M.C.A. I[ST] SEMESTER

PROBLEM SOLVING USING C

Subject Code	1 MCA. 1.1	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

ALGORITHM AND FLOWCHARTS : The meaning of algorithms, Flowcharts and their need, Writing algorithms and drawing flowcharts for simple exercise like finding biggest of three numbers, to find roots of quadratic equation , to find the biggest and smallest of given set of numbers and such other simple examples. 6 Hrs

UNIT-II :

CONSTANTS, VARIABLES, DATA TYPES, OPERATORS AND EXPRESSSION : Character set, C Tokens, keywords & identifiers , structure of C program, executing a C program, constants, variables data types, declaration of variables, declaration of storage classes, assigning values to variables defining symbolic constants, declaring a variable as constant, declaring a variable as volatile, overflow and underflow data.

Arithmetic operators, relation operators , logical operators, assignment operator, increment and decrement operator, conditional operator , bitwise operator, comma operator , special operators, arithmetic expression, evolution of expressions , precedence of arithmetic operators, type conversions in expressions, operator precedence and associatively, mathematical functions. 8 Hrs

UNIT-III :

MANAGING INPUT AND OUTPUT OPERATIONS : The scanf( ) and printf( ) functions for input and output operations, reading a character, writing a character, (the getchar( ) and putchar( ) functions), the address operator (&), formatted input and output using format specifies, Writing simple complete C programs. 6 hrs

UNIT-IV :

CONTROL STATEMENTS AND LOOP CONTROL STRUCTURES : Decision making with if statement, simple if statement, the if ..else statement, nested of if .. else statement ,the else.. if ladder ,the switch statement, the ? : Operator, the goto statement, the break statement, programming examples.

The while statement, the do .. while statement, the for statement, nested loops, jump in loops, the continue statement , programming examples. 8 Hrs

UNIT-V :

ARRAYS : The meaning of the an array, one dimensional and two dimensional arrays, declarations and initialization of arrays, reading , writing and manipulation of above types of arrays, multidimensional arrays , dynamic arrays, programming examples. 6 Hrs

UNIT-VII :

CHARACTER ARRAYS AND STRINGS : Declaration and initialing string variables, reading string from terminal, writing string to screen, arithmetic operations on characters, putting strings together, comparison of two strings, string handling functions, table of strings, other features of strings, programming examples. 6 Hrs

UNIT-VII :

USER DEFINED FUNCTION: Need for user defined functions, a multi function program , elements of user defined functions, defining functions, return values and their types, function calls , function declaration, categories of functions, no arguments and no return values, arguments but no return values, arguments with return values, no arguments with return values, functions that return multiple values, nesting of functions, recursion, passing arrays to functions, passing string to functions, programming examples. 6 Hrs

UNIT-VIII :

STRUCTURE AND UNION : Defining a structure, declaring structure variable, accessing structure members, structure initialization, copying and comparing structure variables, operations on individual members, array of structures, structures within structures, structures and functions, Unions, size of structures, bit fields, programming examples. 6 hrs

TEXT BOOKS:

1. Balagurusamy : Programming in ANSI C, 4th Edition, Tata McGraw Hill, 2008.
2. V. Rajaraman : Computer Programming in C , PHI, 2000.

REFERENCE BOOKS:

1. Behrouz A. Forouzan, Richard F. Gilberg: Computer Science – A structured Approach using C. 3rd Edition, Cengage Learning, 2007.
2. M.G.Venkateshmurthy : Programming Techniques through C, Pearson Education, 2005.
3. Ivor Horton : Beginning C from Novice to Professional, 4th Edition, Springer, 2005.
4. Ashok N. Kamathane: Programming with ANSI and Turbo C, Pearson Education, 2002.
5. K R. Venugopal , S R. Prasad : Mastering C, Tata McGraw Hill, 2006.

ACCOUNTING AND FINANCIAL MANAGEMENT

Subject Code	1 MCA. 1.2	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

INTRODUCTION TO FINANCIAL MANAGEMENT: Forms of organization, direct and indirect taxes. Statutory Registration- excise Duty, central sales tax, VAT, service tax, international fund availability. 6 hrs

UNIT – II :

RISK AND REQUIRED RETURN: Risk and return relationship, methods of measuring the risk, Business risk, financial risk, calculation of expected rate of return to the portfolio, numerical problems. 6 hrs

UNIT – III :

WORKING CAPITAL MANAGEMENT: Definition need and factors influencing the working capital requirement. Determination of operating cycle, cash cycle and operating cycle analysis. Calculation of gross working capital and net working capital requirement. 7hrs

UNIT - IV:

LONG TERM FINANCING: Raising of finance from primary and secondary markets. Valuation of securities, features of convertible securities and warrants. Features of debt, types of debt instruments, return on investment (ROI) and credit rating of units. Shares, debentures. 7 hrs

UNIT – V :

INTRODUCTION: Book keeping – systems of book keeping, journal and ledger posting. Financial Statement, Preparation of Trial balance, profit and Loss Account, Balance Sheet with adjustments. 7 hrs

UNIT – VI :

RATIO ANALYSIS / ACCOUNTING RATIO: Liquidity ratio – Current ratio, quick ratio, turnover ratio, capital structure ratio- Debt – equity ratio, Coverage ratio, Profitability ratio, Profit margin, Return on assets, Activity ratios – Inventory turnover ratio, Debtors Turnover ratio. Preparation of the balance sheet from various ratios. Analysis of any one published balanced sheet. 7 hrs

UNIT – VII :

COSTING: Classification of cost, preparation of cost sheet, absorption and variable costing, job costing, process costing. Classification of the variances analysis – material, labour and overhead variances. 6 hrs

UNIT – VIII :

BUDGETING: Types of budgets – Flexible budgets, preparation of cash budgets, purchase and production budgets and master budget, Budgetary control, advantages & limitations of budgeting. 6 hrs

TEXT BOOKS:

1. **Financial Management,** Khan & Jain, text & problems TMH ISBN 0-07-460208-A. 2001
2. **Financial Accounting, Costing and Management Accounting,** S. M. Maheshwari, 2000

REFERENCE BOOKS:

1. **Financial Management,** I. M. Pandey, Vikas Publication House ISBN 0-7069-5435-1. 2002
2. **Financial Management,** Abrish Gupta, Pearson.
3. **Financial Decision Making,** Humpton. 2000.
4. **Financial Management,** Theory and Practice, Prasanna Chandra TMH ISGN -07-462047-9, 3rd edition 2002.

DIGITAL ELECTRONCS AND COMPUTER DESIGN

Subject Code	1 MCA 1.3	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT I :

BINARY SYSTEMS: Digital Computers And Digital Systems, Binary Numbers, Number Base Conversion, Octal And Hexadecimal Numbers, Complements, Binary Codes, Binary Storage and Registers, Binary Logics, Integrated Circuits

BOOLEAN ALGEBRA AND LOGIC GATES: Basic Definitions, Axiomatic Definition Of Boolean Algebra, Basics Theorems And Properties Of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logics Families, IC Digital Logics Families 8 hrs

UNIT II :

SIMPLIFICATION OF BOOLEAN FUNCTIONS: The Map Method, Two and Three- Variable Maps, Four- Variable Map, Five and Six Variable Maps, Product of Sum Simplification, NAND and NOR Implementation, Other Two Level Implementations, Don't-Care Conditions, the Tabulation Method, Determination of Prime-Implicants, Selection of Prime-Implicants. 6 hrs

UNIT III :

COMBINATIONAL LOGIC: Introduction, Design Procedure, Adders, Subtractors, Code Conversion, Analysis Procedure, Multilevel NAND Circuits, Multilevel NOR Circuits, Exclusive-Or and Equivalence Functions. 6 hrs

UNIT IV :

SEQUENTIAL LOGIC: Introduction, Flip- Flops, Triggering Of Flip- Flops, Analysis Of Clocked Sequential Circuits, State Reduction And Assignment, Flip- Flop Excitation Tables, Design Procedure, Design Of Counters, Design With State Equations. 6 hrs

UNIT V :

Registers: Types of registers, Serial In-Serial Out, Serial in Parallel Out, Parallel In-Serial Out, Parallel In Parallel Out, Application of Shift Register.

Counters: Asynchronous Counters, Decoding Gates, Ripple counters, Synchronous Counters, Decade Counters, Timing sequence, A Digital Clock. 8 hrs

UNIT VI :

PROCESSOR LOGIC DESIGN: Introduction, Processor Organization, Arithmetic Logic Unit, Design Of Arithmetic Circuit, Design of Logic Circuit, Design Of Arithmetic Logic Unit, Status Register, Design Of Shifter, Processor Unit, Design Of Accumulator. 6 hrs

UNIT VII :

COMPUTER DESIGN: Introduction, System of Configuration, Computer Instruction, Timing and Control, Execution of Instructions, Design of Computer Registers, Design of Control, Computer Console. 6 hrs

UNIT VIII:

MICROCOMPUTER SYSTEM DESIGN: Introduction, Microprocessor Organization, Instruction And Addressing Modes, Stack, Subroutines, and Interrupt, Memory Organization, Input-Output Interface, Direct Memory Access. 6 hrs

TEXT BOOK :

1. M.Morris Mano, "Digital Logic and Computer Design", Pearson Prentice Hall, 4th Edisone,2012.

2. *Donals Leach, Albert Paul Malvino & Goutam Saha,* "Digital Principles and Applications", 6th Edition, TMH, 2006.

REFERENCE BOOKS:

1. *Carl Hamcher, Zvonoko Vranesic, Safwat Zaky,* "Computer Organization", 5th Edition, TMH, 2002.
2. *V. Rajaraman, T. Radhakrishnan,* "An Introduction to Digital Computer Design", PHI
2. *Stephen Brown, Zvonko Vranesic,* "Fundamentals of Digital Logic with Verilog Design", TMH, 2006.
3. *Charles H. Roth, Jr. 5th Edition, Thomson,* "Fundamentals of Logic Design", 2004.

DISCRETE MATHEMATICAL STRUCTURES

Subject Code	1 MCA 1.4	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Set theory: Sets and Subsets, Operations on sets, Product of sets, Principles of Inclusion and Exclusion, Countable and Uncountable sets, Counting and Venn Diagrams.7hrs

UNIT - II:

Mathematical Logic: Statements and Notations, Connectives and Truth tables, logic equivalence, well formed formulas, Tautologies, Implications, Use of Quantifiers, Qualifiers. 6 hrs

UNIT - III:

Fundamental Principles of Counting: Integer properties, Counting Technique, The rules of sum of product, Permutations, Combinations, Fundamental Mathematical Induction, Well ordering principle, Recursive function. 7 hrs

UNIT - IV:

Relations and Functions: Cartesian Products, Relations, Types of relations, Matrix Relation, Equivalence relations and partitions, Matrices and Directed graphs, Operations on relations. 6 hrs

UNIT - V:

Functions: Types of Functions, One-to-one, onto functions, Invertible functions, Permutation functions, Pigeonhole principle, Function composition and Inverse Functions.

Boolean Algebra: Boolean algebra, Uniqueness of finite Boolean algebra, Boolean functions and expressions. 7 hrs

UNIT - VI:

Groups: Definitions and Examples, Homomorphism, Isomorphism, Cyclic Groups, Cosets and Lagrange's Theorem. Semi groups, Monoid, Generators and Evaluation of powers. 7 hrs

UNIT - VII:

Graphs: Basic Terminology, Multi graphs and weighted graphs, Paths and Circuits, Hamiltonian paths and Circuits. 6 hr

UNIT - VIII:

Trees: Rooted Trees, Prefix codes, Binary search Trees, Spanning Trees. 6 hrs

TEXT BOOK:

1. *Ralph Grimaldi, B. V. Ramana,* "Discrete and Combinational Mathematics", 5th edition, Pearson Education.
2. *Discrete Mathematical Structure for 3 semester BE classes by Dr. DSC, New Edition.*

REFERENCE BOOKS:

1. *Kenneth H. Rosen,* "Discrete Mathematics and Its Applications", 6th Edition, 2007, McGrew Hill.
2. *D. S. Malik and M. K. Sen, Thomson,* "Discrete Mathematical Structures: Theory and Applications", 2004.
3. *Kolman B. and Busby and Ros,* "Discrete Mathematical Structures", 4/e, Pearson Education.
4. *Purna Chandra Biswal,* "Discrete Mathematics and Graph Theory", PHI.

UNIX AND SHELL PROGRAMMING

Subject Code	1 MCA. 1.5	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

Genera1 Purpose Utilities: banner, cal, date, calendar, who, printf, tty, stty, uname, a filename? the parent-child relationship, pwd, the Home directory, Absolute pathnames, using absolute pathnames for a command, cd, mkdir, rmdir, Relative pathnames, The UNIX file system

Handling Ordinary Files: cat, cp, rm, mv, more, ip, file, wc, od, split, cmp, comm., duff. **The vi editor**: The Three Modes, Input Mode, Saving, The Repeat Factor, Command Mode, Deletion, Navigation, Pattern Search, Joining lines, Repeating the Last command. undoing the Last Editing Instructions, Search and Replace. 6 hrs

UNIT – II :

Basic File Attributes: ls –l, the –d option, File Permissions, chmod.

Security and File Permission: users and groups, security level, changing permission, user masks, changing ownership and group. 6 hrs

UNIT – III :

Shell: Interpretive Cycle, Shell Offerings, Pattern Matching, escaping and Quoting, redirection, /dev/null, /dev/tty, Pipes, tee, command substitution, shell variables. 6 hrs

UNIT – IV :

The Process: process basics, PS, internal and external commands, running jobs in background, nice, at and batch, cron, time commands

Customizing the Environment: System Variables, profile, sty, PWD, Aliases, Command History, In-Line Command Editing. 6 Hrs

UNIT-V :

More file attributes: hard link, symbolic link, umask, find

Simple filters: pr, head, tail, cut, paste, sort, uniq, tr commands

Filters using Regular Expression and the grep Family: grep, Regular Expression, egrep, fgrep, a sed instruction, Line Addressing, Inserting and Changing Test, Context addressing, writing selected lines to a file, The –f option, Substitution, Properties of Regular Expressions. 6 Hrs

UNIT-VI :

Essential Shell Programming: shell script, read, exit, the if conditional, using Tests and U to evaluate expression, the case conditional expr. while: looping, for: looping with a list, set and shift, trap debugging shell scripts with Set - X.

Essential System Administration: root, administrator's privileges, startup & Shutdown, managing disk space, cpio, tar. 6 Hrs

UNIT-VII :

awk-Advanced Filters: Simple awk Filtering, Splitting a Line in to Fields, printf, the Logical and Relational Operators, Number Processing, Variables, The -f option, The BEGIN and END Positional Parameters, get line, Built-in variables, Arrays, Functions, Interface with the Shell, Control Flow. 6 Hrs

UNIT-VIII :

Advanced Shell Programming: The sh command, export, cd, the Command, expr, Conditional Parameter Substitution, Merging Streams, Shell Functions, eval, Exec Statement.

Advanced vi: Operators, the ex mode, named buffered , Numbered Buffers, Entering Control Characters, Searching for a Character, Marking Text Customizing, vi. 6 Hrs

TEXT BOOKS :

1. *Sumitabha Das,* "Unix - concepts and Applications", 4th edition, 2006, McGrew Hill.

REFERENCE BOOKS :

1. *Behrouza A. and Richard Gilberg.,* Unix and shell Programming", Thomson.
2. *M. G. Venkatesh Murthy* "Unix and shell Programming", Pearson Education.

C- PROGRAMMING AND UNIX LAB

Subject Code	1 MCA 1.6	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

DIGITAL ELECTRONICS LAB

Subject Code	1 MCA 1.7	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

M.C.A. II[ND] SEMESTER

OPERATING SYSTEM

Subject Code	1 MCA 2.1	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Introduction to Operating Systems, System Structures: What operating systems do; Computer System organization; Computer System architecture; Operating System structure; Operating System operations; Process management; Memory management; Storage management; Protection and security; Distributed system; Special-purpose systems; Computing environments. Operating System Services; User - Operating System interface; System calls; Types of system calls; System programs; Operating System design and implementation; Operating System structure; Virtual machines; Operating System generation; System boot. 6 hrs

UNIT - II:

Process Management: Process concept; Process scheduling; Operations on processes; Inter-process communication. Multi-Threaded Programming: Overview; Multithreading models; Thread Libraries; threading issues. Process Scheduling: Basic concepts; Scheduling criteria; Scheduling algorithms; Multiple-Processor scheduling; Thread scheduling. 7 hrs

UNIT - III:

Process Management Synchronization: The Critical section problem; Peterson's solution; Synchronization hardware; Semaphores; Classical problems of synchronization; Monitors. 7 hrs

UNIT - IV:

Deadlocks: System model; Deadlock characterization; Methods for handling deadlocks; Deadlock prevention; Deadlock avoidance; Deadlock detection and recovery from deadlock. 6 hrs

UNIT - V:

Memory Management Strategies: Background; Swapping; Contiguous memory allocation; Paging; Structure of page table; Segmentation. Virtual Memory Management: Background; Demand paging; Copy-on-write; Page replacement; Allocation of frames; Thrashing. 7 hrs

UNIT - VI:

File System Implementation of File System: File concept; Access methods; Directory structure; File system mounting; File sharing; Protection. Implementing File System: File system structure; File system implementation; Directory implementation; Allocation methods; Free space management. 7 hrs

UNIT - VII:

Secondary Storage, Structures, Protection: Mass storage structures; Disk structure; Disk attachment; Disk scheduling; Disk management; Swap space management. Protection:

Goals of protection, Principles of protection, Domain of protection, Access matrix, Implementation of access matrix, Access control, Revocation of access rights, Capability-Based systems. 6 hrs.

UNIT - VIII:

Case Study: The LINUX and Operating System 6 hrs.

TEXT BOOK:

1. *Abraham Silberschatz, Peter Baer Galvin, Greg Gagne,* "Operating System Principles" 7th edition, 2006, Wiley-India.

REFERENCE BOOKS:

1. *Milan Milankovic,* "Operating System concepts and design", II Edition, Mgraw hll
2. *D.M Dhamdhere,* "Operating Systems A Concept Based Approach", 2nd Edition, 2002, Tata McGraw- Hill.
3. "Operating Systems", 3rd Edition, 1990, Addison Wesley.
4. *P.C.P. Bhatt,* "Operating Systems", 2nd Edition 2006, PHI.

DATA COMMUNICATION

Subject Code	1 MCA 2.2	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Introduction of Computer Networks: What is Computer Network, Network Goal/Motivations, Applications of Networks, Network Structure, Topology, Classification of Networks, OSI Reference Model **6hrs.**.

UNIT - II:

Data Signals and Digital Transmission: Analog & Digital signals, Transmission impairment, Data rate limits, Performance, Digital-To-Digital Conversion, Transmission modes. **7 hrs .**

UNIT - III:

Multiplexing: Frequency Division Multiplexing, Synchronous Time Division Multiplexing ,Statistical Time Division Multiplexing, Spread Spectrum-Frequency Hopping Spread Spectrum, Direct Sequence Spread Spectrum **6 hrs.**

UNIT - IV:

Transmission Media, Error Detection and Correction: Twisted Pair cable, Co-axial Cable, Fiber-Optic cable, Radio Waves, Microwaves, Infrared Error Detection Techniques-parity Checks, Cyclic Redundancy Checks, Forward Error Correction. **7 hrs.**

UNIT - V:

Data Link Control: Framing, Flow & Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-To-Point Protocol- Faring Transition Phases . **6 hrs.**

UNIT - VI:

Multiple Access: Random Access, ALOHA, Carrier Sense Multiple Access (CSMA), Carrier Sense Multiple, Access With Collision detection (CSMA/CD), Carrier Sense Multiple Access With Collision Avoidance (CSMA/CA). **7 hrs.**

UNIT - VII:

Wireless Lan and Construction of Lan: IEEE 802.11, Bluetooth, Architecture, Bluetooth Layers, Radio layers. Connecting Devices: Passive Hubs, Repeaters Active Hubs, Bridges **6 hrs.**

UNIT - VIII:

Transport and Application Layers: User Datagram Protocol(UDP),TCP,TCP services, TCP Features, TELNET, ELECTRONIC MAIL, Architecture. **7 hrs.**

TEXT BOOKS:

Behrouz A Forouzan "**Data Communication and Networking**", McGraw-Hill Companies, 4th Edition.

REFERENCE BOOKS:

1. *Tanenbaum, A.T.,* "Computer Networks" PHI, Edition.

2. *Alberto Leon, Garcia & Indira Widjaja* "Communication Network, Fundamental Concepts & Key architecture", 3rd Edition Tata McGraw Hill.

3. *William Stallings,* "**Data and Computer Communication**", 8th Edition, Pearson Education.

4. *Nader F.* "Computer and Communication Networks" Mir, Pearson Education, 2007.

5. *Wayne Tomasi,* "**Introduction of Data Communication and Networking**", Pearson Education .

COMPUTER ORIENTED NUMERICAL METHODS

Subject Code	1 MCA 2.3	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT-I:

Errors in Numerical Calculation – Introduction, Numbers and their Accuracy, Mathematical Preliminaries, errors and their computation ,absolute, relative and percentage errors, General error formula, Error in the series Approximation. 6 hrs

UNIT-II:

Solving Non linear Equations - computer & arithmetic errors, method of bisection, the secant method, Newton–Raphson's method, Newton's method for polynomial, Horner's method, Muller's method, order of convergence of other method. 6 hrs

UNIT-III:

Interpolation- Introduction, errors in polynomial Interpolation, Finite Difference, Forward, Backward, Central Difference, Newton's Formulae for Interpolation, Lagrange's Interpolation Formula. 6 hrs

UNIT-IV:

Linear System of Equation- Matrix notation, determinants and matrix inversion, norms, eigen values and eigen vectors of a matrix, the elimination method, Gauss elimination and Gauss-Jordan Method, Iterative method Jacobi Iterative Method and Gauss Seidal Iteration Method. 6 hrs

UNIT-V:

Curve Fillting, B- Splines and Approximation - Least –Square Curve Fitting procedures, fitting a straight line, nonlinear curve fitting, Method of Least Squares for continuous Functions, Orthogonal Polynomial , Gram-Schmidt Orthogonalization Process, B-Splines, Least Square solution, Representation of B- Spines, The Cox-de Boor Recurrence Formula, Computation of B-Splines, Approximation of functions, Chebyshev polynomials, Economization of Power Series. 6 hrs

UNIT-VI:

Numerical Differentiation – Errors in Numerical Differentiation, The cubic spline method, Maximum and Minimum values of a Tabulated function. 6 hrs

UNIT-VII:

Integration - Numerical Integration, Trapezoidal Rule, Simpson's 1/3 Rule, Simpson's 3/8 Rule, Boole's and Weddle's Rules, Romberg Integration, Newton-Cotes Integration Formulae, Euler – Maclaurin Formula. 6 hrs

UNIT-VIII:

Numerical Solution of Ordinary Differential Equations- Solution by Taylor's Series, Picard's Method of successive approximation, Euler's Method, Error Estimate for the Euler Method, Modified Euler's Method, Rung – Ktta Method , Preditor- Corrector Methods, Adams-Moulton Method , Milne's Method, Boundary Value Problems, Finite Difference Method, The Shooting Method, the cubic spline Method. 8 hrs

TEXT BOOKS:

1. S. S. Satry – Introductory Methods of Numerical Analysis, 3rd edition Prentice-Hall India.
2. M. K. Jain, S. R. K. Iyengar, R. K. Jain- Numerical Methods for Scientific and Engineering Computation, 3rd Edition New Age International (P) Limited.

REFERENCES:

1. F. Gerald, Patrick O. Wheatley, Applied Numerical Analysis, 6/e, Pearson Education.
2. Madhumangal Pal, Numerical Analysis for Scientists and Engineers, Narosa Publications.
3. Conte S.D. and Carl DeBoor, Elementary Numerical Analysis, McGraw Hill .
4. Shankar Rao K., Numerical Methods for Scientists and Engineers, PHI.

DATA STRUCTURES WITH C

Subject Code	1 MCA 2.4	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Pointers: Concept, pointer variables, Accessing variables through pointers, pointer declaration and definition of pointer variables, Pointer and function, pointer to pointers, Compatibility, L value and R value, Array and pointer, pointer arithmetic and arrays, passing an array to a function, Understanding complex declaration, Memory allocation function, Array of pointers. 6 hrs

UNIT - II:

Introduction: Concept of Data structures, overview of data structures, Implementation of data structures. 4 hrs

UNIT - III:

Stacks: stack representation, operation on stack, application of stack, conversion of expression precedence, & associative of operators conversion from infix to postfix, conversion of infix to prefix, Evaluation of postfix expression. 8 hrs

UNIT - IV:

Recursion: Recursive definition, How recursion works, Fibonacci series, Euclid's algorithm, Tower of Hanoi problems. 7 hrs

UNIT - V:

Queue: Definition of queue, operations on queue, application of queue, different types of queue, Double ended queue, Circular queue, priority queue. 7 hrs

UNIT - VI:

Lists: Definition of Linked list, singly linked list, operation on singly linked list, Circular singly linked list, Doubly linked list, Application of linked list. 6 hrs

UNIT - VII:

Trees: Binary tree, representation of binary tree, operation on binary tree, application of binary tree. 8 hrs

UNIT - VIII:

Sorting and Searching: Definitions, Bubble sort, selection sort, Merge sort, Quick sort, Tree sort, Radix sort, Linear search, Binary search. 6 hrs

TEXT BOOKS:

1. *Behrouz A. Forouzan and Richard F.Gilberg, Thomson,* "Computer science A structured programming Approach Using C", Second Edition, 2003.
2. *Aaron M.Tenenbaum, Yedidyah Langsam & Moshe J. Augenstien,* "Data Structure using C", Pearson Education / PHI, 2006.

REFERENCES :

1. *A.M. Padma Reddy,* "Systematic Approach to Data Structures Using C", Sri. Nandaz Publications.
2. *Robert Kruse and Bruce,* "Data structures & program design in C", Lenug, Pearson Education.
3. *Richard F. Glberg and Behrouz A. Forouzan,* "Data structures A Pseudocode approach with C", Thomason, 2005.

OBJECT ORIENTED PROGRAMMING WITH C++

Subject Code	1 MCA 2.5	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Principles Of Object Oriented Programming: Object Oriented Programming, Object Oriented Programming Paradigm, Basic Concepts Of Object Oriented Programming, Benefits Of Object Oriented Programming, Applications Of Object Oriented Programming. 6 hrs

UNIT - II:

Introduction to C++: What is C++? Applications of C++, Structure of C++ program, Creating A Source File, Compiling and Linking, Tokens, Keywords, Identifiers and Constants, Data Types, Operators, Operator overloading.

Class and Objects: Introduction to Classes and Objects. Member Functions and Member data, Nesting of Member Functions, Private Member Functions, Arrays within a Class, Memory Allocation for Objects, Static Data Members, Static Member Functions, Arrays of Objects, Objects as Function, Arguments, Friendly Functions, Returning Objects, constant Member Functions, Pointers to Members, Local Classes. 6 hrs

UNIT - III:

Functions In C++: Introduction, The Main Function, Function Prototyping, Call by Reference, Return by Reference, Inline Functions, Default Arguments, const Arguments, Function Overloading, Friend and Virtual Functions, Math Library Functions. 7 hrs

UNIT - IV:

Constructors and Destructors: Introduction to Constructors Parameterized Constructors, Multiple Constructors in a Class, Constructors with Default Arguments, Dynamic Initialization of Objects, Copy Constructor, Dynamic Constructors, Destructors. 6 hrs

UNIT - V:

Operator Overloading and Type Conversions: Introduction, Defining Operator Overloading, Overloading Unary Operators, Overloading Binary Operators, Overloading Binary Operators Using Friends, Manipulation of Strings Using Operators, Rules for Overloading Operators, Type Conversions. 7 hrs

UNIT - VI:

Inheritance: Extending Classes: Introduction, Defining Derived Class, Single Inheritance, Making a Private Member Inheritable, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual Base Classes, Abstract Classes, Constructors in Derived Classes, Member Classes: Nesting of Classes. 7 hrs

UNIT - VII:

Pointers, Virtual Functions and Polymorphism: Introduction, Pointers, Pointers to Objects, this Pointer, Pointers to Derived Classes, Virtual Functions, Pure Virtual Functions. 6 hrs

UNIT - VIII:

Templates: Introduction, class templates, class templates with multiple parameters, function templates, function templates with multiple parameters, overloading of template function, member function templates, type template arguments. 7 hrs

TEXT BOOK:

1. *Balaguruswamy,* "Object Oriented Programming with C++", TATA McGRAW HILL.

REFERENCE BOOK:

1. *Sourav Sahay,* "Object Oriented Programming with **C++",** Oxford University Press.
2. *Stanliy B. Lippman, Josee Lajoie,* **"**C++ Primer**"**, Barbara E. Moo, Addison Wesley
3. *Herbert Schildt,* **"**The Complete Reference C++**"**, TMH.

DATA STRUCTURE WITH C LAB

Subject Code	1 MCA2.6	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

OBJECT ORIENTED PROGRAMMING WITH C++ LAB

Subject Code	1 MCA2.7	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

M.C.A. III[RD] SEMESTER

ANALYSIS AND DESIGN OF ALGORITHMS

Subject Code	2 MCA 3.1	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT- I:

Design of Efficient Algorithms: Algorithms, Analysis of Algorithms, Time and Space Complexity, Running Time of a Program. 6 hrs

UNIT - II:

Elementary Data Structures: Review Of Stack, Queues, Trees. Operations On Stack, Queue And Trees. Recursion, Heaps And Heap Sort. 6 hrs

UNIT - III:

Divide and Conquer: General Method , Binary Search, Max And Min, Merge Sort, Quick Sort, Matrix Multiplication And Related Operations, Strassen's Matrix Multiplication, Inversion Matrices, LUP Decomposition And Its Application, Boolean Matrix Multiplication. 7 hrs

UNIT - IV:

The Greedy Method: The General Method, Knapsack Problem, Job Sequencing With Deadlines, Minimum Cost Spanning Trees: Prim's Algorithm, Kruskal's Algorithm. Optimal Storage on Tapes, Optimal Merge Patterns, Single Source Shortest Paths. 7 hrs

UNIT - V:

Dynamic Programming: The General Method, Multistage Graphs, All Pair's Shortest Paths. 6 hrs

UNIT - VI:

Fast Fourier Transform: Discrete Fourier Transform And Its Inverse, FFT Algorithm, FFT Using Bit Operations, Product Of Polynomials, Schonhage - Straessen Integer Multiplication Algorithm. 7 hrs

UNIT - VII:

Integer and Polynomial Arithmetic: Integer And Polynomial Multiplication And Division, Modular Arithmetic, Chinese Remaindering, GCD And Euclid's Algorithm. 7 hrs

UNIT - VIII:

Backtracking: General Methods, 8 – Queens Problem, Sum Of Subsets, Knapsack Problem, NP – Hard And NP – Complete Problems. 6 hrs

TEXT BOOK:

1. *Ellis, Horwitz, Sartaj Sahani and Rajashekaran S.*, "Computer Algorithms", (1999) Galgotia Publications Pvt.,Ltd.
2. *Aho A.V, Hopcroft J.E and Ullman, J.D.*, "The Design and Analysis of Computer Algorithms", (1976) Addison – Wesley.

REFERENCES:

1. *Sara Baase, Computer Algorithms,* "An Introduction to Design and Analysis", Addison Wesley.

SYSTEM PROGRAMMING

Subject Code	2 MCA 3.2	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I:

MACHINE ARCHITECTURE: Machine Structure, Evaluation of the Components of a Programming System, Assemblers, Loaders, Macros, Compilers, Formal Systems, General Machine Structure, General Approach to a new Machine, Machine structure, Memory, Registers, Instructions, Special Features, Machine Language, Long Way, No Looping, Address Modification Using Instructions as Data, Address Modification Using Index Registers, Loading, Assembly Language, An Assembly Language Program, Example Using Literals. 6 hrs

UNIT – II:

ASSEMBLERS : General Design Procedure, Design of Assembler, Statement of Problem, Data Structure, Format of Data Bases, Algorithm, Look for Modularity, Table Processing: searching and sorting, Linear Search, Binary search, sorting, Interchange sort, Shell sort, Bucket sort, Radix Exchange sort, Address Calculation sort, Comparison of Sorts, Hash or Random Entry Searching 6 hrs

UNIT – III:

MACRO LANGUAGE AND THE MACRO PROCESSOR: Macro Instruction, Features of a Macro Facility, Macro Instruction Arguments, Conditional Macro Expansion, Macro Calls within Macros, Macro Instructions Defining Macros, Implementation, Implementation of a Restricated Facility: A Two-pass Algorithm, A Single-pass Algorithm, Implementation of Macro calls within Macros, Implementation within an Assembler. 6 hrs

UNIT – IV:

LOADERS: Loader Schemes, "Compile-and-Go" Loaders, General Loader Scheme, Absolute Loaders, Subroutine Linkages, Relocating Loaders, Direct-linking Loaders, other Loader Schemes-Binders, Linking Loaders, Overlays, Dynamic Binders, Design of an Absolute Loader, Design of a Direct-Linking Loader, Specification of Problem, Specification of Data structures, Format of Data Bases, Algorithm. 8 hrs

UNIT – V:

PROGRAMMING LANGUGES: Importance of High Level Languages, Features of a High Level Language, Data Types and Data Structures, character String, Bit string-Boolean, Data Structures, Storage Allocation and scope of Names, Storage Classes, Block structure, Accessing Flexibility, Pointers, Label variables and Label Arrays, Functional Modularity, procedures, Recursion, Asynchronous Operation, conditions, signals, Multitasking 6 hrs

UNIT – VI:

FORMAL SYSTEM AND PROGRAMMING LANGUAGES:AN INTRODUTION: Uses of Formal Systems in Programming Languages, Language Specification, Syntax-directed Compilers, Complexity structure Studies, Structure Analysis, Formal Specification, Approaching of Formal Grammars, Development of Formal Specification, Formal Grammars, Examples of Formal Grammars, The Derivation of

Sentences, Sentential Forms and Sentences, Hierarchy of Languages, Backus-Naur Form-Backus Normal Form-BNF, Canonic Systems-Examples: Syntax Specification, Specification of Translation, Recognition and Translation Algorithm, Canonic Systems and Formal System. 8 hrs

UNIT – VII:

LEX AND YACC – 1: Lex and Yacc - The Simplest Lex Program, Recognizing Words With LEX, Symbol Tables, Grammars, Parser-Lexer Communication, The Parts of Speech Lexer, A YACC Parser, The Rules Section, Running LEX and YACC, LEX and Hand- Written Lexers, Using LEX - Regular Expression, Examples of Regular Expressions, A Word Counting Program, Parsing a Command Line. 6 hrs

UNIT – VIII:

LEX AND YACC - 2: Using YACC - Grammars, Recursive Rules, Shift/Reduce Parsing, What YACC Cannot Parse, A YACC Parser - The Definition Section, The Rules Section, Symbol Values and Actions, The LEXER, Compiling and Running a Simple Parser, Arithmetic Expressions and Ambiguity, Variables and Typed Tokens. 6 hrs

TEXT BOOKS:

1. **System programming:**-John .J, Donovon, - Tata McGraw
2. **Lex and Yacc -** John. R. Levine, Mason and Doug Brown, O'Reilly, SPD, 1998.

REFERENCE BOOK:

1. **System Software :Leland.L.Beck, 3rd Editions Addison Wesley,1997**
2. **System Programming and Operating Systems** – D.M.Dhamdhere, 2nd Edition, Tata McGraw - Hill, 1999.

FINATE AUTOMATA FORMAL LANGUAGES

Subject Code	2 MCA 3.3	IA Marks	20
No. of Lecture Hrs./ Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

INTRODUCTION TO FINITE AUTOMATA: Introduction to Finite Automata; The central concepts of Automata theory; Deterministic finite automata; Nondeterministic finite automata. 7 hrs

UNIT – II :

FINITE AUTOMATA, REGULAR EXPRESSIONS: An application of finite automata; Finite automata with Epsilon-transitions; Regular expressions; Finite Automata and Regular Expressions; Applications of Regular Expressions. 7 hrs

UNIT – III :

REGULAR LANGUAGES, PROPERTIES OF REGULAR LANGUAGES: Regular languages; Proving languages not to be regular languages; Closure properties of regular languages; Decision properties of regular languages; Equivalence and minimization of automata. 6 hrs

UNIT – IV :

CONTEXT-FREE GRAMMARS AND LANGUAGES: Context –free grammars; Parse trees; Applications; Ambiguity in grammars and Languages. 6 hrs

UNIT – V :

PUSHDOWN AUTOMATA: Definition of the Pushdown automata; The languages of a PDA; Equivalence of PDA's and CFG's; Deterministic Pushdown Automata. 7 hrs

UNIT – VI :

PROPERTIES OF CONTEXT-FREE LANGUAGES: Normal forms for CFGs; The pumping lemma for CFGs; Closure properties of CFL. 6 hrs

UNIT – VII :

INTRODUCTION TO TURING MACHINE: Problems that Computers cannot solve; The turning machine; Programming techniques for Turning Machines; Extensions to the basic Turning Machines; Turing Machine and Computers. 7 hrs

UNIT – VIII :

UNDECIDABILITY: A Language that is not recursively enumerable; An Undecidable problem that is RE; Post's Correspondence problem; Other undecidable problems. 6 hrs

TEXT BOOK:

1. **Introduction to Automata Theory, Languages and Computation** – John E. Hopcroft, Rajeev Motwani, Jeffrey D.Ullman:, 3rd Edition, Pearson education, 2007.

REFERENCE BOOKS:

1. **Fundamentals of the Theory of Computation: Principles and Practice** – Raymond Greenlaw, H.James Hoove, Morgan Kaufmann, 1998.
2. **Introduction to Languages and Automata Theory** – John C Martin, 3rd Edition, Tata McGraw-Hill, 2007.
3. **Introduction to Computer Theory** – Daniel I.A. Cohen, 2nd Edition, John Wiley & Sons, 2004.
4. **An Introduction to the Theory of Computer Science, Languages and Machines** – Thomas A. Sudkamp, 3rd Edition, Pearson Education, 2006.

ADVANCE COMPUTER NETWORKING

Subject Code	2 MCA 3.4	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

Review of Basic Concepts: OSI Layered Architecture; Building a Network; Applications; Requirements; Network Architecture. 6 hrs

UNIT –II :

Implementing Network software: Performance; Physically connecting hosts; Hardware building blocks. 6 hrs

UNIT – III :

Packet Switching: Switching and forwarding; Bridges and LAN Switches; Cell Switching; Implementation and Performance. 7 hrs

UNIT – IV :

Internetworking: Simple internetworking (IP); Routing; Global Internet; Multicast; MPLS. 7 hrs

UNIT – V :

End –to-End Protocols: Simple demultiplexer (UDP); Reliable byte stream (TCP); RPC; RTP. 7 hrs

UNIT – VI :

Congestion Control and Resource Allocation: Issues in resource allocation; Queuing discipline. 7 hrs

UNIT – VII :

TCP Congestion Control: Congestion-Avoidance mechanisms; Quality of Service. 6 hrs

UNIT – VIII :

Applications: Traditional applications; Web services; Multimedia applications; Overlay Networks. 6 hrs

TEXT BOOKS:

1. Larry L. Peterson and Bruce S. Davie: Computer Networks – A Systems Approach, 4 th Edition, Elsevier, 2007.

REFERENCE BOOKS:

1. Behrouz A. Forouzan: Data Communications and Networking, 4 th Edition, Tata McGraw Hill, 2006.
2. William Stallings: Data and Computer Communication, 8th Edition, Pearson Education, 2007.
3. Alberto Leon-Garcia and Indra Widjaja: Communication Networks -Fundamental Concepts and Key Architectures, 2 nd Edition Tata McGraw-Hill, 2004.

MICROPROCESSORS AND INTERFACING

Subject Code	2 MCA 3.5	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

Microprocessor, microcomputer and Assembly Language: Microprocessor, microprocessor Instruction set and Computer language Large Computer on single Chip Microcontroller, **Introduction to 8085 Assembly Language programming-** The 8085 programming model, Instruction Classification, Instruction Data Format, How to write assemble, and execute a simple program Overview of the 8085 Instruction set, writing and Assembling program.

Microprocessor Architecture and Microcontroller System- Microcontroller Architecture and its operation, Memory, Input output (I/O) Devices.

Microprocessor architecture and memory Interfacing- The 8085 MPU. 8 hrs

UNIT – II :

Interfacing I/O Devices, Basic Interfacing Concept, Interfacing output display Interfacing Input Devices, memory mapped.

PROGRAMMING THE 8085- Introduction to 8085 Instruction, Data transfer (copy) operation, Arithmetic Operation Logic Operation, Branch Operations, writing the assembly Language, program Debugging the program. 6 hrs

UNIT – III :

Programming techniques with additional Instruction, programming techniques Looping:, counting, and indexing, Additional data transfer an Bit Arithmetic instruction, Arithmetic Operation Related to memory, Logical Operation, Rotate Logical Operation compare, Dynamic debugging. 5 hrs

UNIT – IV :

Computer, Microcomputer and Microprocessor an Introduction- 8086 Microprocessor Family Overview ,8086 Internal Architecture, Introduction to programming.

8086 family assembly Language programming Introduction- Program Development steps, Construction the machine codes for 8086 Instruction Writing the program for use with assembler , Assembly language program development tools.

Implementing standards program structure in 8086 assembly language, simple sequence programs, Jumps, Flags and Conditional Jumps, If -then ,If –then –else, and multiple If-then-else programs, while Do program, Repeat –until program. 8 hrs

UNIT - V :

String, Procedure and Macros: The 8086 String Instruction, writing and using procedure, writing and using assembler macros, 8086 Instruction Description and assembler Directives. 5 hrs

UNIT- VI :

Instruction Description, 8086 system connection timing and troubling Shooting, A Basic 8086 Microcomputer system, using a Logic Analyzer to observe Microprocessor Bus Signal, An Example Minimum-mode system The SDK-86, Troubleshooting a simple 8086 –based Microcomputer. 6 hrs

UNIT-VII :

8086 Interrupts and Interrupts application, 8086 Interrupts and Interrupts Response, Hardware Interrupt Application, 8254 Software programmable Timer /Counter, 8259A priority Interrupt Controller 8.39 Software Interrupt Application.

Digital Interfacing, Programmable Parallel Port and Handshake Input/output, Interfacing a Microprocessor to keyboard, Interfacing to Alphanumeric Display, 8279 Circuit Connection and operation Overview, Interfacing to 18-segment and dot matrix Led Display, Interfacing Microcomputer to No multiplex LCD Display, Interfacing Microcomputer ports to high –power Devices. 7 hrs

UNIT-VIII :

Analog Interfacing and Industrial Control - D/A Converter Operation, interfacing and Application, A/D Converter Specification, Types and Interfacing, A Microcomputer – based Scale, A Microcomputer – based Industrial process control system, An 8086-based process –control system, Developing the prototype of microcomputer –based Instrumental , Robotics and Embed control Digital Signal processing and digital Filters

The 80286, 80386 and 80486 Microprocessor- Multiuser/multitasking Operating system Concepts, The Intel 80286 Microprocessor, The Intel 80386 Microprocessor, The Intel 80486 Microprocessor. 7 hrs

TEXT BOOKS :

1. Microprocessor Architecture ,programming and application with 8085, by Ramesh Gaonkar 5/e.
2. Microprocessor and Interfacing, Dougals V.Hall, Tata McGraw Hill 5/e 2006.

ANALYSIS DESIGN OF ALOGORITHS LAB

Subject Code	2 MCA 3.6	IA Marks	20
No. of Lecture Hrs./ Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

MICROPROCESSOR LAB

Subject Code	2 MCA 3.7	IA Marks	20
No. of Lecture Hrs./ Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

M.C.A. IVTH SEMESTER

SOFTWARE ENGINEERING

Subject Code	2 MCA 4.1	IA Marks	20
No. of Lecture Hrs./ Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Overview: Introduction: FAQ's about software engineering, Professional and ethical responsibility. Socio-Technical systems: Emergent system properties; Systems engineering; Organizations, people and computer systems; Legacy systems. 6 hrs

UNIT - II:

Critical Systems, Software Processes: Critical Systems: A simple safety-critical system; System dependability; Availability and reliability. Software Processes: Models, Process iteration, Process activities; The Rational Unified Process; Computer-Aided Software Engineering. 7 hrs

UNIT - III:

Requirements: Software Requirements: Functional and Non-functional requirements; User requirements; System requirements; Interface specification; The software requirements document. Requirements Engineering Processes: Feasibility studies; Requirements elicitation and analysis; Requirements validation; Requirements management. 6 hrs

UNIT - IV:

System Models, Project Management: System Models: Context models; Behavioral models; Data models; Object models; Structured methods. Project Management: Management activities; Project planning; Project scheduling; Risk management. 7 hrs

UNIT - V:

Software Design: Architectural Design: Architectural design decisions; System organization; Modular decomposition styles; Control styles. Object-Oriented design: Objects and Object Classes; An Object-Oriented design process; Design evolution. 7 hrs

UNIT - VI:

Development: Rapid Software Development: Agile methods; Extreme programming; Rapid application development. Software Evolution: Program evolution dynamics; Software maintenance; Evolution processes; Legacy system evolution. 6 hrs

UNIT - VII:

Verification and Validation: Planning; Software inspections; Automated static analysis; and formal methods. Software testing: System testing; Component testing; Test case design; Test automation. 7 hrs

UNIT - VIII:

Management: Managing People: Selecting staff; Motivating people; Managing people; The People Capability Maturity Model. Software Cost Estimation: Productivity; Estimation techniques; Algorithmic cost modeling, Project duration and staffing. 6 hrs

TEXT BOOKS:

1. Ian Sommerville, **"Software Engineering"** 8th Edition, Pearson Education, 2007.

REFERENCE BOOKS:

1. Waman S Jawadekar, **"Software Engineering Principles and Practice"** 2004, Tata McGraw Hill.
2. Roger S. Pressman, **"A Practitioners Approach"** 7th Edition, 2007, McGraw-Hill,
3. Pallote, **"An Integrated Approach to software Engineering"** Narosa
4. Mall R, **"Fundamentals of Software Engineering"**, Prentice Hall of India.

COMPUTER GRAPHICS AND VISUALIZATION

Subject Code	2 MCA 4.2	IA Marks	20
No. of Lecture Hrs./ Week	04	Exam Hours	03
Total No. of Lecture Hrs.	52	Exam Marks	100

UNIT – I :

INTRODUCTION: Applications of computer graphics; A graphics system; Images: Physical and synthetic; Imaging systems; The synthetic camera model; The programmer's interface; Graphics architectures; Programmable pipelines; Performance characteristics. Graphics Programming: The Sierpinski gasket; Programming two-dimensional applications. 7 hrs

UNIT – II :

THE OPENGL: The OpenGL API; Primitives and attributes; Color; Viewing; Control functions; The Gasket program; Polygons and recursion; The three-dimensional gasket; Plotting implicit functions. 6 hrs

UNIT – III :

INPUT AND INTERACTION: Interaction; Input devices; Clients and servers; Display lists; Display lists and modeling; Programming event-driven input; Menus; Picking; A simple CAD program; Building interactive models; Animating interactive programs; Design of interactive programs; Logic operations. 7 hrs

UNIT – IV :

GEOMETRIC OBJECTS AND TRANSFORMATIONS – 1: Scalars, points, and vectors; Three-dimensional primitives; Coordinate systems and frames; Modeling a colored cube; Affine transformations; Rotation, translation and scaling. 6 hrs

UNIT – V :

GEOMETRIC OBJECTS AND TRANSFORMATIONS – 2: Transformations in homogeneous coordinates; Concatenation of transformations; OpenGL transformation matrices; Interfaces to three-dimensional applications; Quaternions. 5 hrs

UNIT – VI :

VIEWING: Classical and computer viewing; Viewing with a computer; Positioning of the camera; Simple projections; Projections in OpenGL; Hidden-surface removal; Interactive mesh displays; Parallel-projection matrices; Perspective-projection matrices; Projections and shadows. 7 hrs

UNIT – VII :

LIGHTING AND SHADING: Light and matter; Light sources; The Phong lighting model; Computation of vectors; Polygonal shading; Approximation of a sphere by recursive subdivisions; Light sources in OpenGL; Specification of materials in OpenGL; Shading of the sphere model; Global illumination. 6 hrs

UNIT – VIII:

IMPLEMENTATION: Basic implementation strategies; The major tasks; Clipping; Line-segment clipping; Polygon clipping; Clipping of other primitives; Clipping in

three dimensions; Rasterization; Bresenham's algorithm; Polygon rasterization; Hidden-surface removal; Antialiasing; Display considerations. 8 hrs

TEXT BOOK:

1. **Interactive Computer Graphics A Top-Down Approach with OpenGL** - Edward Angel, 5th Edition, Addison-Wesley, 2008.

REFERENCE BOOKS:

1. **Computer Graphics Using OpenGL** – F.S. Hill,Jr. 2nd Edition, Pearson Education, 2001.
2. **Computer Graphics** – James D Foley, Andries Van Dam, Steven K Feiner, John F Hughes, Addison-wesley 1997.
3. **Computer Graphics - OpenGL Version** – Donald Hearn and Pauline Baker, 2nd Edition, Pearson Education, 2003.

JAVA AND J2EE

Subject Code	2 MCA 4.3	IA Marks	20
No. of Lecture Hrs./ Week	04	Exam Hours	03
Total No. of Lecture Hrs.	52	Exam Marks	80

UNIT – I :

INTRODUCTION TO JAVA: Java and Java applications; Java Development Kit (JDK); Java is interpreted, Byte Code, JVM; Object-oriented programming; Simple Java programs.

Data types and other tokens: Boolean variables, int, long, char, operators, arrays, white spaces, literals, assigning values; Creating and destroying objects; Access specifiers. Operators and Expressions: Arithmetic Operators, Bitwise operators, Relational operators, The Assignment Operator, The? Operator; Operator Precedence; Logical expression; Type casting; Strings Control Statements: Selection statements, iteration statements, Jump Statements. 6 hrs

UNIT – II :

CLASSES, INHERITANCE, EXCEPTIONS, APPLETS: Classes: Classes in Java; Declaring a class; Class name; Super classes; Constructors; Creating instances of class; Inner classes. Inheritance: Simple, multiple, and multilevel inheritance; Overriding, overloading. Exception handling**:** Exception handling in Java. The Applet Class: Two types of Applets; Applet basics; Applet Architecture; An Applet skeleton; Simple Applet display methods; Requesting repainting; Using the Status Window; The HTML APPLET tag; Passing parameters to Applets; getDocumentbase() and getCodebase(); ApletContext and showDocument(); The AudioClip Interface; The AppletStub Interface; Output to the Console. 6 hrs

UNIT – III :

MULTI THREADED PROGRAMMING, EVENT HANDLING: Multi Threaded Programming: What are threads? How to make the classes threadable; Extending threads; Implementing runnable; Synchronization; Changing state of the thread; Bounded buffer problems, read-write problem, producer-consumer problems. Event Handling: Two event handling mechanisms; The delegation event model; Event classes; Sources of events; Event listener interfaces; Using the delegation event model; Adapter classes; Inner classes. 7 hrs

UNIT – IV :

SWINGS: Swings: The origins of Swing; Two key Swing features; Components and Containers; The Swing Packages; A simple Swing Application; Create a Swing Applet; Jlabel and ImageIcon; JTextField;The Swing Buttons; JTabbedpane; JScrollPane; JList; JComboBox; JTable. 7 hrs

UNIT – V :

JAVA 2 ENTERPRISE EDITION OVERVIEW, DATABASE ACCESS: Overview of J2EE and J2SE. The Concept of JDBC; JDBC Driver Types; JDBC Packages; A Brief Overview of the JDBC process; Database Connection; Associating the JDBC/ODBC Bridge with the Database; Statement Objects; ResultSet; Transaction Processing; Metadata, Data types; Exceptions. 6 hrs

UNIT – VI :

JAVA Servlets: JAVA servlets and common Gateway interface programming: Benefits of using a JAVA servlets, A simple JAVA servlets, Developments Description, Reading a data from client, reading a HTTP Request Headers, Sending a data to a client and writing the HTTP response Header, working with cookies, Tracking sessions. 6 hrs

UNIT – VII :

JSP, RMI: Java Server Pages (JSP): JSP, JSP Tags, Tomcat, Request String, User Sessions, Cookies, Session Objects. Java Remote Method Invocation: Remote Method Invocation concept; Server side, Client side. 6 hrs

UNIT – VIII :

ENTERPRISE JAVA BEANS: Enterprise java Beans; Deployment Descriptors; Session Java Bean, Entity Java Bean; Message-Driven Bean; The JAR File. 7 hrs

TEXT BOOKS:

1. **Java - The Complete Reference** – Herbert Schildt, 7th Edition, Tata McGraw Hill, 2007.
2. **J2EE - The Complete Reference** – Jim Keogh, Tata McGraw Hill, 2007.

***REFERENCE BOOKS*:**

1. **Introduction to JAVA Programming** – Y. Daniel Liang, 6th Edition, Pearson Education, 2007.
2. **The J2EE Tutorial** – Stephanie Bodoff et al, 2nd Edition, Pearson Education, 2004.

RELATIONAL DATABASE MANAGEMENT SYSTEMS

Subject Code	2 MCA 4.4	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Introduction: Introduction; An example; Characteristics of Database approach; Actors on the screen; Workers behind the scene; Advantages of using DBMS approach; A brief history of database applications; when not to use a DBMS. Data models, schemas and instances; Three-schema architecture and data independence; Database languages and interfaces; The database system environment; Centralized and client-server architectures; Classification of Database Management systems. 8 hrs

UNIT –II:

Entity-Relationship Model: Using High-Level Conceptual Data Models for Database Design; An Example Database Application; Entity Types, Entity Sets, Attributes and Keys; Relationship types, Relationship Sets, Roles and Structural Constraints; Weak Entity Types; Refining the ER Design; ER Diagrams, Naming Conventions and Design Issues; Relationship types of degree higher than two. 6 hrs

UNIT - III:

Relational Model and Relational Algebra: Relational Model Concepts; Relational Model Constraints and Relational Database Schemas; Update Operations, Transactions and dealing with constraint violations; Unary Relational Operations: SELECT and PROJECT; Relational Algebra Operations from Set Theory; Binary Relational Operations : JOIN and DIVISION; Additional Relational Operations; Examples of Queries in Relational Algebra; Relational Database Design Using ER- to-Relational Mapping. 8 hrs

UNIT - IV:

SQL - 1: SQL Data Definition and Data Types; Specifying basic constraints in SQL; Schema change statements in SQL; Basic queries in SQL; More complex SQL Queries. 6 hrs

UNIT - V:

SQL - 2: Insert, Delete and Update statements in SQL; Specifying constraints as Assertion and Trigger; Views (Virtual Tables) in SQL; Additional features of SQL; Database programming issues and techniques; Embedded SQL, Dynamic SQL; Database stored procedures and SQL / PSM. 6 hrs

UNIT - VI:

Database Design - 1: Informal Design Guidelines for Relation Schemas; Functional Dependencies; Normal Forms Based on Primary Keys; General Definitions of Second and Third Normal Forms; Boyce-Codd Normal Form. 6 hrs

UNIT - VII:

Database Design - 2: Properties of Relational Decompositions; Algorithms for Relational Database Schema Design; Multivalued Dependencies and Fourth Normal Form; Join Dependencies and Fifth Normal Form; Inclusion Dependencies; Other Dependencies and Normal Forms. 6 hrs

UNIT – VIII:

Transaction Management: The ACID Properties; Transactions and Schedules; Concurrent Execution of Transactions; Lock- Based Concurrency Control; Performance of locking; Transaction support in SQL; Introduction to crash recovery; 2PL, Serializability and Recoverability; Lock Management; Introduction to ARIES; The log; Other recovery-related structures; The write -ahead log protocol; Check pointing; Recovering from a System Crash; Media Recovery; Other approaches and interaction with concurrency control. 8 hrs

TEXT BOOKS:

1. *Elmasri and Navathe,* "Fundamentals of Database Systems" 5th Edition, 2007, Addison-Wesley.
2. *Raghu Ramakrishnan and Johannes Gehrke* "Database Management Systems", 3rd Edition, 2003, McGraw-Hill.

REFERENCE BOOKS:

1. *Silberschatz, Korth and Sudharshan,* "Data Base System Concepts", 5th Edition, 2006, Mc-GrawHill.
2. *C. J. Date, A. Kannan, S. Swamynatham,* "An Introduction to Database Systems" 8th Edition, 2006, Pearson Education.

ELECTIVE-I

OPTICAL NETWORKS

Subject Code	2 MCA 4.5.1	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Introduction: Three generations of Digital Transport Networks; A brief introduction to WDM and TDM; The Optical Marketplace; Wireless Optical Systems; Key Optical Nodes; Other Key Terms; Evolution of Optical Systems; Key attributes of Optical Fiber. 6hrs

UNIT - II:

Telecommunications Infrastructure: The Local Connections; The Backbone Connections; The Digital Multiplexing Hierarchy; The Digital Signaling Hierarchies; T1 / DS1 and T3/DS3; The Layered Protocol Model in the Transport Network; considerations for Interworking Layer1, Layer 2, and Layer 3 Networks. 6 hrs

UNIT - III:

Characteristics of Optical Fiber: The Basics; The Wavelength; The Basic Components; Structure of the Fiber; Fiber Types; Key Performance Properties of Fiber; Attenuation; Amplifier Spontaneous Emission; Chromatic Dispersion; Lasers.4. Timing and Synchronization: Timing and Synchronization in Digital Networks; Effect of a Timing error; The Clocking Signal; Types of Timing in Networks; Timing Variations; Methods of Clock Exchange; Distribution of Timing Using SONET and DS1; Timing Downstream Devices; Building Integrated Timing Supply; Synchronization Status Messages and Timing Loops. 8 hrs

UNIT -IV:

SONET and SDH: Introduction; The SONET Multiplexing Hierarchy; SONET and SDH Multiplexing Structure; The SONET / SDH Frame Structure; SONET and SDH Functional Components; SONET and SDH Problem Detection; Locating and Adjusting Payload with Pointers; Virtual Tributaries in more detail; Virtual Tributaries in Virtual Containers; The Overhead Bytes; SONET and SDH Concatenation. 7 hrs

UNIT -V:

Architecture of Optical Transport Networks: The Digital Wrapper; Control Planes; In-Band and Out-Band Control Signaling; Importance of Multiplexing and Multiplexing Hierarchies; Current Digital Transport Hierarchy; SONET Multiplexing Hierarchy; SDH Multiplexing Hierarchy; Key Indexes and Other Terms; The New Optical Transport and Digital Transport Hierarchy; The OTN Layered Model; Encapsulation and Decapsulation Operations; Generic Framing Procedure. 7 hrs

UNIT -VI:

WDM: The WDM Operation; DWDM, TDM and WDM Topologies; Relationship of WDM to SONET / SDH; EDF; WDM Amplifiers; Add-Drop Multiplexers; WDM Cross-Connects; Wavelength Continuity Property; Examples of DWDM Wavelength Plan; Higher Dispersion for DWDM; Tunable DWDM Lasers. 6 hrs

UNIT -VII:

Network Topologies and Protection Schemes: The Non-Negotiable Requirement Robust Networks; Diversity in the Network; Line and Path Protection Switching; Types of Topologies; Working and Protection Fibers; Point-to-Point Topology; BLSR; Protection Switching on Four-Fiber BLSR; Meshed Topologies; PONs; Ethernet in the Wide Area Backbone? Metro Optical Networking. 6 hrs

UNIT -VIII:

Architecture of IP and MPLS-Based OTNs: IP, MPLS, and Optical Control Planes; Interworking the three Control Planes; Management of the Planes; A Framework for the IP over Optical Networks; An Opposing View; Generalized MPLS use in Optical Networks; Bi-Directional LSPs in Optical Networks; GMPLS Extensions for G.709; GMPLS with SONET and SDH. 6 hrs

TEXTBOOKS:

1. Uyless Black: Optical Networks, Pearson Education Asia, 2002.

REFERENCEBOOKS:

1. Rajiv Ramaswami and Kumar N.Sivaranjan: Optical Networks - A Practical Perspective, Morgan Kaufuann, 2000.
1. Paul E.Green Jr.,: Fiber Optic Network, Prentice Hall, 1993.
2. Jeff Hecht: Understanding Fiber Optics,4th Edition, PHI 1999.

ARTIFICIAL INTELLIGENCE

Subject Code	2 MCA 4.5.2	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

PROBLE AND SEARCH: What is Artificial intelligence? The AI problems, the Underling Assumption, What is an AI Technique?, The Level of the Model, Criteria for success, some general Reference, One Final Word ,Defining the problem as a state Apace search, production System, problem Characters, production System Characteristics, Issues in the Design of search programs. 6 hrs

UNIT – II :

HEURISTIC SEARCH TECHNIQUE: General- and- Test, Hill climbing, Best-First Search, Problem Reduction, Constraints Satisfaction, Means-Ends Analysis. 8 hrs

UNIT – III :

KNOWLEDGE REPRESENTATION: Representations and Mapping, Approaches to knowledge, representations, Issues in knowledge Representation, The Frame problems. 6 hrs

UNIT – IV :

USE OF PREDICATE LOGIC: Representing simple facts in logics, Representing Instance and Is a relationships, Computable Functions and predicates, Resolution, Natural Deduction. 6 hrs

UNIT –V :

REPRESENTING KNOWLEDGE USING RULES: Procedural versus Declarative Knowledge, Logic Programming, Forward versus Backward Reasoning, Matching, control Knowledge. 8 hrs

UNIT – VI :

SYMBOLIC REASONING UNDER UNCERTAINTY: Introduction to No monotonic Reasoning, Logics for Nonmonotonic Reasoning, Implementation Issues, Augmenting a Problem Solver, Implementation: Depth- First Search, Implementation: Breadth-first Search. 6 hrs

UNIT – VII :

STATICAL REASONING: Probability and Bayes' theorem, Certainty factors and Rule based systems, Bayesian Networks, Dempster – Shafer Theory, Fuzzy Logic. Weak slot- and- filler structure: semantic Nets, Frames. 6 hrs

UNIT – VIII :

STRONG SLOT- AND –FILLER STRUCTURE: Conceptual Dependency , Scripts, CYC, Syntactic- semantic Spectrum of Representation, Logic and slot- and-Filler Structures, Other Representation Techniques. 6 hrs

TEXT BOOKS:

1. **Artificial intelligence** – Elaine Rich & Kevin Knight, M/H 1983.
2. **Artificial intelligence** Pearson 4/e- George Fluger
3. **Artificial intelligence a modern Approach**, Stuart Russel and Peter Norvig 2/e.

DIGITAL IMAGE PROCESSING

Subject Code	2 MCA 4.5.3	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

DIGITIZED IMAGE AND ITS PROPERTIES: Basic concepts, Image digitization, Digital image properties. 6 hrs

UNIT – II :

IMAGE PREPROCESSING: Image pre-processing: Brightness and geometric transformations, local preprocessing. 7 hrs

UNIT – III :

SEGMENTATION – 1: Thresholding, Edge-based segmentation. 6 hrs

UNIT – IV :

SEGMENTATION – 2: Region based segmentation, Matching. 6 hrs

UNIT – V :

WAVELETS AND MULTIRESOLUTION PROCESSING: Background, Image Pyramids, Subband Coding, The Haar Transform, Multiresolution Expansions, Series Expansions, Scaling Functions, Wavelet Functions, Wavelet Transforms in One Dimension, The Wavelet Series Expansions, The Discrete Wavelet Transform, The Continuous Wavelet Transform, The Fast Wavelet Transform. 7 hrs

UNIT – VI :

IMAGE COMPRESSION: Fundamentals, Coding Redundancy, Spatial and Temporal Redundancy, Irrevelant Information, Measuring Image Information, Fidelity Criteria, Image Compression Models, Image Formats, Containers, and Compression Standards, Huffman Coding, Golomb Coding, Arithmetic Coding, LZW Coding, Run-Length Coding, Symbol-Based Coding, Bit-Plane Coding, Block Transform Coding, Predictive Coding, Wavelet Coding. 6 hrs

UNIT – VII :

IMAGE RESTORATION AND RECONSTRUCTION: A model of the Image Degradation/Restoration Process, Noise Models, Periodic Noise, Restoration in the Presence of Noise Only – Spatial Filtering, Periodic Noise Reduction by Frequency Domain Filtering, Linear, Position-Invariant Degradations, Estimating the Degradation Function, Inverse Filtering, Minimum Mean Square Error (Wiener) Filtering, Constrained Least Squares Filtering, Geometric Mean Filter, Image Reconstruction from Projections. 7 hrs

UNIT – VIII :

MORPHOLOGICAL IMAGE PROCESSING: Preliminaries, Erosion and Dilation, Opening and Closing, The Hit-or-Miss Transformation, Some Basic Morphological Algorithms, Gray-Scale Morphology. 6 hrs

TEXT BOOKS:

1. **Image Processing, Analysis and Machine Vision** – Milan Sonka, Vaclav Hlavac and Roger Boyle, 2nd Edition, Thomson Learning, 2001.
2. **Digital Image Processing –** Rafel C Gonzalez and Richard E Woods, 2nd Edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. **Digital Image Processing and Computer Vision - Boyle**
2. **Fundamentals of Digital Image Processing** – Anil K Jain, Pearson Education/Prentice-Hall of India Pvt. Ltd., 1997.
3. **Digital Image Processing and Analysis** – B.Chanda, D Dutta Majumder, Prentice-Hall India, 2002.

MICROCONTROLLERS

Subject Code	2 MCA 4.5.4	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

MICRO CONTROLLER: 8051 Microcontroller architecture –oscillator and clocks-program counter and data pointer-registers –flags-PSW-internal memory-internal RAM-stacks and stack pointer-SFR-internal ROM-I/O pins-ports-external memory. 8 hrs

UNIT – II :

PERIPHERALS: Counters of times: timer/counter interrupts-timing timer –modes of operation-counting-serial data input and serial data output: serial data interrupt-data transmission-data reception-transmission modes-interrupts: timer flag interrupt-serial port interrupt-external interrupt-reset-interrupt priority-interrupt destination-software generated interrupt. 8 hrs

UNIT – III :

ARITHMETIC AND LOGICAL OPERATIONS: Introduction –addressing modes-byte level logical operation-bit level logical operations-rotate and swap operation-simple program. 5 hrs

UNIT – IV :

ARITHMETIC OPERATIONS: introduction-flags-incrementing and decrementing-addition- subtraction-multiplication-division-simple programs 5 hrs

UNIT – V :

INSTRUCTION SET: Introduction –external data move-code memory-read only data move-push and pop opcodes- data exchange- Simple programs. 6 hrs

UNIT – VI :

Jump & Call Instruction- introduction- jump & call program- jumps- call & subroutines- Simple programs. 6 hrs

UNIT – VII :

OPERTATIONAL AMPLIFIERS AND APPLICATION: Operational amplifier specifications, frequency compensation 4 hrs

UNIT – VIII :

APPLICATIONS OF OPERATIONAL AMPLIFIERS: Linear & nonlinear circuits using operational amplifiers and their analysis – inverting and non inverting amplifiers, Differentiator, Integrator, Voltage to current converter, Instrumentation amplifier, low-pass and band filters, comparator, multivibrators and Schmitt trigger ,triangular wave generator, log and antilog amplifiers. 10 hrs

***TEXT BOOK*:**

1. "The 8051 Micro controller Architecture, Programming and Applications" by Kennath . J . Ayala , Delmar Cengage Learning, 2004 ISBN- 10: 140186158X ISBN – 13 : 978-1401861582

REFERENCE BOOKS:

1. " The 8051 Microcontroller and Embedded -system" by Mohammed A l Maszid , Prentice Hall ,1999
2. ISBN-10: 0138610223 ISBN-13:978-0138610227
3. "Design with Operational And Analog Integrated Circuits" by Gray and Meyer, Wiley International ,1995
4. 3. "Applications and design with Analog Integrated Circuits" by J Michael Jacob , Prentice Hall of India , 1996
5. "Integrated Circuits" by K.R. Botkar, Khanna Publishers, 1996

OPERATIONS RESEARCH

Subject Code	2 MCA 4.5.5	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I:

Introduction To Operation Research And Linear programming: What is Operations Research? : Operation research Models, Solving the OR Model, Queuing and Simulation Models, Art of Modeling, More than Just Mathematics, Phases of an OR Study, Two variable LP Model, Graphical LP Solution, Graphic Sensitivity Analysis, Computer Solutions of LP Problems, Analysis of selected LP Models. 7 hrs

UNIT – II:

The Simplex Method: LP Solution Space in Equation Form, Transition from Graphical to Algebraic Solution, Artificial Staring solution, Special cases in simplex method application. 6 hrs

UNIT - III:

Duality Analysis: Definition of the dual problem, Primal- Dual Relationships, Economic Interpretation. Of Dual variables, Economic Interpretation. Of Dual constraints, Dual simplex Method. 7 hrs

UNIT - IV:

Transportation And Assignment Model: Definition of the transportation Model, Nontraditional Transportation Models, the Transportation Algorithm, The Assignment Model. 6 hrs

UNIT - V:

Network Model: Network Definitions, Minimal spanning Tree Algorithm, Shortest-Route problem, Network Representation, critical path (CPM) computations construction of the time schedule , linear programming formulation of CPM , PERT networks. 7 hrs

UNIT - VI:

Goal Programming: A goal programming formulation, goal programming algorithms: the weights Method, The preemptive method. 6 hrs

UNIT - VII:

Basic Probability: Laws of Probability: Addition Law of probability, Conditional law of probability, Random variables and probability Distributions, Expectation of random variable: mean and variance of Random variable, mean and variance of joint random variables, four common probability distributions: Binomial Destitution, Poisson distribution, Negative Exponential distortion, normal distribution, Empirical Distributions.
7 hrs

UNIT - VIII:

Decision Analysis And Games: decision making under certainty – analytic Hierarchy process (AHP) , excepted value criteria , Design under uncertainty, game theory ,optimal solutions of to person Zero- sum games, solution of mixed strategy games. 6 hrs

TEXT BOOK:.

1. Hamdy A. Taha "Operation Research", Collin McMillan, seventh edition.

REFERENCES:

1. *Sharma J.K.* "Operation Research, Theory & Application", Holden day.
2. *Panneerselvam R.*, "Operation Research", PHI New Edition.
3. *Kishore Trivedi*, "Probability & Statistical with Reliability & Queuing & computer science application", Prentice Hall.
4. *Hiiler F.S & Liebermann G.J.*, "Operation Research", Holden day.

COMPUTER GRAPHICS LAB

Subject Code	2 MCA 4.6	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

RELATIONAL DATA BASE MANAGEMENT SYSTEM LAB

Subject Code	2 MCA 4.7	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

M.C.A. VTH SEMESTER

OBJECT ORIENTED ANALYSIS AND DESIGN

Subject Code	3 MCA 5.1	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Introduction and modeling concepts: What Is Object orientation?, What is OO Development?. OO Themes, Evidence for Usefulness of OO Development, OO Modeling History, Modeling as Design Technique: Modeling, Abstraction, The three Models, Class Modeling: Object and class concept, Link and Association concepts, Generalization and inheritance, A Sample of class Model. 8 hrs

UNIT - II:

Class and State Modeling: Advanced Object and class concepts, Association Ends, N-ary Association, Aggregation, Abstract Class, Multiple inheritance, Metadata, Reification, Constraints, Derived Data, Packages. State Modeling: Events, State, Transitions and Condition, Sate Diagram, State diagram Behavior. Advanced State Modeling: Nested State Diagram, Nested State, Signal Generalization, Concurrency, A simple State model. Relation of Class and State Model 8 hrs

UNIT - III:

Interaction Modeling And Modeling concepts: use case models, sequence model, Activity model, class model, state model, Interaction model, Relationship Among the Models. 6 hrs

UNIT- III:

System Conception And Domain Analysis: Development state, Development Life cycle. Devising A System Concepts, Elaborating a Concept, Preparing a Problem Statement, Overview of analysis, Domain class model, Domain State Model Domain Interaction Model, Interaction Analysis 6 hrs

UNIT - IV:

Application Analysis And System Design: Application Interaction Model, Application Class model, Application state model , Adding Operation .System Design: Over View of System Design, Estimating Performance, Making a Reuse Plan, Breaking a System onto Subsystem, Identifying Concurrency, Allocation Of Subsystems, Management of Data storage, Handling Global Resource, Choosing a Software Control Strategy, Handling Boundary conditions, Setting Trade-off Priorities, Common Architectural Styles, Architectural of the ATM System. 6 hrs

UNIT - V:

Class design And Process Summary: Overview of class Design, Bridging the Gap, Realizing Use Cases, Designing Algorithms, Recursing Downward, Refactoring, Reification Of Behavior, Adjustment Of Inheritance, Organization A Class Design. Process Summary: System Conception, Analysis, Design. 6 hrs

UNIT - VI:

Implementation: Implementation Modeling Overview Of Implementation, Fine-Tuning Classes, Fine- Tuning Generalization, Realizing Association, Databases: Introduction, Abbreviated ATM Model, Implementing Structure - Basic, Implementing Structure –Advanced , Implementing Structure For the ATM Example, Implementing Functionality, Object Oriented Database, Programming Style: Object Oriented Style, Reusability, Extensibility, Robustness, Programming- in- the-large. 6 hrs

UNIT - VII:

Software Engineering: Overview of Interactive Development, Interactive development vs water fall model vs. Rapid Prototyping, Interaction Scope, Performing an Iteration, Planning the Next Iteration Scope, Performing an iteration, Planning the Next Iteration, Modeling and Iterative Development, Identifying Risks. 6 hrs

UNIT - VIII:

Managing Models: Overview of Managing Models, Kinds of models, Modeling Pitfalls. Modeling sessions, Organizing Personnel, Learning Techniques, teach Techniques, Tools , Estimating Modeling Effort. 6 hrs

TEXT BOOK:

1. Michael R Blaha and James R Rumbaugh, "Object Oriented Modeling and Design with UML", 2/e, PHI.

REFERENCES:

1. G. Booch, J. Rambaugh and I. Jacobson, The Unified Modeling Language User GUIDE.
   Pearson Education.
2. Simon Bennett, MCrobb Rayfarmar, "Object Oriented Systems Analysis and Design USI"UML, 2/e, Tata McGraw Hill.
3. A l Bahram, "Object-oriented systems Development", McGrawHill.
4. Craig Larman, Applying UML and Patterns, Pearson Education.
5. H. Erikson, M Penker, B. Lyons, and D. Fado, UML 2 Tool Kit, Wiley Publishing.
6. Meilir Page-Jones, "Fundamentals of Object Oriented Design in UML", Pearson Education.
7. W. Richard Stevens, "Using UML: Software Engineering with Objects and Components", 11 Pearson Education
8. Grady Booch, "Object-Oriented Analysis and Design", 2/e, Pearson Education.

COMPILER DESIGN

Subject Code	3 MCA 5.2	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

Introduction to Compiling : Compilers, Analysis of the source Program, The Phases of a Compiler, Cousins of the Compiler, The Grouping of Phases, Compiler-Constructions tools.

Simple One-Pass Compiler: Overview, Syntax Definition, Syntax-directed translation, Parsing, A translator for simple Expressions, Lexical Analysis, Incorporating a Symbol table, Abstract stack Machines. 10 hrs

UNIT – II :

Lexical Analysis: The role of the Lexical Analyzer, Input buffering, Specification of, Recognition of tokens,A language of Specifying lexical Analyzers, Finite automata, From a regular expression to an NFA, Design of Lexical analyzer generator ,Optimization of DFA-based pattern matchers. 6 hrs

UNIT – III :

Syntax Analysis: The role of the parser, context-free grammars, Writing a grammar, top-down parsing, Bottom-up Parsing, operator-precedence parsing, LR parsers, Using ambiguous 6Hours grammars, parser generators. 6 hrs

UNIT – IV :

Syntax-Directed Translation: Syntax-direct definitions, Construction of syntax trees, Bottom-up evaluation of S-attributed definitions, L-attributed definition, Top-down translation, Bottom-up evaluation of inherited attributes, Recursive evaluators, Space for attribute values at compile time, Assigngning space at compiler-Construction time ,Analysis of Syntax-directed definitions. 7 hrs

UNIT – V :

Run-timer Environment: Source language issues, Storage organization, Storage-allocation Strategies, Access to nonlocal names, Parameter Passing, Symbol tables, Language facilities for dynamic storage allocation, storage allocation in Forton. 6 hrs

UNIT – VI :

Intermediate code Generation: Intermediate Languages, Declaration, Assignment statements, Boolean Expressions, Case statements, Back patching, Procedure calls. 6 hrs

UNIT – VII :

Code Generation: Issues in the design of a code generator, Target Machine, Run-time storage management, Basic blocks and flow graphs, Next-use information, A simple code generator, Register allocation and assignment, The dag representation of basic blocks, Peephole optimization, Generating code from dags, Dynamic Programming code-generation algorithm 6 hrs

UNIT – VIII :

Code Optimization: Introduction, The Principal sources of Optimization, Optimization of basic blocks, Loops in flow graphs, Introduction to global data-flow analysis, Iterative solution of data flow equations, code-improving transformation ,Dealing with aliases, Data flow Analysis of Structured flow graphs, Efficient Data flow algorithm, A tool for Data flow analysis, Estimation of types, Symbolic debugging of Optimized code.
6 hrs

TEXTBOOKS :

1. *Alfred. V. Aho, Ravi Sethi, Jeffrey. D. Ullam,* "Compilers Principles, Techniques & Tools".

REFERENCE BOOK :

1. *N. Fischer, Richard.J. Leblanc,* "Crafting compilers with Charles, Jr. Person Education.
2. *Andrew W* "Modern Compiler Implementation in C", Apple Cambridge University Press.
3. *Kenneth C,* "Compiler Construction Principles & practice", London- Thomson Education.

MOBILE COMPUTING

Subject Code	3 MCA 5.3	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Introduction: Applications, History of Wireless communication, A simplified reference model. 6 hrs

UNIT - II:

Wireless Transmission: Frequencies, Signals, Antennas, Signal propagation, Multiplexing, modulation, Spread spectrum, Cellular systems. 6 hrs

UNIT - III:

Medium Access Control: Motivation for a specialized MAC, SDMA, FDMA, TDMA, CDMA, Comparison of S/T/F/CDMA. 7 hrs

UNIT - IV:

Satellite Systems: Basics, Routers, Location, Handover, examples. 6 hrs

UNIT - V:

Broadcast systems: Cyclic representation of data, Digital audio & video broadcasting 6 hrs

UNIT - VI:

Wireless LAN: Infrared V/S Radio transmission, Infrastructures and ad hoc Networks, IEEE 802.11, Hiperlan, Bluetooth. 7 hrs

UNIT - VII:

Wireless ATM: Wireless ATM working group, WATM services, references model, Functions, radio access layer, Handover, Location Management, Addressing, Mobile quality of services, Access point control protocol. 7 hrs

UNIT - VIII:

Mobile Network Layer: Mobile IP, Dynamic host configuration protocol, Ad hoc networks. Mobile Transport layer, Support for mobility and wireless application protocol. 7 hrs

TEXT BOOK :

1. *Schiller J. H.* "Mobile Communications", Addison Wesley.

REFERENCES :

1. *Stuber G. L.*, Principles of Mobile Communications, Academic Press 1996
2. *Rappapert T. S.*, Wireless Communication Principles & Practices, Pentacle Hall,1996.

C# PROGRAMMING AND .NET

Subject Code	3 MCA 5.3	IA Marks	20
No. of Lecture Hrs./ Week	04	Exam Hours	03
Total No. of Lecture Hrs.	52	Exam Marks	80

UNIT – I :

THE PHILOSOPHY OF .NET: Understanding the Previous State of Affairs, The .NET Solution, The Building Block of the .NET Platform (CLR,CTS, and CLS), The Role of the .NET Base Class Libraries, What C# Brings to the Table, An Overview of .NET Binaries (aka Assemblies), the Role of the Common Intermediate Language, The Role of .NET Type Metadata, The Role of the Assembly Manifast, Compiling CIL to Platform – Specific Instructions, Understanding the Common Type System, Intrinsic CTS Data Types, Understanding the Common Languages Specification, Understanding the Common Language Runtime A tour of the .NET Namespaces, Increasing Your Namespace Nomenclature, Deploying the .NET Runtime. 6 hrs

UNIT – II :

BUILDING C# APPLICATIONS: The Role of the Command Line Complier (csc.exe), Building C # Application using csc.exe Working with csc.exe Response Files, Generating Bug Reports , Remaining C# Compiler Options, The Command Line Debugger (cordbg.exe) Using the, Visual Studio .NET IDE, Other Key Aspects of the VS.NET IDE, C# "Preprocessor" Directives, An Interesting Aside: The System. Environment Class. 6 hrs

UNIT – III :

C# LANGUAGE FUNDAMENTALS: The Anatomy of a Basic C# Class, Creating objects: Constructor Basics, The Composition of a C# Application, Default Assignment and Variable Scope, The C# Member Initialization Syntax, Basic Input and Output with the Console Class, Understanding Value Types and Reference Types, The Master Node: System, Object, The System Data Types (and C# Aliases), Converting Between Value Types and Reference Types: Boxing and Unboxing, Defining Program Constants, C# Iteration Constructs, C# Controls Flow Constructs, The Complete Set of C# Operators, Defining Custom Class Methods, Understating Static Methods, Methods Parameter Modifies, Array Manipulation in C #, String Manipulation in C#, C# Enumerations, Defining Structures in C#, Defining Custom Namespaces. 8 hrs

UNIT – IV :

OBJECT- ORIENTED PROGRAMMING WITH C#: Forms Defining of the C# Class, Definition the "Default Public Interface" of a Type, Recapping the Pillars of OOP, The First Pillars: C#'s Encapsulation Services, Pseudo- Encapsulation: Creating Read-Only Fields, The Second Pillar: C#'s Inheritance Supports, keeping Family Secrets: The "Protected" Keyword, Nested Type Definitions, The Third Pillar: C #'s Polymorphic Support, Casting Between. 6 hrs

UNIT – V :

EXCEPTIONS AND OBJECT LIFETIME: Ode to Errors, Bugs, and Exceptions, The Role of .NET Exception Handing, the System. Exception Base Class, Throwing a Generic Exception, Catching Exception, CLR System – Level Exception (System. System Exception), Custom Application-Level Exception (System. System Exception), Handling Multiple Exception, The Family Block, the Last Chance Exception Dynamically Identifying

Application – and System Level Exception Debugging System Exception Using VS. NET, Understanding Object Lifetime, the CIT of "new", The Basics of Garbage Collection, Finalization a Type, The Finalization Process, Building an Ad Hoc Destruction Method, Garbage Collection Optimizations, The System. GC Type. 6 hrs

UNIT - 6

INTERFACES AND COLLECTIONS: Defining Interfaces Using C# Invoking Interface Members at the object Level, Exercising the Shapes Hierarchy, Understanding Explicit Interface Implementation, Interfaces As Polymorphic Agents, Building Interface Hierarchies, Implementing, Implementation, Interfaces Using VS .NET, understanding the I Convertible Interface, Building a Custom Enumerator (I Enumerable and Enumerator), Building Cloneable objects (ICloneable), Building Comparable Objects (I Comparable), Exploring the system. Collections Namespace, Building a Custom Container (Retrofitting the Cars Type). 6 hrs

UNIT - 7

Callback Interfaces, Delegates, and Events, Advanced Techniques: Understanding Callback Interfaces, Understanding the .NET Delegate Type, Members of System. Multicast Delegate, The Simplest Possible Delegate Example, Building More a Elaborate Delegate Example, Understanding Asynchronous Delegates, Understanding (and Using) Events. The Advances Keywords of C#, A Catalog of C# Keywords Building a Custom Indexer, A Variation of the Cars Indexer Internal Representation of Type Indexer. Using C# Indexer from VB .NET. Overloading operators, The Internal Representation of Overloading Operators, interacting with Overload Operator from Overloaded- Operator-Challenged Languages, Creating Custom Conversion Routines, Defining Implicit Conversion Routines, The Internal Representations of Customs Conversion Routines. 8 hrs

UNIT - 8

UNDERSTANDING .NET ASSEMBLES: Problems with Classic COM Binaries, An Overview of .NET Assembly, Building a Simple File Test Assembly, A C#. Client Application, A Visual Basic .NET Client Application, Cross Language Inheritance, Exploring the CarLibrary's, Manifest, Exploring the CarLibrary's Types, Building the Multifile Assembly ,Using Assembly, Understanding Private Assemblies, Probing for Private Assemblies (The Basics), Private A Assemblies XML Configurations Files, Probing for Private Assemblies (The Details), Understanding Shared Assembly, Understanding Shared Names, Building a Shared Assembly, Understanding Delay Signing, Installing/Removing Shared Assembly, Using a Shared Assembly, 6 hrs

***TEXT BOOKS*:**

1. **Pro C# with .NET 3.0** – Andrew Troelsen, Special Edition, Dream tech Press, India, 2007.
2. **Programming in C#** – E. Balagurusamy, 5th Reprint, Tata McGraw Hill, 2004. (For Programming Examples)

REFERENCE BOOKS:

1. **Inside C#** – Tom Archer, WP Publishers, 2001.
2. **C#: The Complete Reference** – Herbert Schildt, Tata McGraw Hill, 2004.

ELECTIVE – II

EMBEDDED COMPUTING SYSTEMS

Subject Code	3 MCA 5.5.1	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Introduction to Embedded Systems - An embedded system; Processor in the system; Embedded hardware units and devices in a system; Embedded software in a system; Examples of embedded systems; Embedded system-on-Chip (SoC) and use of VLSI circuit design technology; Complex systems design and processors; Design process in embedded system. 7 hrs

UNIT - II:

Introduction to Embedded Systems – 2, Devices: Formalization of system design; Design process and design examples; Classification of embedded systems; Skills required for an embedded system designer. I/O types and examples; Serial communication devices; Parallel device ports; Sophisticated interfacing features in device ports. 7 hrs

UNIT - III:

Devices -2, Communication Buses for Device Networks: Wireless devices; Timer and counting devices; Watchdog timer; Real time clock; Networked embedded systems; Serial bus communication protocols; Parallel bus device protocols; Internet enabled systems; Wireless and mobile system protocols. 6 hrs

UNIT - IV:

Device Drivers and Interrupts Service Mechanism : Device access without interrupts; ISR concept; Interrupt sources; Interrupt servicing Mechanism; Multiple interrupts; Context switching and the periods for context-switching; Classification of interrupt service mechanisms; Direct memory access; Device drivers programming. 7 hrs

UNIT – V:

Program Modeling Concepts : Program models; DFG models; State machine programming models for event controlled program flow; Modeling of multiprocessor systems. 6 hrs

UNIT – VI:

Inter-Process Communication, Synchronization Multiple processes in an application; Multiple threads in an application; Tasks and task states; Task and data; Distinctions between functions, ISRs and tasks; Concept of semaphores; Shared data; Inter Process Communication; Signal function; Semaphore functions. 6 hrs

UNIT - VII:

Real-time Operating systems: Operating System services; Process management; Timer functions; Event functions; Memory management; Device, file and I/O sub-systems management; Interrupt routines in RTOS environment; Real-Time Operating

Systems; Basic design using an RTOS; RTOS task scheduling models, interrupt latency and response times of the tasks as performance metrics; OS security issues. 7 hrs

UNIT - VIII:

Embedded Software Development: Introduction; Host and target machines; Linking and locating software; Getting embedded software in to the target system; Issues in hardware-software design and co-design; Testing on host machine; Simulators; Laboratory tools.

6 hrs

TEXT BOOKS:

1. *Rajkamal*, "Embedded Systems Architecture, Programming and Design", 2nd Edition, Tata McGraw Hill, 2008.

REFERENCE BOOKS:

1. *Wayne Wolf*, "Computers as Components Principles of Embedded Computer System Design", Elsevier, 2005.
2. *Tammy Noergaard*, "Embedded Systems Architecture", Elsevier, 2005.
3. *Steve Heath*, "Embedded Systems Design", 2nd Edition, Elsevier, 2003.
4. *Dr. K.V.K.K. Prasad*, "Embedded/Real-Time Systems: Concepts, Design and Programming – The Ultimate Reference", Dreamtech Press, 2004.
5. *Michael J.Point*, "Embedded C", Pearson Education, 2002.

DATA WAREHOUSING AND DATA MINING

Subject Code	3 MCA 5.5.2	IA Marks	20
No. of Lecture Hrs./ Week	04	Exam Hours	03
Total No. of Lecture Hrs.	52	Exam Marks	80

UNIT I:

Data Warehousing and OLAP : Data Warehouse basic concepts, Data Warehouse Modeling, Data Cube and OLAP 6 hrs

UNIT II:

Data Mining : Introduction, What is Data Mining, Motivating Challenges, Data Mining Tasks, Which technologies are used, which kinds of applications are targeted by Data Mining 6 hrs

UNIT III:

Data Mining-Which type of data : Types of Data, Data Preprocessing, Measures of Similarity and Dissimilarity, Data Mining Applications 6 hrs

UNIT IV:

Association Analysis, Basic Concepts and Algorithms : Frequent Itemset Generation, Rule Generation, Compact Representation of Frequent Itemsets, Alternative methods for generating Frequent Itemsets, FP Growth Algorithm, Evaluation of Association Patterns 6 hrs

UNIT V:

Classification: Basics, General approach to solve classification problem, Decision Trees, Rule Based Classifiers, Nearest Neighbor Classifiers. Bayesian Classifiers. 6 hrs

UNIT VI:

Estimating Predictive accuracy of classification methods, Improving accuracy of clarification methods, Evaluation criteria for classification methods, Multiclass Problem. 6hrs

UNIT VII:

Clustering Techniques: Overview, Features of cluster analysis, Types of Data and Computing Distance, Types of Cluster Analysis Methods, Partitional Methods, Hierarchical Methods, Density Based Methods, Quality and Validity of Cluster Analysis 8 hrs

UNIT VIII :

Outlier Analysis : Outlier detection methods, Statistical Approaches, Clustering based applications, Classification based approached 6 hrs

TEXT BOOKS:

1. Pang-Ning Tan, Michael Steinbach, Vipin Kumar: Introduction to Data Mining, Addison-Wesley, 2005.
2. G. K. Gupta: Introduction to Data Mining with Case Studies, 3rd Edition, PHI, New Delhi, 2009.

REFERENCE BOOKS:

1. Arun K Pujari: Data Mining Techniques University Press, 2nd Edition, 2009.
2. Jiawei Han and Micheline Kamber: Data Mining - Concepts and Techniques, 2nd Edition,
3. Morgan Kaufmann Publisher, 2006.
4. Alex Berson and Stephen J. Smith: Data Warehousing, Data Mining, and OLAP
5. Computing Mc GrawHill Publisher, 1997.

PROTOCOL ENGINEERING

Subject Code	3 MCA 5.5.3	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Introduction: Communication model, Communication Software, Communication Subsystems, Communication Protocol Definition/Representation, Formal and Informal Protocol Development Methods, Protocol Engineering Phases. 6 hrs

UNIT -II:

Error Control, Flow Control: Type of Transmission Errors, Linear Block Code, Cyclic Redundancy Checks, Introduction to Flow Control, Window Protocols, Sequence Numbers, Negative Acknowledgments, Congestion Avoidance. 6 hrs

UNIT -III:

Network Reference Model: Layered Architecture, Network Services and Interfaces, Protocol Functions: Encapsulation, Segmentation, Reassembly, Multiplexing, Addressing, OSI Model Layer Functions, TCP/IP Protocol Suite, Application Protocols. 6 hrs

UNIT - IV:

Protocol Specification: Components of specification, Service specification, Communication Service Specification Protocol entity specification: Sender, Receiver and Channel specification, Interface specifications, Interactions, Multimedia specifications, Alternating Bit Protocol Specification, RSVP specification. 8 hrs

UNIT-V:

Protocol Specification Language (SDL): Salient Features. Communication System Description using SDL, Structure of SDL. Data types and communication paths, Examples of SDL based Protocol Specifications: Question and answer protocol, X-on-X-off protocol, Alternating bit protocol, Sliding window protocol specification, TCP protocol specification, SDL based platform for network, OSPF, BGP Multi Protocol Label Switching SDL components. 8 hrs

UNIT-VI:

Protocol Verification / Validation: Protocol Verification using FSM, ABP Verification, Protocol Design Errors, Deadlocks, Unspecified Reception, Non-executable Interactions, State Ambiguities, Protocol Validation Approaches: Perturbation Technique, Reachability Analysis, Fair Reachability Graphs, Process Algebra based Validation, SDL Based Protocol Verification: ABP Verification, Live ness Properties, SDL Based Protocol Validation: ABP Validation. 8 hrs

UNIT-VII:

Protocol Conformance and Performance Testing: Conformance Testing Methodology and Framework, Local and Distributed Conformance Test Architectures, Test Sequence Generation Methods: T, U, D and W methods, Distributed Architecture by Local Methods, Synchronizable Test Sequence, Conformance testing with Tree and Tabular Combined Notation (TTCN), Conformance Testing of RIP, Testing Multimedia Systems, quality of service test architecture(QOS), Performance Test methods, SDL Based Performance Testing of TCP, OSPF, Interoperability testing, Scalability testing protocol synthesis problem. 8 hrs

UNIT-VIII:

Protocol Synthesis and Implementation: Synthesis methods, Interactive Synthesis Algorithm, Automatic Synthesis Algorithm, Automatic Synthesis of SDL from MSC, Protocol Re-synthesis, Requirements of Protocol Implementation, Objects Based Approach To Protocol Implementation, Protocol Compilers, Code generation from Estelle, LOTOS, SDL and CVOPS. 8 hrs

TEXTBOOKS:

1. Pallapa Venkataram and Sunilkumar S. Manvi: Communication Protocol Engineering, PHI, 2004.

REFERENCE BOOKS:

1. Mohammed G. Gouda: Elements of Protocol Design, Wiley Student Edition, 2004

UNIX SYSTEM PROGRAMMING

Subject Code	3 MCA 5.5.4	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT – I :

INTRODUCTION: UNIX and ANSI Standards: The ANSI C Standard, The ANSI/ISO C++ Standards, Difference between ANSI C and C++, The POSIX Standards, The POSIX.1 FIPS Standard, The X/Open Standards. UNIX and POSIX APIs: The POSIX APIs, The UNIX and POSIX Development Environment, API Common Characteristics. 8 hrs

UNIT – II :

UNIX FILES: File Types, The UNIX and POSIX File System, The UNIX and POSIX File Attributes, Inodes in UNIX System V, Application Program Interface to Files, UNIX Kernel Support for Files, Relationship of C Stream Pointers and File Descriptors, Directory Files, Hard and Symbolic Links. 6 hrs

UNIT – III :

UNIX File APIs: General File APIs, File and Record Locking, Directory File APIs, Device File APIs, FIFO File APIs, Symbolic Link File APIs, General File Class, regfile Class for Regular Files, dirfile Class for Directory Files, FIFO File Class, Device File Class, Symbolic Link File Class, File Listing Program. 7 hrs

UNIT – IV :

UNIX PROCESSES: The Environment of a UNIX Process: Introduction, main function, Process Termination, Command-Line Arguments, Environment List, Memory Layout of a C Program, Shared Libraries, Memory Allocation, Environment Variables, setjmp and longjmp Functions, getrlimit, setrlimit Functions, UNIX Kernel Support for Processes. 7 hrs

UNIT – V :

PROCESS CONTROL: Introduction, Process Identifiers, fork, vfork, exit, wait, waitpid, waited, wait3, wait4 Functions, Race Conditions, exec Functions, Changing User IDs and Group IDs, Interpreter Files, system Function, Process Accounting, User Identification, Process Times. Process Relationships: Introduction, Terminal Logins, Network Logins, Process Groups, Sessions, Controlling Terminal, tcgetpgrp, tcsetpgrp, and tcgetsid Functions, Job Control, Shell Execution of Programs, Orphaned Process Groups. 7 hrs

UNIT – VI :

SIGNALS AND DAEMON PROCESSES: Signals: The UNIX Kernel Support for Signals, signal, Signal Mask, sigaction, The SIGCHLD Signal and the waitpid Function, The sigsetjmp and siglongjmp Functions, Kill, Alarm, Interval Timers, POSIX.lb Timers. Daemon Processes: Introduction, Daemon Characteristics, Coding Rules, Error Logging, Singleinstance daemons; Daemon conventions; Client-Server Model. 7 hrs

UNIT – VII :

INTERPROCESS COMMUNICATION: Introduction; Pipes, popen, pclose Functions; Coprocesses; FIFOs; XSIIPC; Message Queues; Semaphores. 6 hrs

UNIT – VIII :

NETWORK IPC: SOCKETS: Introduction; Socket Descriptors; Addressing; Connection establishment; Data transfer; Socket options; Out-of-banddata; Nonblocking and asynchronous I/O. 6 hrs

TEXT BOOKS:

1.**Unix System Programming Using C++** – Terrence Chan - Prentice Hall India, 1999.

2. **Stephen A. Rago: Advanced Programming in the UNIX Environment** – W.Richard Stevens, 2nd Edition, Pearson Education / PHI, 2005.

REFERENCE BOOKS:

1. Advanced Unix Programming – Marc J. Rochkind:, 2nd Edition, Pearson Education, 2005.

SYSTEM SIMULATION

Subject Code	3 MCA 5.5.5	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

UNIT - I:

Introduction to Simulation: When Simulation is the Appropriate Tool, When Simulation is Not Appropriate, Advantages and Disadvantages of Simulation, Areas of Application, System and System Environment, Components of a System, Discrete and Continuous Systems, Model of a System, Types of Models, Discrete-Event System Simulation. 7 hrs

UNIT - II:

Simulation Examples: Simulation of Queuing Systems, Simulation of Inventory System, Other Examples of Simulation. 6 hrs

UNIT - III:

General Principles: Concepts in Discrete-Event Simulation-The Event scheduling/Time Advance Algorithm, World views, Manual Simulation Using Event scheduling **,**List Processing-Lists: Basic Properties and Operations, Using Arrays for List Processing**,** Using Dynamic Allocation and Linked Lists, Advanced Techniques. 6 hrs

UNIT- IV:

Simulation Software: History of Simulation Software,-The Period of Search, The Advent, The Formative Period, The Expansion Period, Consolidation and Regeneration, Selection of Simulation Software, An Example Simulation, Simulation in Java, Simulation in GPSS, Simulation in SSF, Simulation Software-Arena, Auto Mod, Extend, Flexsim, Micro Saint, ProModel, QUEST, SIMUL8, WITNESS, SIMUL8, WITNESS, Experimentation and Statistical-Analysis Tools-Common Featured, Products. 8 hrs

UNIT - V:

Statistical Models in Simulation: Review of Terminology and Concepts, Useful Statistical Models, Discrete Distribution, Continuous Distribution, Poisson Process-Properties Poisson Process, Non Stationary Poisson Process, Empirical Distribution. 6 hrs

UNIT VI:

Queuing Models: Characteristics of Queuing System-The Calling Population, System Capacity, The Arrival Process, Queue Behavior and Queue Discipline, Service Times and the Service Mechanism, Queuing Notation, Long-Run Measures of Performance of Queuing System-Time-Average Number in System L, Average-Time Spent in System per Customer w, The Conservation equation, Server Utilization, Costs in Queuing Problems, Steady-state Behavior of Infinite-Population Markovian Models-Single-server Queues with Poisson Arrivals and Unlimited Capacity, Multi server Queue, Multi server Queue with Poisson Arrivals and Limited Capacity, Steady-State Behavior of Finite-Population Models, Network of Queues. 8 hrs

UNIT - VII:

Random-Number Generation: Properties of Random Numbers, Generation of Pseudo- Random Numbers, Techniques for Generation Random Numbers-Linear Congruential Method, Combined Linear Congruential Generators, Random Number Streams, Inverse Transform Technique-Exponential Distribution, Uniform Distribution, Acceptance-Rejection Technique-Poisson Distribution, Non Stationary Poisson Process, Gamma Distribution. 7 hrs

UNIT - VIII:

Applications: Input Modeling-Data Collection, Identifying the Distribution with Data-Histograms, Selecting the Family of Distributions, Quantile- Quantile Plots ,Simulation of Computer Networks- Introduction, Traffic Modeling, Media Access Control-Token-Passing Protocols, Ethernet ,Data Link Layer, TCP Model Construction- Constrution, Examples. 6 hrs

TEXT BOOK:

1. *Jerry Banks,John S.Carson,Barry L.Nelson,David M.Nicol,* "Object-Oriented Analysis and Design", 4/e, Pearson Education.

REFERENCES:

1. AVERILL M .LAWAND DAVID KELTON,"SIMULATION MODELLING AND ANALYSIS"3RD EDITION TATA MCGRAWHILL
2. JEFFRY GORDON"SYSTEM SIMULATIO"PHI

JAVA AND J2EE PROGRAMMING LAB

Subject Code	3 MCA 5.6	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

C# AND .NET LAB

Subject Code	3 MCA 5.7	IA Marks	20
No. of Lecture Hrs./Week	04	Exam Hours	03
Total No. of Lecture Hours	52	Exam Marks	80

M.C.A. VITH SEMESTER

PROJECT WORK

Subject Code	3 MCA 6.1	IA Marks

Sl No.	Particulars	Duration	Maximum Marks		Total
			Exam	Internal Assessment	
01	Project Work		150	--	150
02	Seminar	-	--	50	50
03	Viva-Voice		50	--	50
Total					250