (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.		**Evaluation**
Branch: Information Technology **Schedule per Week** **Practical Hrs.: 3**		**Examination Time = Three (4) Hours** **Maximum Marks = 100** **[Sessional/Mid-term (45) & End-term (30)]**
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

3IT11A- UNIX SHELL PROGRAMMING (Common to Computer Science and Engineering& Info. Tech)

Class: III Sem. B.Tech.	**Evaluation**
Branch: Information Technology **Schedule per Week** **Practical Hrs : 2**	**Examination Time = Four (3) 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.

4IT1A- MICROPROCESSOR AND INTERFACES (Common to Computer Science and Engineering& Info. Tech)

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

Engineering& Info. Tech)

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

4IT2A- DISCRETE MATHEMATICAL STRUCTURES (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Information Technology **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	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.
II	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.
III	Proof Methods: Vacuous, Trivial, Direct, Indirect by Contrapositive and Contradiction, Constructive & Non-constructive proof, Counter example. 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.
IV	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.
V	Language of Logic: Proposition, Compound Proposition, Conjunction, Disjunction, Implication, Converse, Inverse & Contrpositive, Biconditional Statements, tautology, Contradiction & Contingency, Logical Equivalences, Quantifiers, Arguments.

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

4IT3A- STATISTICS & PROBABILITY THEORY (Common to Computer Science and Engineering & Info. Tech)

Units	Contents of the subject

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

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 Markov 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.

4IT4A- SOFTWARE ENGINEERING (Common to Computer Science and Engineering & Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Information Technology **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
3. Software Engineering By Ian Sommerville
4. Software Engineering Concepts By **Richard E. Fairley** (Mcgraw-Hill)

4IT5A- PRINCIPLES OF COMMUNICATION (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Information Technology **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	ANALOG MODULATION: Concept of frequency translation. Amplitude Modulation: Description of full AM, DSBSC, SSB and VSB in time and frequency domains, methods of generation & demodulation, frequency division multiplexing (FDM). Angle Modulation: Phase and frequency modulation. Descriptions of FM signal in time and frequency domains, methods of generation & demodulation, pre-emphasis & de-emphasis, PLL.
II	PULSE ANALOG MODULATION: Ideal sampling, Sampling theorem, aliasing, interpolation, natural and flat top sampling in time and frequency domains. Introduction to PAM, PWM, PPM modulation schemes. Time division multiplexing (TDM)
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	DIGITAL MODULATION: Baseband transmission: Line coding (RZ, NRZ), inter symbol interference (ISI), pulse shaping, Nyquist criterion for distortion free base band transmission, raised cosine spectrum. Pass band transmission: Geometric interpretation of signals, orthogonalization. ASK, PSK, FSK, QPSK and MSK modulation techniques, coherent detection and calculation of error probabilities.
V	SPREAD-SPECTRUM MODULATION: Introduction, Pseudo-Noise sequences, direct- sequence spread spectrum (DSSS) with coherent BPSK, processing gain, probability of error, frequency-hop spread spectrum (FHSS). Application of spread spectrum: CDMA.

Text/References:

1. Principles of communication systems By Taub Schilling, T.M.H.
2. Fundamentals of communication systems By Proakis & Salehi, Pearson education
3. Communication Systems 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

4IT6A- PRINCIPLES OF PROGRAMMING LANGUAGES

(Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Information Technology **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., Pearson
2. Programming languages: concepts and constructs, Ravi Sethi, ISBN 9780201590654.
3. Programming Language Pragmatics, Scott, ELSEVIER

4IT7A- MICROPROCESSOR LAB (Common to Computer Science and Engineering& Info. Tech)

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

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.

4IT8A- COMMUNICATION LAB
(Common to Computer Science and Engineering& Info. Tech.

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

Tech)

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).

4IT9A- COMPUTER AIDED SOFTWARE ENGINEERING LAB
(Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Information Technology **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 Recommended:**
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 Note: Open Source tools will be preferred.
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	

4IT10A- Business Entrepreneurship Development (Common to Computer Science and Engineering& Info. Tech)

Class: IV Sem. B.Tech.	**Evaluation**
Branch: Information Technology **Schedule per Week** **Practical Hrs : 2**	**Examination Time = Three (3) Hours** **Maximum Marks = 50** **[Sessional/Mid-term (30) & End-term (20)]**

1. Introduction to Entrepreneurship- Concept and need, Entrepreneurship and innovation, Entrepreneurship and economic growth.
2. Entrepreneurial competencies, Leadership, Decision making, Motivation, Risk taking.
3. Business Enterprise Planning- Identification of business opportunity, Idea generation, Demand estimation, Preparation of project report, Feasibility analysis.
4. Intellectual Property rights, Patents, Taxation- Central excise & Sales tax, VAT.
5. Government Policies for Entrepreneurs, Entrepreneurial career opportunities for Engineers, case studies.

5IT1A- COMPUTER ARCHITECTURE (Common to CS & IT)

Class: V Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Lectures: 3, Tutorial: 0**	**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)

5IT2A- Digital Signal Processing

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

5IT3A- TELECOMMUNICATION FUNDAMENTALS (Common to CS & IT)

Class: V 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	Data Transmission: Terminology, Frequency, spectrum, bandwidth, analog and digital transmission, Transmission impairments, channel capacity, Transmission Media. Wireless Transmission: Antenna and antenna gain. Network Reference Models (OSI/ISO and TCP/IP) Physical Layer: Line Encoding Schemes. Concept of bit period, effect of clock skew, Synchronous and Asynchronous communication. Data Link Layer: Functions of data link layer and design issues Flow Control: Flow control in loss less and lossy channels using stop-and-wait, sliding window protocols. Performance of protocols used for flow control.
II	Error Control Coding: Error Detection, Two Dimensional Parity Checks, and 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. Data Link Control: HDLC & PPP including frame structures. MAC sublayer: Channel Allocation Problem, Pure and slotted Aloha, CSMA, CSMA/CD, collision free multiple access. Throughput analysis of pure and slotted Aloha. Ethernet Performance.
III	Wireless LAN: Hidden node and Exposed node Problems, RTS/CTS based protocol, 802.11 Architecture, protocol stack, Physical layer, MAC Sublayer. Bluetooth Architecture and Protocol Stack Data Link Layer Switching: Bridges (Transparent, Learning and Spanning Tree), Virtual LANs
IV	Multiplexing: Frequency division, time division (Synchronous and statistical) multiplexing. ADSL, DS1 and DS3 carriers. Multiple Accesses: TDMA frame structure, TDMA Burst Structure, TDMA Frame efficiency, TDMA Superframe structure, Frame acquisition and synchronization, Slip rate 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

Text/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.

5IT4A- DATABASE MANAGEMENT SYSTEMS (Common to CS & IT)

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 TO DATABASE SYSTEMS: Overview and History of DBMS. File System v/s DBMS .Advantage of DBMS Describing and Storing Data in a DBMS. Queries in DBMS. Structure of a DBMS.
II	ENTITY RELATIONSHIP MODEL: Overview of Data Design Entities, Attributes and Entity Sets, Relationship and Relationship Sets. Features of the ER Model- Key Constraints, Participation Constraints, Weak Entities, Class Hierarchies, Aggregation, Conceptual Data Base, Design with ER Model-Entity v/s Attribute, Entity vs Relationship Binary vs Ternary Relationship and Aggregation v/s ternary Relationship Conceptual Design for a Large Enterprise.
III	RELATIONSHIP ALGEBRA AND CALCULUS**:** Relationship Algebra Selection and Projection, Set Operations, Renaming, Joints, Division, Relation Calculus, Expressive Power of Algebra and Calculus.
IV	SQL QUERIES PROGRAMMING AND TRIGGERS: The Forms of a Basic SQL Query, Union, Intersection and Except, Nested Queries ,Correlated Nested Queries, Set-Comparison Operations, Aggregate Operators, Null Values and Embedded SQL, Dynamic SQL, ODBC and JDBC, Triggers and Active Databases.
V	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.

References:

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

5IT5A- OPERATING SYSTEMS (Common to CS & IT)

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.

5IT6.1A- ADVANCED DATA STRUCTURE (Common to CS & IT)

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: Definitions, 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. 2A- E-Commerce

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 ecommerce, intra organizational ecommerce and consumer to business electronic commerce, architectural framework, Network infrastructure for ecommerce, market forces behind 1 way, component of 1 way acess equipment, global information distribution network, broadband 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 and network security.	
III	**Encryption:** World wide web & security, encryption, transaction security, secret key encryption , public key encryption, virtual private network(VPN), implementation management issues.	
IV	**Electronic payment:** Overview of electronic payments, digital token based, electronic 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 Ecommerce, 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.

5IT6.3A- SATELLITE & MICROWAVE COMMUNICATION

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.

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.

5IT9A- OPERATING SYSTEMS SIMULATION LAB(Common to CS & IT)

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. (Available for free download from http://www.ontko.com/moss/).

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.

5IT10A- DIGITAL HARDWARE DESIGN LAB (Common to CS & IT)

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)]**

Tech)

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

6IT3A- THEORY OF COMPUTATION (Common to CS & IT)

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.

6IT4A- PROGRAMMING IN JAVA

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. U.K. Chakraborty and D.G. Dastidar: Software and Systems – An Introduction, Wheeler Publishing, Delhi.
3. Joseph O'Neil and Herb Schildt: Teach Yourself JAVA, TMH, Delhi.

6IT5A- INFORMATION THEORY & CODING

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,

6IT6.1A- ADVANCE TOPICS IN OPERATING SYSTEMS (Common to CS & IT)

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	**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.

6IT6.2A- BIO INFORMATICS

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

6IT7A- JAVA PROGRAMMING LAB (Common to CS & IT)

Class: VI Sem. B.Tech.	**Evaluation**
Branch: I.T. **Schedule per Week** **Practical Hrs.: 3**	**Examination Time = Five (4) Hours** **Maximum Marks = 75** **[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.

6IT9A- UML LAB

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)]**

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 elctronic 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

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. <u>You do not know on which road he is and how far he is from you</u>. 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.

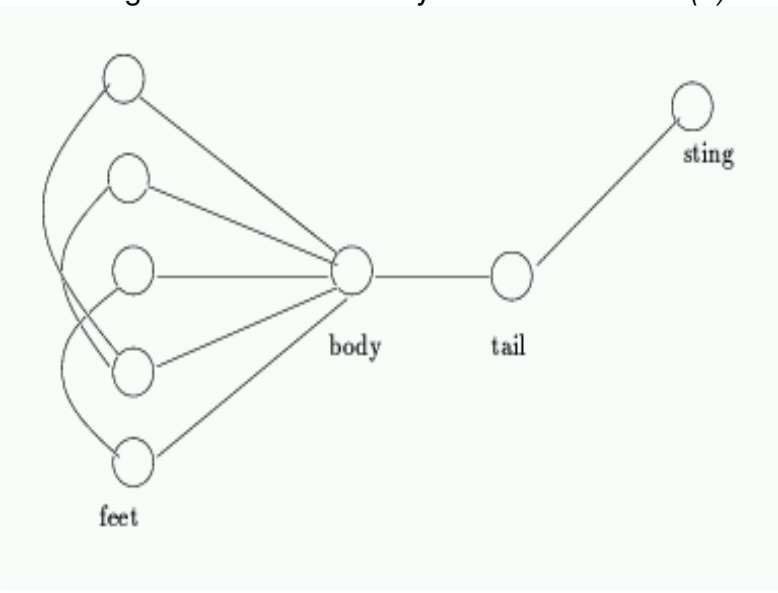
8. **A simple problem on sorted array:** Design an *O(n)*-time algorithm that, given a real number *x* and a sorted array *S* of *n* numbers, determines whether or not there exist two elements in *S* whose sum is exactly *x* .

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 A- SOFTWARE PROJECT MANAGEMENT

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.

7 IT 2 A- INFORMATION SYSTEM SECURITY (Common to CS & IT)

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 security attacks, services and mechanism, classical encryption techniques- substitution ciphers and transposition ciphers, cryptanalysis, stream and block ciphers. Modern Block Ciphers: Block ciphers principals, Shannon's theory of confusion and diffusion, fiestal structure, data encryption standard(DES), differential and linear cryptanalysis of DES, block cipher modes of operations, triple DES.
II	AES, RC6, random number generation. S-box theory: Boolean Function, S-box design criteria, Bent functions, Propagation and nonlinearity, construction of balanced functions, S-box design.
III	Public Key Cryptosystems: Principles of Public Key Cryptosystems, 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. X.509 Discrete Logarithms, Diffie-Hellman Key Exchange.
IV	Message Authentication and Hash Function: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions and MAC, MD5 message digest algorithm, Secure hash algorithm(SHA). Digital Signatures: Digital Signatures, authentication protocols, digital signature standards (DSS), proof of digital signature algorithm. Remote user Authentication using symmetric and Asymmetric Authentication
V	Pretty Good Privacy. IP Security: Overview, IP Security Architecture, Authentication Header, Encapsulation Security Payload in Transport and Tunnel mode with multiple security associations (Key Management not Included). Strong Password Protocols: Lamport's Hash, Encrypted Key Exchange.

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.

7IT3 A- DATA MINING & WARE HOUSING (Common to CS & IT)

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.

7 IT 4 A- INTERNET PROGRAMMING

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 A- COMPUTER GRAPHICS & MULTIMEDIA TECHNIQUES

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 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 components, Multimedia Input/Output Technologies: Storage and retrieval technologies, Architectural and telecommunication considerations. Animation: Introduction, Rules, problems and Animation techniques.

References

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

7 IT 6.1 A- ADVANCED DATA BASE MANAGEMENT SYSTEMS

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 – Measures of query cost, Implementation of database operations, External Sorting, Materialization vs. Pipelining, Size Estimations of various database operations, Evaluation plans, Cost-based vs. Heuristic optimization, Materialized views.
II	Transaction Processing and Serializability – Database Transaction and its processing, Transaction properties, Concurrent Transactions, Need of Serializability, Conflict vs. View Serializability.
III	Concurrency and Recovery – Implementation of Concurrency: Lock-based protocols and Timestamp-based protocols, Deadlock handling, Database Failures, Recovery Schemes: Shadow Paging and Log-based Recovery, Recovery with Concurrent transactions.
IV	Database Security and Advanced SQL – Database Integrity Constraints, Assertions and Triggers in SQL, Authorization and Authentication in SQL, Nested Subqueries, Views, and Embedded SQL.
V	Distributed Database Systems – Data Storage in Distributed systems, Local vs. Global Transactions, Transaction processing, Concurrency and Recovery in Distributed database systems, Distributed Query processing.

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. Gray J and Reuter A, Transaction Processing: Concepts and Techniques, Morgan Kaufmann, 1993

7 IT 6.2 A- Intelligent Systems

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	Introduction to AI: knowledge Importance of AI, Knowledge Base System, Knowledge organization & manipulation, LISP and other AI programming Languages.
II	Knowledge Representation: Syntax Semantics, Inference Rules, Non-deductive Inference methods, representations using rules, Fuzzy Logic & Natural language computations. Probabilistic Reasoning. Object Oriented Representations.
III	Knowledge Organization & Manipulation: Search & control strategies, matching techniques, knowledge organization & management.
IV	Knowledge Systems Architecture: Rule based, non-production, uncertainty knowledge system building tools.
V	Knowledge Acquisition: General concepts, learning by induction.

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 A- SPEECH PROCESSING

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

7IT7A- COMPUTER GRAPHICS & MULTIMEDIA LAB

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 polynomial by drawing lines, use appropriate methods for filling and filling convex & concave polynomials.

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

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 A- DMW Lab

Class: VII 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:

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 elctronic 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 A- INTERNET PROGRAMMING LAB

Class: VII 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)]**

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 A- Software Testing & Validation

Class: VIII Sem. B.Tech.	Evaluation
Branch: Information Technology **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, methods of verification, validation, level of validation, principle of testing, context of texting 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 and process
III	**Regression Testing, internationalization**-Introduction, test phases of internationalization testing, enabling testing, locale testing, language testing ,localization testing ,ad-hoc testing-overview, buddy testing, pair testing, explainatory 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, design and architecture of automation, process model for automation, test matrices and measurement- type of metrics, project metrics, productivity metrics, progress metrics, release metrics

8IT2 A- Digital Image Processing (Common to CS & IT)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **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 Image Processing:** Digital Image representation, Sampling & Quantization, Steps in image Processing, Image acquisition, color image representation
II	**Image Transformation & Filtering:** Intensity transform functions, histogram processing, Spatial filtering, Fourier transforms and its properties, frequency domain filters, colour models, Pseudo colouring, colour transforms, Basics of Wavelet Transforms
III	**Image Restoration:** Image degradation and restoration process, Noise Models, Noise Filters, degradation function, Inverse Filtering, Homomorphism Filtering
IV	**Image Compression:** Coding redundancy, Interpixel redundancy, Psychovisual redundancy, Huffman Coding, Arithmetic coding, Lossy compression techniques, JPEG Compression
V	**Image Segmentation & Representation:** Point, Line and Edge Detection, Thresholding, Edge and Boundary linking, Hough transforms, Region Based Segmentation, Boundary representation, Boundary Descriptors, Regional

Suggested Readings/Books

1. Gonzalez and Woods: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992.

Boyle and Thomas: Computer Vision - A First Gurse 2nd Edition, ISBN 0-632-028-67X, Blackwell

Science 1995.

2. Gonzalez and Woods: Digital Image Processing ISDN 0-201-600- 781, Addison Wesley 1992.

3. Pakhera Malay K: Digital Image Processing and Pattern Recogination, PHI.

4. Trucco&Verri: Introductory Techniques for 3-D Computer Vision, Prentice Hall, Latest Edition

5. Low: Introductory Computer Vision and Image Processing, McGraw-Hill 1991, ISBN 0-07-707403-3.

8 IT3A- Data Compression Techniques

Class: VII Sem. B.Tech.	Evaluation
Branch: Computer Engg. **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.

Text Books & References:

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

8 IT 4.1 A- MOBILE COMPUTING (Common to CS & IT)

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, PCS location management Scheme.
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.
III	Middleware for application development: adaptation, Mobile agents. Service Discovery Middleware: Service Discovery & standardization Methods (universally Unique Identifiers, Textual Description & using interfaces), unicast Discovery, Multicast Discovery & advertisement, service catalogs, Garbage Collection, Eventing.
IV	Mobile IP, Mobile TCP, Database systems in mobile environments, World Wide Web and mobility
V	Ad Hoc networks, localization, MAC issues, Routing protocols, 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), QoS in Ad Hoc Networks, applications.

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
6. Mobile Communications Handbook by Jerry D. Gybson
7. Mobile Communications Handbook by Raymond Steel

8 IT 4.2 A- Information Retrieval (Common to CS & IT)

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	Knowledge Representation: Knowledge representation, Basics of Prepositional logic, Predicate logic, reasoning using first order logic, unification, forward chaining, backward chaining, resolution Production rules, frames, semantic networks scripts.
II	Ontology Development: Description logic-taxonomies, Topic maps Ontology, Definition expressing ontology, logically ontology representations, – XML, RDF, RDFS, OWL, OIL, ontology development for specific domain, ontology engineering, Semantic web services.
III	Information Retrieval Modeling: Information retrieval, taxonomy, formal characterization, classic information retrieval, set theoretic model, algebraic model, probabilistic model, structured text, retrieval models, models for browsing, retrieval performance evaluation, keyword based querying, pattern matching, structural queries, query operations.
IV	Text and Multimedia Languages and Properties: Introduction, metadata, markup languages, multimedia. Text operations: document preprocessing, document clustering text Compressionbasic concepts - statistical methods. Indexing and searching: inverted files, suffix trees, signature file,Booleanqueries, sequential searching, pattern matching.
V	Recent Trends in IR: Parallel and distributed IR, multimedia IR, data modeling, query languages, A generic Multimedia indexing Approach, one dimensional time series, two dimensional color

	images, Automatic feature extraction. Web Searching, Characterizing the Web, Search Engines, Browsing, Meta searchers, Searching using hyperlinks

TEXT BOOKS

1. Stuart Russell and Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education, Second edition, 2003. (UNIT I)

2. Michael C. Daconta, Leo J. Obart and Kevin J. Smith,"Semantic Web – A Guide to the Future of XML, Web Services and Knowledge Management", Wiley Publishers, 2003 (UNIT II)

3. Ricardo Baeza-Yates, BerthierRibeiro-Neto, "Modern Information Retrieval", Addison Wesley, 1999. (UNITs III, IV & V)

REFERENCES

1. Elain Rich and Kevin Knight, "Artificial Intelligence", Tata McGraw-Hill, Third edition, 2003

2. Christopher D. Manning, PrabhakarRaghavan and HinrichSchutze, "Introduction to Information Retrieval", Cambridge University Press, 2008.

8 IT 4.3A- Robotics

Class: Vlll 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)]**

Unit	Contents
I	Introduction -- brief history, types, classification and usage, Science and Technologyof robots, Some useful websites, textbooks and research journals.
II	Elements of robots -- joints, links, actuators, and sensorsPosition and orientation of a rigid body, Homogeneous transformations,Representation of joints, link representation using D-H parameters, Examples of D-Hparameters and link transforms, different kinds of actuators – stepper, DC servo andbrushless motors, model of a DC servo motor, Types of transmissions, Purpose ofsensors, internal and external sensors, common sensors – encoders, tachometers,strain gauge based force-torque sensors
III	Introduction, Direct and inverse kinematics problems, Examples of kinematics of common serial manipulators, workspace of a serial robot, Inverse kinematics of constrained and redundant robots, Tractrix based approach for fixed and free robots and multi-body systems, simulations and experiments, Solution procedures usingtheory of elimination, Inverse kinematics solution for the general 6R serialmanipulator.
IV	Degrees-of-freedom of parallel mechanisms and manipulators, Active and passivejoints, Constraint and loop-closure equations, Direct kinematics problem, Mobility ofparallel manipulators, Closed-from and numerical solution, Inverse kinematics ofparallel manipulators and mechanisms, Direct kinematics of Gough-Stewart platform.
V	Linear and angular velocity of links, Velocity propagation, Manipulator Jacobians forserial and parallel manipulators, Velocity ellipse and ellipsoids, Singularity analysisfor serial and parallel manipulators, Loss and gain of degree of freedom, Statics ofserial and parallel manipulators, Statics and force transformation matrix of a Gough-Stewart platform, Singularity analysis and statics.

TEXT BOOKS

1. Mittal and Nagrath, Robotics and Control, Tata McGraw-Hill Education, 2003.

2. Fred G. Martin, Robotic Explorations: A Hands On Introduction to Engineering, Pearson Education, 2001.

8IT5A- Software Testing Lab

Class: VIII 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	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

8IT6A- Digital Image Processing lab (Common to CS & IT)

Class: VIII Sem. B.Tech.	Evaluation
Branch: Info. Tech **Schedule per Week** **Practical Hrs:2**	**Examination Time = Three (3) Hours** **Maximum Marks =50** **[Mid-term (30) & End-term (20)]**

S. No.	List of Experiment
1	Color image segmentation algorithm development
2	Wavelet/vector quantization compression
3	Deformable templates applied to skin tumor border finding
4	Helicopter image enhancement
5	High-speed film image enhancement
6	Computer vision for skin tumor image evaluation
7	New Border Images

8IT7A- Advance Web Programming

Class: VIIl Sem. B.Tech.	Evaluation
Branch: Info. Tech **Schedule per Week** **Practical Hrs: 2**	**Examination Time = Three (3) Hours** **Maximum Marks = 50** **[Mid-term (60) & End-term (40)]**

S. No.	List of Experiment
1	. Creation of HTML Files
2	Working with Client Side Scripting : VBScript, JavaScript
3	Configuration of web servers: Apache Web Server, Internet Information Server (IIS)
4	Working with ActiveX Controls in web documents
5	Experiments in Java Server Pages: Implementing MVC Architecture using Servlets, Data Access Programming (using ADO), Session and Application objects, File System Management
6	Working with other Server Side Scripting: Active Server Pages, Java Servlets, PHP
7	Experiments in Ajax Programming
8	Developing Web Services
9	Developing any E-commerce application (Mini Project)
10	Application Development in cloud computing Environment
11	Experiment Using Open Source Tool e.g. ANEKA

8IT8A- MOBILE APPLICATION DEVELOPMENT LAB

Class: VIII Sem. B.Tech.	Evaluation
Branch: Info. Tech **Schedule per Week** **Practical Hrs:2**	**Examination Time = Three (3) Hours** **Maximum Marks = 50** **[Mid-term (30) & End-term (20)]**

S. No.	List of Experiment
1	Installation of Java wireless toolkit (J2ME)
2	Working with J2ME Features
3	Threads and High Level UI
4	Working on drawing and images
5	Developing Networked Applications using the wireless toolkit
6	Authentication with a web server