

J. S. University, Shikohabad



**Master of Computer Application
(M.C.A.)**

*Scheme
&
Syllabus*

[Effective from the session 2015-16]



J. S. UNIVERSITY, SHIKOHABAD

DEPARTMENT OF COMPUTER SCIENCE & ENGINEERING

VISION

- To generate competent professionals to become part of the industry & research organizations at the national & international levels.
- To be in the frontier of computer science and engineering by creating the most conducive environment for quality academic and research oriented undergraduate and postgraduate education in computer science and engineering.
- To be renowned itself as a reputed organization in engineering education and research aimed towards betterment of society.

MISSION

- Creating the knowledge of fundamental principles and innovative technologies through research within the core areas of computer science and also in interdisciplinary topics.
- Empowering the youth in rural communities with computer education. Imparting moral and ethical values and interpersonal skills to the students.
- Provide exposure of latest tools and technologies in the area of engineering and technology

Program outcome

1.Ability to apply knowledge of computing, mathematics fundamentals to the solution of complex problems.

2.Ability to formulate and analyze a problem, and define the computing requirements appropriate to its solution using basic principles of mathematics and computer applications.

3.Ability to design and conduct research based experiments, perform analysis and interpretation of data and provide valid conclusions.

4.Ability to learn and adopt new technologies, and use them effectively towards continued professional development throughout the life.

5.To understand contemporary issues in providing technology solutions for sustainable development considering impact on economic, social, political, and global issues and thereby contribute to the welfare of the society.

Program specification outcome (PSO)

- Design, develop and implement interdisciplinary application software projects to meet the demands of industry requirements using modern tools and technologies.
- Analyze the societal needs to provide novel solutions through technological based research.
- Lifelong learning – Build up the passion for continuing professional development.
- Project Management and Finance – Incorporate scientific, financial and management principles for the development of feasible projects.
- Individual and Team work – Work individually and in teams for the fulfilment of the desired task

M.C.A.

SEMESTER – FIRST

S.No.	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	MCA-11	Professional Communication	4	1	-	-	50	100	150	3
2	MCA-12	Computer Concepts and Programming in C	4	1	-	-	50	100	150	3
3	MCA-13	Accounting and Financial Management	4	1	-	-	50	100	150	3
4	MCA-14	Discrete Mathematics	4	1	-	-	50	100	150	3
5	MCA-15	Organizational Behaviour	4	1	-	-	50	100	150	3
PRACTICA/DRAWING SUBJECTS										
6	MCA-11P	Professional Communication Lab	-	-	4	-	50	50	100	3
7	MCA-12P	C Programming Lab	-	-	4	-	50	50	100	3
8	MCAGD-10	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
Grand Total									1000	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

STUDY AND EVALUATION SCHEME FOR

M.C.A.

SEMESTER – SECOND

S.No	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	MCA-21	Data Structures using C	4	1	-	-	50	100	150	3
2	MCA-22	Computer Based Numerical & Statistical Techniques	4	1	-	-	50	100	150	3
3	MCA-23	Computer Organization	4	1	-	-	50	100	150	3
4	MCA-24	Principles of Management	4	1	-	-	50	100	150	3
5	MCA-25	Environmental Science and Ethics	4	1	-	-	50	100	150	3
PRACTICAL/DRAWING SUBJECTS										
6	MCA-21P	Data Structures Lab	-	-	4	-	50	50	100	3
7	MCA-22P	Computer Based Numerical & Statistical Techniques Lab	-	-	4	-	50	50	100	3
8	MCAGD-20	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
Grand Total									1000	

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(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

M.C.A.

SEMESTER - Third

S.No	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	MCA-31	Operating Systems	4	1	-	-	50	100	150	3
2	MCA-32	Design & Analysis of Algorithms	4	1	-	-	50	100	150	3
3	MCA-33	Database Management System	4	1	-	-	50	100	150	3
4	MCA-34	Internet & Java Programming	4	1	-	-	50	100	150	3
5	MCA-35	Computer Based Optimization Techniques	4	1	-	-	50	100	150	3
6	MAC-31	Human Values & Professional Ethics	2	1	-	-	25	50	75*	2

PRACTICA/DRAWING SUBJECTS

7	MCA-31P	DBMS Lab	-	-	4	-	50	50	100	3
8	MCA-32P	Java Programming Lab	-	-	4	-	50	50	100	3
9	MCAGD-30	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
Grand Total									1000	

* Human values & Professional Ethics /Cyber Security will be offered as a compulsory audit course for which passing marks are 30% in End Semester Examination and 40% in aggregate

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

M.C.A.

SEMESTER - FOURTH

S.No	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	MCA-41	Management Information Systems	4	1	-	-	50	100	150	3
2	MCA-42	Web Technology	4	1	-	-	50	100	150	3
3	MCA-43	Distributed system	4	1	-	-	50	100	150	3
4	MCA-44	Artificial Intelligence	4	1	-	-	50	100	150	3
5	MCA-45	Mobile Computing	4	1	-	-	50	100	150	3
6	MAC-41	Cyber Security	2	1	-	-	25	50	75*	2

PRACTICA/DRAWING SUBJECTS

7	MCA-41P	Mini Project	-	-	4	-	50	50	100	3	
8	MCA-42P	Web Technology Lab	-	-	4	-	50	50	100	3	
9	MCAGD-40	Games//Social and Cultural Activities + Discipline (25 + 25)							50		
Grand Total									1000		

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NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

M.C.A.

SEMESTER - FIFTH

S.No	Subject Code	Name of Subject	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
THEORY SUBJECT										
1	MCA-51	Computer Network	4	1	-	-	50	100	150	3
2	MCA-52	Network Security & Cryptography	4	1	-	-	50	100	150	3
3	MCA-53	Software Engineering	4	1	-	-	50	100	150	3
4	MCA-54	Image Processing	4	1	-	-	50	100	150	3
5	MCA-55	Software Testing	4	1	-	-	50	100	150	3
PRACTICA/DRAWING SUBJECTS										
7	MCA-51P	Computer Network Lab	-	-	4	-	50	50	100	3
8	MCA-52P	Project Based On Software Engineering	-	-	4	-	50	50	100	3
9	MCAGD-50	Games//Social and Cultural Activities + Discipline (25 + 25)							50	
Grand Total									1000	

NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

M.C.A.

SEMESTER - SIXTH

S.No	Subject Code	Name of Subject/ Practical	Periods Per Week				Evaluation Scheme			
			L	T	P	D	Sessional	End Exam	Total	Duration
1	MCA-61	Colloquium/Seminar	4	1	-	-	200		200	-
2	MCA-62	Project	4	1	-	-	300	500	800	-

PRACTICA/DRAWING SUBJECTS

Grand Total									1000	
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NOTE:- (1) Each period will be 50 minutes duration.

(2) Each session will be of 16 weeks.

(3) Effective teaching will be at least 14 weeks.

(4) Remaining periods will be utilised for revision etc.

MCA-11 : PROFESSIONAL COMMUNICATION

COURSE OUTCOME

- Understand and apply communication theory
- Critically think about communication processes and messages
- Write effectively for a variety of contexts and audiences
- Interact skillfully and ethically
- Develop and deliver professional presentations
- Engage in scholarly inquiry and social scientific research
- Recognize the effects of diversity, access, and power on communication

Unit -1 Basics of Technical Communication

Technical Communication: features; Distinction between General and Technical communication; Language as a tool of communication; Levels of communication: Interpersonal, Organizational, Mass communication; The flow of Communication: Downward, Upward, Lateral or Horizontal (Peer group); Importance of technical communication; Barriers to Communication.

Unit - II Constituents of Technical Written Communication

Words and Phrases: Word formation. Synonyms and Antonyms; Homophones; Select vocabulary of about 500-1000 New words; Requisites of Sentence Construction: Paragraph Development: Techniques and Methods -Inductive, Deductive, Spatial, Linear, Chronological etc; The Art of Condensation- various steps.

Unit - III Forms of Technical Communication

Business Letters: Sales and Credit letters; Letter of Enquiry; Letter of Quotation, Order, Claim and Adjustment Letters; Job application and Resumes.

Official Letters: D.O. Letters; Govt. Letters, Letters to Authorities etc.

Reports: Types; Significance; Structure, Style & Writing of Reports.

Technical Proposal; Parts; Types; Writing of Proposal; Significance.

Technical Paper, Project. Dissertation and Thesis Writing: Features, Methods & Writing.

Unit - IV Presentation Strategies

Defining Purpose; Audience & Locale; Organizing Contents; Preparing Outline; Audio-visual Aids; Nuances of Delivery; Body Language; Space; Setting Nuances of Voice Dynamics; Time- Dimension.

Unit - V Value- Based Text Readings

Following essays form the suggested text book with emphasis on Mechanics of writing,

- (i) The Aims of Science and the Humanities by M.E. Prior
- (ii) The Language of Literature and Science by A.Huxley
- (iii) Man and Nature by J.Bronowski
- (iv) The Mother of the Sciences by A.J.Bahm
- (v) Science and Survival by Barry Commoner
- (vi) Humanistic and Scientific Approaches to Human Activity by Moody E. Prior
- (vii) The Effect of Scientific Temper on Man by Bertrand Russell.

Text Book

1. Improve Your Writing ed. V.N. Arora and Laxmi Chandra, Oxford Univ. Press, New Delhi .
2. Technical Communication – Principles and Practices by Meenakshi Raman &Sangeeta Sharma, Oxford Univ. Press 2007, New Delhi.

MCA-12 : COMPUTER CONCEPTS AND PROGRAMMING IN C

Course outcome

- a) Explain the organization of basic computer , its design and the design of control unit.
- b) Demonstrate the working of central processing unit and RISC and CISC Architecture.
- c) Describe the operations and language of the register transfer, micro operations and input- output organization.
- d) Understand the organization of memory and memory management hardware.
- e) Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization

UNIT 1:

Introduction to any Operating System [Unix, Linux, Windows], Programming Environment, Write and Execute the first program, Introduction to the Digital Computer; Concept of an algorithm; termination and correctness. Algorithms to programs: specification, top-down development and stepwise refinement. Introduction to Programming, Use of high level programming language for the systematic development of programs. Introduction to the design and implementation of correct, efficient and maintainable programs, Structured Programming, Trace an algorithm to depict the logic, Number Systems and conversion methods

UNIT 2:

Standard I/O in "C", **Fundamental Data Types and Storage Classes:** Character types, Integer, short, long, unsigned, single and double-precision floating point, storage classes, automatic, register, static and external, **Operators and Expressions:** Using numeric and relational operators, mixed operands and type conversion, Logical operators, Bit operations, Operator precedence and associativity,

UNIT 3:

Conditional Program Execution: Applying if and switch statements, nesting if and else, restrictions on switch values, use of break and default with switch, **Program Loops and Iteration:** Uses of while, do and for loops, multiple loop variables, assignment operators, using break and continue, **Modular Programming:** Passing arguments by value, scope rules and global variables, separate compilation, and linkage, building your own modules.

UNIT 4:

Arrays: Array notation and representation, manipulating array elements, using multidimensional arrays, arrays of unknown or varying size, **Structures:** Purpose and usage of structures, declaring structures, assigning of structures, **Pointers to Objects:** Pointer and address arithmetic, pointer operations and declarations, using pointers as function arguments, Dynamic memory allocation, defining and using stacks and linked lists.

UNIT 5:

Sequential search, Sorting arrays, Strings, Text files, **The Standard C Preprocessor:** Defining and calling macros, utilizing conditional compilation, passing values to the compiler, **The Standard C Library:** Input/Output : fopen, fread, etc, string handling functions, Math functions :log, sin, alike Other Standard C functions.

Text Books :

1. Problem Solving and Program Design in C, by Jeri R. Hanly, Elliot B. Koffman, PearsonAddison-Wesley, 2006.
2. Computer Science- A Structured Programming Approach Using C, by Behrouz A. Forouzan, Richard F. Gilberg, Thomson, Third Edition [India Edition], 2007.

MCA 13 : ACCOUNTING AND FINANCIAL MANAGEMENT

COURSE OUTCOME:

1. Know and apply accounting and finance theory
2. Explain and apply international accounting standards
3. Critically evaluate financial statement information
4. Evaluate and compare different investment

Unit I

Overview: Accounting concepts, conventions and principles; Accounting Equation, International Accounting principles and standards; Matching of Indian Accounting Standards with International Accounting Standards.

Unit II

Mechanics of Accounting: Double entry system of accounting, journalizing of transactions; preparation of final accounts, Profit & Loss Account, Profit & Loss Appropriation account and Balance Sheet, Policies related with depreciation, inventory and intangible assets like copyright, trademark, patents and goodwill.

Unit III

Analysis of financial statement: Ratio Analysis- solvency ratios, profitability ratios, activity ratios, liquidity ratios, market capitalization ratios ; Common Size Statement ; Comparative Balance Sheet and Trend Analysis of manufacturing, service & banking organizations.

Unit IV

Funds Flow Statement : Meaning, Concept of Gross and Net Working Capital, Preparation of Schedule of Changes in Working Capital, Preparation of Funds Flow Statement and its analysis ; Cash Flow Statement: Various cash and non-cash transactions, flow of cash, preparation of Cash Flow Statement and its analysis.

SUGGESTED READINGS

- 1) Narayanswami - *Financial Accounting: A Managerial Perspective* (PHI, 2ndEdition).
- 2) Mukherjee - *Financial Accounting for Management* (TMH, 1stEdition).
- 3) Ramchandran&Kakani - *Financial Accounting for Management* (TMH, 2ndEdition).
- 4) Ghosh T P - *Accounting and Finance for Managers* (Taxman, 1stEdition).
- 5) Maheshwari S.N &Maheshwari S K - *An Introduction to Accountancy* (Vikas, 9thEdition)

MCA-14 : DISCRETE MATHEMATICS

COURSE OUTCOME

1. Write an argument using logical notation and determine if the argument is or is not valid.
2. Demonstrate the ability to write and evaluate a proof or outline the basic structure of and give examples of each proof technique described.
3. Understand the basic principles of sets and operations in sets.
4. Prove basic set equalities.
5. Apply counting principles to determine probabilities

Unit-I:

Set Theory: Definition of sets, countable and uncountable sets, Venn Diagrams, proofs of some general identities on sets

Relation: Definition, types of relation, composition of relations, Pictorial representation of relation, equivalence relation, partial ordering relation.

Function: Definition, type of functions, one to one, into and onto function, inverse function, composition of functions, recursively defined functions.

Notion of Proof: Proof by counter-example, the contra-positive, proof by contradiction, inductive proof.

Unit-II:

Algebraic Structures: Definition, Properties, types: Semi Groups, Monoid, Groups, Abelian group, properties of groups, Subgroup, cyclic groups, Cosets, factor group, Permutation groups, Normal subgroup, Homomorphism and isomorphism of Groups, example and standard results, Rings and Fields: definition and standard results.

Unit-III:

Posets, Hasse Diagram and Lattices: Introduction, ordered set, Hasse diagram of partially, ordered set, isomorphic ordered set, well ordered set, properties of Lattices, and complemented lattices.

Boolean Algebra: Basic definitions, Sum of Products and Product of Sums, Form in Boolean Algebra, Logic gates and Karnaugh maps.

Graphs: Simple graph, multi graph, graph terminology, representation of graphs, Bipartite, Regular, Planar and connected graphs, connected components in a graph, Euler graphs, Hamiltonian path and circuits, Graph coloring, chromatic number, isomorphism and Homomorphism of graphs.

Tree: Definition, Rooted tree, properties of trees, binary search tree, tree traversal.

Unit-IV:

Propositional Logic: Proposition, First order logic, Basic logical operation, truth tables, tautologies, Contradictions, Algebra of Proposition, logical implications, logical equivalence, predicates, Universal and existential quantifiers.

Unit-V:

Combinatorics: Basic Counting Technique, Pigeon-hole Principle, Recurrence Relation, Generating function, Polya's Counting Theorem

Text books and Supplementary reading:

1. Discrete Mathematics and Its Applications, By Kenneth H Rosen, McGraw Hill, Sept.2002.
2. Discrete Mathematical Structures with Applications to Computer Science, By J. P. Tremblay, R. Manohar, McGraw Hill Pub, 1975.
3. Graph Theory With Applications to Engineering and Computer Science, By Prentice Hall, Englewood Cliffs, N. J, 1974

MCA-15 : ORGANISATIONAL BEHAVIOUR

Course Outcomes:

- 1) To understand the conceptual framework of the discipline of OB and its practical applications in the organizational set up.
- 2) To deeply understand the role of individual, groups and structure in achieving organizational goals effectively and efficiently.
- 3) To critically evaluate and analyze various theories and models that contributes in the overall understanding of the discipline.
- 4) To develop creative and innovative ideas that could positively shape the organizations.
- 5) To accept and embrace in working with different people from different cultural and diverse background in the workplace.

Brief description of modules/ Main modules:

UNIT I

Concept, Nature, Characteristics, Conceptual Foundations and Importance, Models of Organizational Behaviour, Management Challenge, A Paradigm Shift, Relationship with Other Fields, Organisational Behaviour: Cognitive Framework, Behaviouristic Framework and Social Cognitive Framework.

UNIT II

Perception and Attribution: Concept, Nature, Process, Importance. Management and Behavioural Applications of Perception.

Attitude: Concept, Process and Importance, Attitude Measurement. Attitudes and Workforce Diversity. Personality: Concept, Nature, Types and Theories of Personality Shaping, Personality Attitude and Job Satisfaction. Learning: Concept and Theories of Learning.

UNIT III

Motivation: Concepts and Their Application, Principles, Theories, Employee Recognition, Involvement, Motivating a Diverse Workforce. Leadership: Concept, Function, Style and Theories of Leadership-Trait, Behavioural and Situational Theories. Analysis of Interpersonal Relationship, Group Dynamics: Definition, Stages of Group Development, Group Cohesiveness, Formal and Informal Groups, Group Processes and Decision Making, Dysfunctional Groups.

UNIT IV

Organisational Power and Politics: Concept, Sources of Power, Distinction Between Power, Authority and Influence, Approaches to Power, Political Implications of Power: Dysfunctional Uses of Power. Knowledge Management & Emotional Intelligence in Contemporary Business Organisation Organisational Change : Concept, Nature, Resistance to change, Managing resistance to change, Implementing Change, Kurt Lewin Theory of Change.

Conflict: Concept, Sources, Types, Functionality and Dysfunctionality of Conflict, Classification of Conflict Intra, Individual, Interpersonal, Intergroup and Organisational, Resolution of Conflict, Meaning and Types of Grievance and Process of Grievance Handling. Stress: Understanding Stress and Its Consequences, Causes of Stress, Managing Stress. Organisational Culture : Concept, Characteristics, Elements of Culture, Implications of Organisation culture, Process of Organisational Culture.

Suggested Reading:

1. Newstrom John W. - Organizational Behaviour: Human Behaviour at Work (Tata Mc Graw Hill, 12th Edition)
2. Luthans Fred - Organizational Behaviour (Tata Mc Graw Hill)

3. Mc Shane L. Steven, Glinow Mary Ann Von & Shar ma Radha R. - Organizational Behaviour(Tata Mc Graw Hill, 3rdEdition)
4. Robbins Stephen P. - Organizational Behaviour (Pearson Education, 12thEdition)
5. Hersey Paul, Blanchard, Kenneth H and Johnson Dewey E. - Management of OrgansationalBehavior: Leading Human Resources (Pearson Education, 8thEdition)
6. Greenberg Jerald and Baron Robert A. - BehaviorIn Organisations: Understanding and Managing the Human Side of Work (Prentice Hall of India)
- 7.Davis, Keith - Human Behaviour at Works – Tata Mc Graw Hill, New Delhi.
8. Pareek, Udai - Behavioural Process in Organization (Oxford 4 IBH, New Delhi).

MCA-11P : LANGUAGE LAB

Interactive and Communicative Practical with emphasis on Oral Presentation/Spoken Communication based on International Phonetic Alphabets (I.P.A.)

LIST OF PRACTICALS

1. Group Discussion: Practical based on Accurate and Current Grammatical Patterns.
2. Conversational Skills for Interviews under suitable Professional Communication Lab conditions with emphasis on Kinesics.
3. Communication Skills for Seminars/Conferences/Workshops with emphasis on Paralinguistics/Kinesics.
4. Presentation Skills for Technical Paper/Project Reports/ Professional Reports based on proper Stress and Intonation Mechanics.
5. Official/Public Speaking based on suitable Rhythmic Patterns.
6. Theme- Presentation/ Key-Note Presentation based on correct argumentation methodologies.
7. Individual Speech Delivery/Conferences with skills to defend Interjections/Quizzes.
8. Argumentative Skills/Role Play Presentation with Stress and Intonation.
9. Comprehension Skills based on Reading and Listening Practicals on a model Audio -Visual Usage.

Reference Books

1. Bansal R.K. & Harrison: Phonetics in English, Orient Longman, New Delhi.
2. Sethi&Dhamija: A Course in Phonetics and Spoken English, Prentice Hall, New Delhi.

3. L.U.B.Pandey&R.P.Singh, A Manual of Practical Communication, A.I.T.B.S. Pub. India Ltd.
Krishan Nagar, Delhi.
4. Joans Daniel, English Pronouncing Dictionary, Cambridge Univ. Press.

MCA-12P :C PROGRAMMING LAB

Suggested Assignments to be conducted on a 3-hour slot. It will be conducted in tandem with the theory course so the topics for problems given in the lab are already initiated in the theory class. The topics taught in the theory course should be appropriately be sequenced for synchronization with the laboratory. A sample sequence of topics and lab classes for the topic are given below:

1. Familiarization of a computer and the environment and execution of sample programs
2. Expression evaluation
3. Conditionals and branching
4. Iteration
5. Functions
6. Recursion
7. Arrays
8. Structures
9. Linked lists
10. Data structures

It is suggested that some problems related to continuous domain problems in engineering and their numerical solutions are given as laboratory assignments. It may be noted that some of basic numerical methods are taught in the Mathematics course.

MCA-21 : DATA STRUCTURES USING 'C'

COURSE OUTCOME:

1. Explain the organization of basic computer , its design and the design of control unit.
2. Demonstrate the working of central processing unit and RISC and CISC Architecture.
3. Describe the operations and language f the register transfer, micro operations and input- output organization.
4. Understand the organization of memory and memory management hardware.
5. Elaborate advanced concepts of computer architecture, Parallel Processing, interprocessor communication and synchronization.

Unit -I

Introduction: Basic Terminology, Elementary Data Organization, Data Structure operations, Algorithm Complexity and Time-Space trade-off

Arrays: Array Definition, Representation and Analysis, Single and Multidimensional Arrays, address calculation, application of arrays, Character String in C, Character string operation, Array as Parameters, Ordered List, Sparse Matrices, and Vectors.

Stacks: Array Representation and Implementation of stack, Operations on Stacks: Push & Pop, Array Representation of Stack, Linked Representation of Stack, Operations Associated with Stacks, Application of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack.

Recursion: Recursive definition and processes, recursion in C, example of recursion, Tower of Hanoi Problem, simulating recursion. Backtracking, recursive algorithms, principles of recursion, tail recursion, removal of recursion.

Unit - II

Queues: Array and linked representation and implementation of queues, Operations on Queue: Create, Add, Delete, Full and Empty. Circular queue, Deque, and Priority Queue .

Linked list: Representation and Implementation of Singly Linked Lists, Two -way Header List, Traversing and Searching of Linked List, Overflow and Underflow, Insertion and deletion to/from Linked Lists, Insertion and deletion Algorithms, Doubly linked list, Linked List in Array, Polynomial representation and addition, Generalized linked list, Garbage Collection and Compaction.

Unit - III

Trees: Basic terminology, Binary Trees, Binary tree representation, algebraic Expressions, Complete Binary Tree. Extended Binary Trees, Array and Linked Representation of Binary trees, Traversing Binary trees, Threaded Binary trees. Traversing Threaded Binary trees, Huffman

algorithm.

Searching and Hashing: Sequential search, binary search, comparison and analysis, Hash Table, Hash Functions, Collision Resolution Strategies, Hash Table Implementation.

Unit - IV

Sorting: *Insertion Sort, Bubble Sorting, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting .*

Binary Search Trees : Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B -trees.

Unit - V

Graphs: Terminology & Representations, Graphs & Multi-graphs, Directed Graphs, Sequential Representations of Graphs, Adjacency Matrices, Traversal, Connected Component and Spanning Trees, Minimum Cost Spanning Trees.

File Structures: Physical Storage Media File Organization, Organization of records into Blocks, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.

Text Books

1. Y. Langsam, M. Augenstein and A. Tannenbaum, Data Structures using C and C++, Pearson Education Asia, 2nd Edition, 2002.
2. Ellis Horowitz, S. Sahni, D. Mehta Fundamentals of Data Structures in C++, Galgotia Book Source, New Delhi.

Reference Books

1. S. Lipschutz, Data Structures Mc-Graw Hill International Editions, 1986.

MCA-22: COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

COURSE OUTCOME:

1. Adequate exposure to learn alternative methods and analyze mathematical problems to determine the suitable numerical techniques.
2. Use the concepts of interpolation, eigen value problem techniques for mathematical problems arising in various fields.
3. Solve initial value and boundary value problems which have great significance in engineering practice using ordinary and partial differential equations.
4. Demonstrate elementary programming language, implementation of algorithms and computer programs to solve mathematical problems

Unit-I

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation

Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula –Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

Unit-II

Simultaneous Linear Equations : Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence

Interpolation and approximation : Finite Differences, Difference tables

Polynomial Interpolation: Newton's forward and backward formula

Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula.

Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation

Approximation of function by Taylor's series and Chebyshev polynomial

Unit-III

Numerical Differentiation and Integration : Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Boole's Rule, Weddle's Rule Euler – Maclaurin Formula

Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector method, Automatic error monitoring, stability of solution.

Unit-IV

Curve fitting, Cubic Spline and Approximation : Method of least squares, fitting of straight lines, polynomials, exponential curves etc

Frequency Chart: Different frequency chart like Histogram, Frequency curve, Pi-chart.

Regression analysis: Linear and Non-linear regression, Multiple regression

Unit-V

Time series and forecasting: Moving averages, smoothing of curves, forecasting models and methods. Statistical Quality Controls methods

Testing of Hypothesis: Test of significance, Chi-square test, t-test, ANOVA, F-Test

Application to medicine, agriculture etc.

References:

1. Rajaraman V., "Computer Oriented Numerical Methods", PHI
2. Gerald & Wheatley, "Applied Numerical Analyses", AW
3. Jain, Iyengar and Jain, "Numerical Methods for Scientific and Engineering Computations", New Age Int.
4. Grewal B. S., "Numerical methods in Engineering and Science", Khanna Publishers, Delhi
5. T. Veerarajan, T Ramachandran, "Theory and Problems in Numerical Methods", TMH
6. PradipNiyogi, "Numerical Analysis and Algorithms", TMH

MCA-23 : COMPUTER ORGANIZATION

COURSE OUTCOME:

1. To understand the structure, function and characteristics of computer systems. To understand the design of the various functional units and components of computers.
2. To identify the elements of modern instructions sets and their impact on processor design.
3. To explain the function of each element of a memory hierarchy.
4. To identify and compare different methods for computer I/O.

Unit-I

Register Transfer Language, Bus and Memory Transfers, Bus Architecture, Bus Arbitration, Arithmetic Logic, Shift Microoperation, Arithmetic Logic Shift Unit, Design of Fast address, Arithmetic Algorithms (addition, subtraction, Booth Multiplication), IEEE standard for Floating point numbers.

Unit-II

Control Design:

Hardwired & Micro Programmed (Control Unit): Fundamental Concepts (Register Transfers, Performing of arithmetic or logical operations, Fetching a word from memory, storing a word in memory), Execution of a complete instruction, Multiple-Bus organization, Hardwired Control, Micro programmed control(Microinstruction, Microprogram sequencing, Wide -Branch addressing, Microinstruction with Next-address field, Prefetching Microinstruction).

Unit-III

Processor Design:

Processor Organization: General register organization, Stack organization, Addressing mode, Instruction format, Data transfer & manipulations, Program Control, Reduced Instruction Set Computer.

Unit -IV

Input-Output Organization:

I/O Interface, Modes of transfer, Interrupts & Interrupt handling, Direct Memory access, Input-Output processor, Serial Communication.

Unit-V

Memory Organization:

Memory Hierarchy, Main Memory (RAM and ROM Chips), organization of 2D and $2^{1/2}$ D, Auxiliary memory, Cache memory, Virtual Memory, Memory management hardware.

Text Book

1. Computer System Architecture, M. Mano(PHI)

Reference Books

1. Computer Organization, Vravice, Zaky&Hamacher (TMH Publication)
2. Structured Computer Organization, Tannenbaum (PHI)
3. Computer Organization, Stallings(PHI)
4. Computer Organization, John P.Hayes (McGraw Hill)

MCA- 24 : PRINCIPLES OF MANAGEMENT

Course Outcomes-

1. Evaluate the global context for taking managerial actions of planning, organizing and controlling.
2. Assess global situation, including opportunities and threats that will impact management of an organization.
3. Integrate management principles into management practices.
4. Assess managerial practices and choices relative to ethical principles and standards.
5. Specify how the managerial tasks of planning, organizing, and controlling can be executed in a variety of circumstances.

UNIT I

Management: Concept, Nature, Importance; Management : Art and Science, Management As a Profession, Management Vs. Administration, Management Skills, Levels of Management, Characteristics of Quality Managers.

Evolution of Management: Early contributions, Taylor and Scientific Management, Fayol's Administrative Management, Bureaucracy, Hawthorne Experiments and Human Relations, Social System Approach, Decision Theory Approach.

Business Ethics and Social Responsibility: Concept, Shift to Ethics, Tools of Ethics.

UNIT II

Introduction to Functions of Management

Planning: Nature, Scope, Objectives and Significance of Planning, Types of Planning, Process of Planning, Barriers to Effective Planning, Planning Premises and Forecasting, Key to Planning, Decision Making.

Organizing: Concept, Organisation Theories, Forms of Organisational Structure, Combining Jobs: Departmentation, Span of Control, Delegation of Authority, Authority & Responsibility, Organisational Design.

UNIT III

Staffing: Concept, System Approach, Manpower Planning, Job Design, Recruitment & Selection, Training & Development, Performance Appraisal

Directing: Concept, Direction and Supervision

Motivation: Concept, Motivation and Performance, Theories Of Motivation, Approaches for Improving Motivation, Pay and Job Performance, Quality of Work Life, Morale Building.

UNIT IV

Leadership: The Core of Leadership: Influence, Functions of Leaders, Leadership Style, Leadership Development.

Communication: Communication Process, Importance of Communication, Communication Channels, Barriers to Communication.

Controlling: Concept, Types of Control, Methods: Pre-control: Concurrent Control: Post-control, An Integrated Control System, The Quality Concept Factors affecting Quality, Developing a Quality Control System, Total Quality Control, Pre-control of Inputs, Concurrent Control of Operations. Post Control of Outputs.

Change and Development: Model for Managing Change, Forces for Change, Need for Change, Alternative Change Techniques, New Trends in Organisational Change.

Suggested Reading:

1. Stoner, Freeman & Gilbert Jr – Management (Prentice Hall of India, 6thEdition)
2. Koontz – Principles of Management (Tata Mc Graw Hill, 1st Edition 2008)
3. Robbins & Coulter – Management (Prentice Hall of India, 8thEdition)
4. Robbins S.P. and Decenzo David A. – Fundamentals of Management: Essential Concepts and Applications (Pearson Education, 5thEdition)
5. Hillier Frederick S. and Hillier Mark S. – Introduction to Management Science: A Modeling and Case Studies Approach with Spreadsheets (Tata Mc Graw Hill, 2ndEdition 2008)
6. Wehrich Heinz and Koontz Harold – Management: A Global and Entrepreneurial Perspective (Mc Graw Hill, 12thEdition 2008)

MCA-25 Environmental Science and Ethics

COURSE OUT COME

1. Articulate the interconnected and interdisciplinary nature of environmental studies;
2. Demonstrate an integrative approach to environmental issues with a focus on sustainability;
3. Use critical thinking, problem-solving, and the methodological approaches of the social sciences, natural sciences, and humanities in environmental problem solving;
4. Communicate complex environmental information to both technical and non-technical audiences;

UNIT I:Environment and natural systems:-

Introduction to Environment and Environmental Studies: Definition and Components of Environment, Relationship between the different components of Environment Ecology and Ecosystems: Introduction, Concept of an ecosystem, structure and functions of ecosystem Components of ecosystem- Producers, Consumers, Decomposers Energy Flow in Ecosystem, Food Chains, Food webs ,Ecological Pyramids Major Ecosystems: Forest Ecosystem, Grassland Ecosystem, Desert Ecosystem, Environmental effects of Agriculture.

UNIT-II: Biodiversity and Environmental pollution:-

Definition, description at national and global level, threats and conservation.Natural resources- Renewable and non renewable, Biogeochemical cycles-Hydrologic Cycle, Carbon cycle,carbon ,nitrogen, sulphur cycle.Conventional and non conventional energy resources. Definition, types of environmental pollution, causes and effectsEnvironmental protection through assessment and education: pollution control laws, global efforts in environmental protection.

UNIT-III: Human Population and Environment:-

Population growth, population explosion and migration, transportation and industrial growthSocial issues related to Environment(related to water and energy conservation and waste management)

UNIT IV:Environmental legislation for environmental protection:5 Environmental Acts and Regulations: List of prevalent Environmental Acts, Brief description related to the purpose with at least five important provisions Water (Prevention and control of pollution) Act 1974, Air (Prevention and control of pollution) Act 1981, Environmental Protection Act, Environmental Awareness: Role of Non-Government Organizations. Environmental Ethics in India.

Recommended Textbook

Dr. Suresh k. Dhameja, J Krishnawamy, R.J Ranjit, Wiley Indiagopalan, Environmental Studies by Benny Joseph, U K Khare, 2011 Published by Tata McGraw Hill

MCA-21P : DATA STRUCTURES LAB

Write Program in C or C++ for following:

- Sorting programs: Bubble sort, Merge sort, Insertion sort, Selection sort, and Quick sort.
- Searching programs: Linear Search, Binary Search.
- Array implementation of Stack, Queue, Circular Queue, Linked List.
- Implementation of Stack, Queue, Circular Queue, Linked List using dynamic memory allocation.
- Implementation of Binary tree.
- Program for Tree Traversals (preorder, inorder, postorder).
- Program for graph traversal (BFS, DFS).
- Program for minimum cost spanning tree, shortest path.

MCA-22P : COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES LAB

Write programs in C

- To implement floating point arithmetic operations i.e., addition, subtraction, multiplication and division.
- To deduce errors involved in polynomial interpolation.

Algebraic and transcendental equations using Bisection, Newton Raphson,

Iterative, method of false position, rate of conversions of roots in tabular form for each of these methods.

- To implement formulae by Bessels, Newton, Stirling, Lagranges etc.
- To implement method of least square curve fitting.
- Implement numerical differentiation.
- Implement numerical integration using Simpson's 1/3 and 3/8 rules, trapezoidal rule.
- To show frequency chart, regression analysis, Linear square fit, and polynomial fit.

Semester Third

[MCA-31] OPERATING SYSTEMS

COURSE OUTCOMES.

1. . Understand fundamental operating system abstractions such as processes, threads, files, semaphores, IPC abstractions, shared memory regions, etc.
2. Analyze important algorithms eg. Process scheduling and memory management algorithms
3. Categorize the operating system's resource management techniques, dead lock management techniques, memory management techniques.
4. Demonstrate the ability to perform OS tasks in Red Hat Linux Enterprise.

Unit-I

Introduction: Definition and types of operating systems, Batch Systems, multi programming, time-sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines.

Unit-II

Process Management: Process concept, Process scheduling, Cooperating processes, Threads, Interprocess communication, CPU scheduling criteria, Scheduling algorithms, Multiple-processor scheduling, Real-time scheduling and Algorithm evaluation.

Unit-III

Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

Unit-IV

Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging,

Segmentation with paging in MULTICS and Intel 386, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Disk structure, disk scheduling methods, Disk management, Swap-Space management, Disk reliability.

Unit-V

Security & Case Study: Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption.

Windows NT-Design principles, System components, Environmental subsystems, File system, Networking and program interface, Linux system-design principles, Kernel Modules, Process Management, Scheduling, Memory management, File Systems, Input and Output, Interprocess communication, Network structure, security

References

1. Abraham Siberschatz and Peter Baer Galvin, "Operating System Concepts", Addison-Wesley
2. Milan Milankovic, "Operating Systems, Concepts and Design", Tata McGraw-Hill.
3. Harvey M Deital, "Operating Systems", Addison Wesley

[MCA-32] DESIGN AND ANALYSIS OF ALGORITHMS

Course Outcomes-

- Argue the correctness of algorithms using inductive proofs and invariants.
- Analyze worst-case running times of algorithms using asymptotic analysis

Unit-I

Introduction: Algorithms, Analysis of Algorithms, Design of Algorithms, Complexity of Algorithms, Asymptotic

Notations, Growth of function, Recurrences and their solution methods. Sorting in polynomial Time: Insertion sort, Merge sort, Heap sort, and Quick sort Sorting in Linear Time: Counting sort, Radix Sort, Bucket Sort, Medians and order statistics.

Unit-II

Advanced Data Structure: Red Black Trees, Augmenting Data Structure, Binomial Heap, B-Tree, Fibonacci Heap, and Data Structure for Disjoint Sets, All kinds of Algorithms on these data structures, Dictionaries and priority Queues, mergeable heaps, concatenable queues

Unit-III

Advanced Design and Analysis Techniques: Dynamic programming, Greedy Algorithm, Backtracking, Branch-and-Bound, Amortized Analysis

Unit-IV

Graph Algorithms: Elementary Graph Algorithms, Breadth First Search, Depth First Search, Minimum Spanning Tree, Kruskal's Algorithms, Prim's Algorithms, Single Source Shortest Path, All pair Shortest Path, Maximum flow and Traveling Salesman Problem

Unit-V

Randomized Algorithms, String Matching, NP-Hard and NP-Completeness, Approximation Algorithms, Sorting Network, Matrix Operations, Polynomials and FFT, Number Theoretic Algorithms

References

1. Thomas H Cormen Leiserson "Introduction to Algorithms", PHI Learning Private Limited, Delhi India.
2. Sara Baase and Allen Van Gelder ,Computer Algorithms : "Introduction to Design and Analysis", Pearson Education
3. Jon Kleinberg and Eva Tardos "Algorithm Design", Pearson Education

[MCA-33] DATABASE MANAGEMENT SYSTEMS

Unit- I

Course Outcomes-

- Describe the fundamental elements of relational database management systems
- Explain the basic concepts of relational data model, entity-relationship model, relational database design, relational algebra and SQL.
- Design ER-models to represent simple database application scenarios
- Convert the ER-model to relational tables, populate relational database and formulate SQL queries on data.

Introduction: An overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure.

Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

Unit- II

Relational data Model and Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus.

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, Insert, update and delete operations, Joins, Unions, Intersection, Minus, Cursors in SQL. PL/SQL, Triggers and clusters.

Unit- III

Data Base Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

Unit- IV

Transaction Processing Concepts: Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.

Unit- V

Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multi-version schemes, Recovery with concurrent transaction. Transaction Processing in Distributed system, data fragmentation. Replication and allocation techniques for distributed system, overview of concurrency control and recovery in distrusted database.

References

1. Date C J, "An Introduction To Database System", Addison Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts", Tata Mcgraw-hill Education (India) Pvt. Ltd.

[MCA-34] INTERNET & JAVA PROGRAMMING

Course outcomes-

1. To identify different components of client server architecture on Internet computing.
2. Knowledge of how to develop and deploy applications and applets in JAVA.
3. Knowledge of how to develop and deploy GUI using JAVA Swing and

AWT.

4. • Design, develop and implement interactive web applications.
5. • Be able to implement, compile, test and run JAVA programs comprising more than one class and to
6. address a particular software problem.

Unit-1

Internet: Internet, Connecting to Internet: Telephone, Cable, Satellite connection, Choosing an ISP, Introduction to Internet services, E-Mail concepts, Sending and Receiving secure E-Mail, Voice and Video Conferencing.

Unit-2

Core Java: Introduction, Operator, Data type, Variable, Arrays, Control Statements, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Networking, Event handling, Introduction to AWT, AWT controls, Layout managers, Menus, Images, Graphics.

Unit-3

Java Swing: Creating a Swing Applet and Application, Programming using Panes, Pluggable Look and feel, Labels, Text fields, Buttons, Toggle buttons, Checkboxes, Radio Buttons, View ports, Scroll Panes, Scroll Bars, Lists, Combo box, Progress Bar, Menus and Toolbars, Layered Panes, Tabbed Panes, Split Panes, Layouts, Windows, Dialog Boxes, Inner frame.

JDBC: The connectivity Model, JDBC/ODBC Bridge, (5) java.sql package, connectivity to remote database, Navigating through multiple rows retrieved from a database.

Unit-4

Java Beans: Application Builder tools, The bean developer kit(BDK), JAR files, Introspection, Developing a simple bean, using Bound properties, The Java Beans API, Session Beans, Entity Beans, Introduction to Enterprise Java beans (EJB),

Introduction to RMI (Remote Method Invocation): A simple client-server application using RMI.

Unit-5

Java Servlets: Servlet basics, Servlet API basic, Life cycle of a Servlet, Running Servlet, Debugging Servlets, Thread-safe Servlets, HTTP Redirects, Cookies, Introduction to Java Server pages (JSP).

References:

1. Margaret Levine Young, "The Complete Reference Internet", Tata Mcgraw-hill Education Pvt. Ltd.
2. Thampi, "Object Oriented Programming in JAVA" Wiley Dreamtech Publication.

[MCA-35] COMPUTER BASED OPTIMIZATION TECHNIQUES

Course Outcomes-

1. After completing the course student shall be able to distinguish different computer aided optimization techniques.
2. Be able to create simple architecture for evolutionary algorithms
3. Have the knowledge of applying evaluation optimization technique the engineering applications.

Unit I

Preliminaries: Inventory Models and Replacement problems: Inventory models –various costs-deterministic

inventory models, Single period inventory model with shortest cost, stochastic models, Application of inventory

models, Economic lot sizes-price breaks, Replacement problems-capital equipment-discounting costs-replacement in anticipation of failure- group replacement-stochastic nature underlying the failure phenomenon.

Unit II

Linear Programming Problems (LPP): Definition of LPP, Graphical Solutions of Linear Programming Problems, Simplex Method, and Artificial Variable Method, Two Phase Method, Charnes' Big-M Method, Sensitivity Analysis, Revised Simplex Method, Duality, Dual Simplex Method

Unit III

Integer Linear Programming Problems: Integer Linear Programming Problems, Mixed Integer Linear Programming Problems, Cutting Plane Method, Branch and Bound Method, 0-1 integer linear programming problem.

Transportation Problems: Introduction to Transportation Model, Matrix Form of TP, Applications of TP Models, Basic Feasible Solution of a TP, Degeneracy in TP, Formation of Loops in TP, Solution Techniques of TP, Different Methods for Obtaining Initial Basic Feasible Solutions viz. Matrix Minima Method, Row Minima Method, Column Minima Methods, Vogel's Approximation Method, Techniques for Obtaining Optimal Basic Feasible Solution.

Assignment Problems: Definition, Hungarian Method for AP.

Unit IV

Introduction to NLP: Definition of NLP, Convex Programming Problems, Quadratic Programming Problems, Wolfe's Method for

Quadratic Programming, Kuhn-Tucker Conditions, Geometrical Interpretation of KT-Conditions, KT-Points etc.

Dynamic Programming: Bellman's Principle of optimality of Dynamic Programming, Multistage decision problem and its solution by Dynamic Programming with finite number of stages, Solution of linear programming problems as a Dynamic Programming problem

Unit V

Queuing Theory Introduction to Queues, Basic Elements of Queuing Models, Queue Disciplines, Memoryless Distribution, Role of Exponential and Poisson Distributions, Markovian Process, Erlang Distribution, Symbols and Notations, Distribution Of Arrivals, Distribution of Service Times, Definition of Steady and Transient State, Poisson Queues.

References:

1. Hadley, G., "Linear Programming, and Massachusetts", Addison-Wesley .
2. Taha, H.A, "Operations Research – An Introduction", Macmillian

[MAC-31] Human Value & Professional Ethics

Course Outcomes-

1. Making engineering and technology students aware of the various issues concerning man and society.
2. These issues will help to sensitize students to be broader towards the social, cultural, economic and human issues, involved in social changes.
3. Able to understand the nature of the individual and the relationship between the self and the community.
4. Understanding major ideas, values, beliefs, and experiences that have shaped human history and cultures.

Module-1

Course introduction, Needs Basic guidelines

- 1 Understand the need , basic , guidelines content for process value education.
2. Self Exploration what is it? It content and process, Natural Acceptance and experiential Validation as the mechanism for self exploration.
- 3 Continues happiness and Prosperity- A look at continues human Aspiration.
- 4 Understanding Happiness and Prosperity correctly- A critical appraisal of the current senerio.
- 5 Method to fulfilled the human aspiration

Module -2

Understanding Harmony in human Being (Harmony in Myself)

1. Understanding Harmony as a co - existence of the sentient I and the Material Body.
2. Understanding the need of self (I) and body sukh and suvidha.
3. Understanding the body of an instrument of I (being Doar, seer and enjoyer.
4. Understanding the Charactersticks and activities of (I)

Module -3

Understanding harmony in the Family and Society

1. Understanding harmony in the Family and basic unit of Human interaction.
2. Understanding values in human - Human relationship meaning of nayaya and program for the fulfillment of ensure abhay and tripti.
3. Understanding the meaning of Vishvas difference between intension and competence.
4. Understanding the Harmony in the society (society being an Extension of family - samadhan , Samriddi , Abhay,sahastitva and comprehension of Human goals.

Module -4

Understanding the harmony in the Nature and existence – whole Existence as Co-existence.

- 1 Understanding the harmony in the Nature.
- 2 Interconnectedness and mutual fulfillment among the four order of Nature -recyclability ,andself regulation in nature.
- 3 Holistic pception of Harmony at all levels of existence.

Module - 5 Implication of the above Holistic understanding of Harmony on professional ethics.

- 1 Natural acceptance of human values.
- 2 Deffinateness of ethical human conduct.
- 3 Basic for humanistic education. Humanstick constitution and human universal order.
- 4 Case studies of typical holistic technologies , Management model and Production system.
- 5 Strategy for transition from the presnt stage of universal order.

A – At the level of individual : as socially and ecologically responsible engineers technologist and manager.

B– At the Level of Society as mutually enriching institution and organisations

[MCA-31P] DBMS LAB

The programme to be implemented using SQL

1. Create Table, SQL for Insertion, Deletion, Update and Retrival using aggregating functions.
2. Write Programs in PL/SQL, Understanding the concept of Cursors.
3. Write Program for Join, Union & intersection etc.
4. Creating Views, Writing Assertions, Triggers.
5. Creating Forms, Reports etc.
6. Writing codes for generating read and update operator in a transaction using different situations.
7. Implement of 2PL concerning central algorithm.
8. Developing code for understanding of distributed transaction processing.

Students are advised to use Developer 2000 Oracle 8+ version for above experiments. However, depending on the availability of Software's students may use power builder/SQL Server/DB2 etc. for implementation.

[MCA-32P]Java Programming Lab

1. Write a program in Java for illustrating, overloading, over riding and various forms of inheritance.
2. Write programs to create packages and multiple threads in Java.
3. Write programs in Java for event handling Mouse and Keyboard events.
4. Using Layout Manager create different applications.
5. Write programs in Java to create and manipulate Text Area, Canvas, Scroll Bars, Frames and Menus using swing/AWT.
6. Using Java create Applets.
7. Use Java Language for Client Server Interaction with stream socket connections.
8. Write a program in java to read data from disk file.

Semester Fourth

[MCA-41] MANAGEMENT INFORMATION SYSTEMS

Course Outcomes-

1. Relate the basic concepts and technologies used in the field of management information systems;
2. Compare the processes of developing and implementing information systems.
3. Outline the role of the ethical, social, and security issues of information systems.
4. Translate the role of information systems in organizations, the strategic management processes, with the implications for the management.
5. Apply the understanding of how various information systems like DBMS work together to accomplish the information objectives of an organization.

Unit 1: Foundation of Information Systems: Introduction to information system in business, fundamentals of information systems, Solving business problems with information systems, Types of information systems, Effectiveness and efficiency criteria in information system.

Unit 2: An overview of Management Information Systems: Definition of a management information system, MIS versus Data processing, MIS & Decision Support Systems, MIS & Information Resources Management, End user computing, Concept of an MIS, Structure of a Management information system.

Unit 3: Concepts of planning & control: Concept of organizational planning, The Planning Process, Computational support for planning, Characteristics of control process, The nature of control in an organization.

Unit 4: Business applications of information technology: Internet & electronic commerce, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information System for Managerial Decision Support, Information System for Strategic Advantage.

Unit 5: Managing Information Technology: Enterprise & global management, Security & Ethical challenges, Planning & Implementing changes.

Advanced Concepts in Information Systems: Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, and Procurement Management.

References

1. Brian, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.
2. Gordon B. Davis & Margrethe H. Olson, "Management Information System", Tata Mcgraw-hill Education Pvt. Ltd.
3. Brian, "Introduction to Information System", Tata Mcgraw-hill Education Pvt. Ltd.

[MCA-42] WEB TECHNOLOGY

Course Outcomes-

1. Analyze a web page and identify its elements and attributes.
2. Create web pages using XHTML and Cascading Style Sheets.
3. Build dynamic web pages using JavaScript (Client side programming).
4. Create XML documents and Schemas.
5. Build interactive web applications using AJAX.

Unit I: Introduction:

Introduction to web, protocols governing the web, web development strategies, Web applications, web project, web team.

Unit II: Web Page Designing:

HTML: list, table, images, frames, forms, CSS;

XML: DTD, XML schemes, presenting and using XML

Unit III: Scripting:

Java script: Introduction, documents, forms, statements, functions, objects; event and event handling; introduction to AJAX, VB Script

Unit IV: Server Site Programming:

Introduction to active server pages (ASP), ASP.NET, java server pages (JSP), JSP application design, tomcat server, JSP objects, declaring variables, and methods, debugging, sharing data between JSP pages, Session, Application: data base action, development of java beans in JSP, introduction to COM/DCOM.

Unit V: PHP (Hypertext Preprocessor):

Introduction, syntax, variables, strings, operators, if-else, loop, switch, array, function, form, mail, file upload, session, error, exception, filter, PHP-ODBC.

References

1. Xavier, C, " Web Technology and Design" , New Age International.
2. Ivan Bayross, " HTML, DHTML, Java Script, Perl & CGI", BPB Publication.

[MCA-43] DISTRIBUTED SYSTEM

Course Outcomes-

1. To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.
2. To know about Shared Memory Techniques.
3. Have Sufficient knowledge about file access.
4. Have knowledge of Synchronization and Deadlock

Unit-I

Characterization of Distributed Systems: Introduction, Examples of distributed Systems, Resource sharing and the Web Challenges. Architectural models, Fundamental Models.

Theoretical Foundation for Distributed System: Limitation of Distributed system, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks.

Concepts in Message Passing Systems: causal order, total order, total causal order, Techniques for Message Ordering, Causal ordering of messages, global state, termination detection.

Unit-II

Distributed Mutual Exclusion: Classification of distributed mutual exclusion, requirement of mutual exclusion theorem, Token based and non token based algorithms, performance metric for distributed mutual exclusion algorithms.

Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized dead lock detection, distributed dead lock detection, path pushing algorithms, edge chasing algorithms.

Unit-III

Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive consistency Problem, Solution to Byzantine Agreement problem, Application of Agreement problem, Atomic Commit in Distributed Database system.

Distributed Resource Management: Issues in distributed File Systems, Mechanism for building distributed file systems, Design issues in Distributed Shared Memory, Algorithm for Implementation of Distributed Shared Memory.

Unit-IV

Failure Recovery in Distributed Systems: Concepts in Backward and Forward recovery, Recovery in Concurrent systems, Obtaining consistent Checkpoints, Recovery in Distributed Database Systems.

Fault Tolerance: Issues in Fault Tolerance, Commit Protocols, Voting protocols, Dynamic voting protocols.

Unit -V

Transactions and Concurrency Control: Transactions, Nested transactions, Locks, Optimistic Concurrency control, Timestamp ordering, Comparison of methods for concurrency control.

Distributed Transactions: Flat and nested distributed transactions, Atomic Commit protocols, Concurrency control in distributed transactions, Distributed deadlocks, Transaction recovery. Replication: System model and group communication, Fault - tolerant services, highly available services, Transactions with replicated data.

References:

1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Ramakrishna,Gehrke," Database Management Systems", Mc Grawhill

[MCA-44] ARTIFICIAL INTELLIGENCE

Course Outcomes-

1. Analyze the implications of applying AI systems to organizations and future of work.
2. Explain how to develop AI systems to meet business, organizational, and technology requirements.
3. Implement AI frameworks and platforms to improve business, organizational, and technology outcomes.
4. Develop bots to automate organizational processes from end to end.

Introduction : Introduction to Artificial Intelligence, Foundations and History of Artificial Intelligence, Applications of Artificial Intelligence, Intelligent Agents, Structure of Intelligent Agents. Computer vision, Natural Language Processing.

Unit-II

Introduction to Search : Searching for solutions, Uniformed search strategies, Informed search strategies, Local search algorithms and optimistic problems, Adversarial Search, Search for games, Alpha - Beta pruning.

Unit-III

Knowledge Representation & Reasoning: Propositional logic, Theory of first order logic, Inference in First order logic, Forward & Backward chaining, Resolution, Probabilistic reasoning, Utility theory, Hidden Markov Models (HMM), Bayesian Networks.

Unit-IV

Machine Learning : Supervised and unsupervised learning, Decision trees, Statistical learning models, Learning with complete data - Naive Bayes models, Learning with hidden data – EM algorithm, Reinforcement learning,

Unit-V

Pattern Recognition : Introduction, Design principles of pattern recognition system, Statistical Pattern recognition, Parameter estimation methods - Principle Component Analysis (PCA) and Linear Discriminant Analysis (LDA), Classification Techniques – Nearest Neighbor (NN) Rule, Bayes Classifier, Support Vector Machine (SVM), K – means clustering.

References:

1. Stuart Russell, Peter Norvig, "Artificial Intelligence – A Modern Approach", Pearson Education
2. Elaine Rich and Kevin Knight, "Artificial Intelligence", Tata Mcgraw-hill Education Pvt. Ltd.

[MCA-45] MOBILE COMPUTING

Course Outcomes-

1. Define mobile technologies in terms of hardware, software, and communications.
2. Utilize mobile computing nomenclature to describe and analyze existing mobile computing frameworks and architectures.
3. Evaluate the effectiveness of different mobile computing frameworks.
4. Describe how mobile technology functions to enable other computing technologies.

Unit - I

Introduction, issues in mobile computing, overview of wireless telephony: cellular concept, GSM:air-interface, channel structure, location management: HLR-VLR, hierarchical, handoffs, channel allocation in cellular systems, CDMA, GPRS.

Unit - II

Wireless Networking, Wireless LAN Overview: MAC issues, IEEE 802.11, Blue Tooth, Wireless multiple access protocols, TCP over wireless, Wireless applications, data broadcasting, Mobile IP, WAP: Architecture, protocol stack, application environment, applications.

Unit – III

Data management issues, data replication for mobile computers, adaptive clustering for mobile wireless networks, File system, Disconnected operations.

Unit - IV

Mobile Agents computing, security and fault tolerance, transaction processing in mobile computing environment.

Unit – V

Adhoc networks, localization, MAC issues, Routing protocols, global state routing (GSR), Destination sequenced distance vector routing (DSDV), Dynamic source routing (DSR), Ad Hoc on demand distance vector routing (AODV), Temporary ordered routing algorithm (TORA), QoS in Ad Hoc Networks, applications.

References:

1. J. Schiller, “Mobile Communications”, Addison Wesley.
2. Charles Perkins, “Mobile IP”, Addison Wesley.

[MAC-41] Cyber Security

Course Outcomes-

1. Analyze and resolve security issues in networks and computer systems to secure an IT infrastructure.
2. Design, develop, test and evaluate secure software.
3. Develop policies and procedures to manage enterprise security risks.
4. Evaluate and communicate the human role in security systems with an emphasis on ethics, social engineering vulnerabilities and training.
5. Interpret and forensically investigate security incidents.

UNIT-1

Introduction to information systems, Types of information Systems, Development of Information Systems, Introduction to information security, Need for Information security, Threats to Information Systems, Information Assurance, Cyber Security, and Security Risk Analysis.

UNIT-2

Application security (Database, E-mail and Internet), Data Security Considerations-Backups, Archival Storage and Disposal of Data, Security Technology-Firewall and VPNs, Intrusion Detection, Access Control. Security Threats - Viruses, Worms, Trojan Horse, Bombs, Trapdoors, Spoofs, E-mail viruses, Macro viruses, Malicious Software, Network and Denial of Services Attack, Security Threats to E-Commerce-Electronic Payment System, eCash, Credit/Debit Cards. Digital Signature, public Key Cryptography.

UNIT-3

Developing Secure Information Systems, Application Development Security, Information Security Governance & Risk Management, Security Architecture & Design Security Issues in Hardware, Data Storage & Downloadable Devices, Physical Security of IT Assets, Access Control, CCTV and intrusion Detection Systems, Backup Security Measures.

UNIT-4

Security Policies, Why Policies should be developed, WWW policies, Email Security policies, Policy Review Process- Corporate policies-Sample Security Policies, Publishing and Notification Requirement of the Policies. Information Security Standards-ISO, IT Act, Copyright Act, Patent Law, IPR. Cyber Laws in India; IT Act 2000 Provisions, Intellectual Property Law: Copy Right Law, Software License, Semiconductor Law and Patent Law.

References :

1. Charles P. Pfleeger, Shari Lawrence Pfleeger, "Analysing Computer Security", Pearson Education India.
2. V.K. Pachghare, "Cryptography and information Security", PHI Learning Private Limited, Delhi India.
3. Dr. Surya Prakash Tripathi, Ritendra Goyal, Praveen kumar Shukla, "Introduction to Information Security and Cyber Law" Willey Dreamtech Press.

[MCA-51] COMPUTER NETWORK

Course outcome:

1. Recognize the technological trends of Computer Networking.
2. Discuss the key technological components of the Network.
3. Evaluate the challenges in building networks and solutions to those

Unit-I

Introduction Concepts: Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

Unit-II

Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

Unit - III

Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control Internetworking -TCP / IP, IP packet, IP address, IPv6.

Unit - IV

Transport Layer: Transport Layer - Design issues, connection management, session Layer-Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

Unit-V

Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.

Text Books :

1. Forouzen, "Data Communication and Networking", TMH
2. A.S. Tanenbaum, Computer Networks, Pearson Education
3. W. Stallings, Data and Computer Communication, Macmillan Press

[MCA-52] Network Security & Cryptography

Course outcome:

1. Analyze and design classical encryption techniques and block ciphers.
2. Understand and analyze data encryption standard.
3. Understand and analyze public-key cryptography, RSA and other public-key cryptosystems
4. such as Diffie-Hellman Key Exchange, ElGamal Cryptosystem, etc.
5. Understand key management and distribution schemes and design User Authentication
6. Protocols.

Unit-I

Introduction to security attacks, services and mechanism, Classical encryption techniques substitution ciphers and transposition ciphers, cryptanalysis, steganography, Stream and block ciphers.

Modern Block Ciphers: Block ciphers principles, Shannon's theory of confusion and diffusion, fiestal structure, Data encryption standard(DES), Strength of DES, Idea of differential cryptanalysis, block cipher modes of operations, Triple DES

Unit-II

Introduction to group, field, finite field of the form $GF(p)$, modular arithmetic, prime and relative prime numbers, Extended Euclidean Algorithm, Advanced Encryption Standard (AES) encryption and decryption Fermat's and Euler's theorem, Primality testing, Chinese Remainder theorem, Discrete Logarithmic Problem, Principals of public key crypto systems, RSA algorithm, security of RSA

Unit-III

Message Authentication Codes: Authentication requirements, authentication functions, message authentication code, hash functions, birthday attacks, security of hash functions, Secure hash algorithm (SHA) Digital Signatures: Digital Signatures, Elgamal Digital Signature Techniques, Digital signature standards (DSS), proof of digital signature algorithm,

Unit-IV

Key Management and distribution: Symmetric key distribution, Diffie-Hellman Key Exchange, Public key distribution, X.509 Certificates, Public key Infrastructure. Authentication Applications: Kerberos
Electronic mail security: pretty good privacy (PGP), S/MIME.

Unit-V

IP Security: Architecture, Authentication header, Encapsulating security payloads, combining security associations, key management. Introduction to Secure Socket Layer, Secure electronic, transaction (SET)

System Security: Introductory idea of Intrusion, Intrusion detection, Viruses and related threats, firewalls

References:

1. William Stallings, "Cryptography and Network Security: Principals and Practice", Pearson Education.
2. Behrouz A. Frouzan: Cryptography and Network Security, TMH

[MCA-53] Software Engineering

Course Outcome:

1. How to apply the software engineering lifecycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment
2. An ability to work in one or more significant application domains
3. Work as an individual and as part of a multidisciplinary team to develop and deliver quality software
4. Demonstrate an understanding of and apply current theories, models, and techniques that provide a basis for the software lifecycle
5. Demonstrate an ability to use the techniques and tools necessary for engineering practice

Unit-I: Introduction

Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.

Unit-II: Software Requirement Specifications (SRS)

Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modeling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS.

Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.

Unit-III: Software Design

Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halstead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.

Unit-IV: Software Testing

Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, Top-Down and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.

Unit-V: Software Maintenance and Software Project Management

Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re-Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts, Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.

References:

1. R. S. Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.

[MCA-54] Image Processing

Course Outcome:

1. Explain the fundamentals of digital image and its processing
2. Perform image enhancement techniques in spatial and frequency domain.
3. Elucidate the mathematical modelling of image restoration and compression Apply the concept of image segmentation.
4. Describe object detection and recognition techniques.

UNIT-I

Introduction and Fundamentals

Motivation and Perspective, Applications, Components of Image Processing System, Element of Visual Perception, A Simple Image Model, Sampling and Quantization.

Image Enhancement in Frequency Domain

Fourier Transform and the Frequency Domain, Basis of Filtering in Frequency Domain, Filters – Low-pass, High-pass; Correspondence Between Filtering in Spatial and Frequency Domain; Smoothing Frequency Domain Filters – Gaussian Lowpass Filters; Sharpening Frequency Domain Filters – Gaussian Highpass Filters; Homomorphic Filtering.

UNIT-II

Image Enhancement in Spatial Domain

Introduction; Basic Gray Level Functions – Piecewise-Linear Transformation Functions: Contrast Stretching; Histogram Specification; Histogram Equalization; Local Enhancement; Enhancement using Arithmetic/Logic Operations – Image Subtraction, Image Averaging; Basics of Spatial Filtering; Smoothing - Mean filter, Ordered Statistic Filter; Sharpening – The Laplacian.

UNIT-III

Image Restoration

A Model of Restoration Process, Noise Models, Restoration in the presence of Noise only-Spatial Filtering – Mean Filters: Arithmetic Mean filter, Geometric Mean Filter, Order Statistic Filters – Median Filter, Max and Min filters; Periodic Noise Reduction by Frequency Domain Filtering – Bandpass Filters; Minimum Mean-square Error Restoration.

UNIT-IV

Morphological Image Processing

Introduction, Logic Operations involving Binary Images, Dilation and Erosion, Opening and Closing, Morphological Algorithms – Boundary Extraction, Region Filling, Extraction of Connected Components, Convex Hull, Thinning, Thickening

UNIT-V Registration

Introduction, Geometric Transformation – Plane to Plane transformation, Mapping, Stereo Imaging – Algorithms to Establish Correspondence, Algorithms to Recover Depth

Segmentation

Introduction, Region Extraction, Pixel-Based Approach, Multi-level Thresholding, Local Thresholding, Region-based Approach, Edge and Line Detection: Edge Detection, Edge Operators, Pattern Fitting Approach, Edge Linking and Edge Following, Edge Elements Extraction by Thresholding, Edge Detector Performance, Line Detection, Corner Detection.

References:

1. Digital Image Processing 2 nd Edition, Rafael C. Gonzalvez and Richard E. Woods. Published by: Pearson Education.
2. Digital Image Processing and Computer Vision, R.J. Schalkoff. Published by: John Wiley and Sons, NY.

[MCA-55] Software Testing

Course outcome:

1. List a range of different software testing techniques and strategies and be able to apply specific(automated) unit testing method to the projects.
2. Distinguish characteristics of structural testing methods.
3. Demonstrate the integration testing which aims to uncover interaction and compatibility problems as early as possible.
4. Discuss about the functional and system testing methods.
5. Demonstrate various issues for object oriented testing.

Unit-I: Introduction

Faults, Errors, and Failures, Basics of software testing, Testing objectives, Principles of testing, Requirements, behavior and correctness, Testing and debugging, Test metrics and measurements, Verification, Validation and Testing, Types of testing, Software Quality and Reliability, Software defect tracking.

Unit-II: White Box and Black Box Testing

White box testing, static testing, static analysis tools, Structural testing: Unit/Code functional testing, Code coverage testing, Code complexity testing, Black Box testing, Requirements based testing, Boundary value analysis, Equivalence partitioning, state/graph based testing, Model based testing and model checking, Differences between white box and Black box testing.

Unit-III: Integration, System, and Acceptance Testing

Top down and Bottom up integration, Bi-directional integration, System integration, Scenario Testing, Defect Bash, Functional versus Non-functional testing, Design/Architecture verification, Deployment testing, Beta testing, Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution,

Unit-IV: Test Selection & Minimization for Regression Testing

Regression testing, Regression test process, Initial Smoke or Sanity test, Selection of regression tests, Execution Trace, Dynamic Slicing, Test Minimization, Tools for regression testing, Ad hoc Testing: Pair testing, Exploratory testing, Iterative testing, Defect seeding.

Unit-V: Test Management and Automation

Test Planning, Management, Execution and Reporting, Software Test Automation: Scope of automation, Design & Architecture for automation, Generic requirements for test tool framework, Test tool selection, Testing in Object Oriented Systems.

References:

1. S. Desikan and G. Ramesh, "Software Testing: Principles and Practices", Pearson Education.
2. Aditya P. Mathur, "Fundamentals of Software Testing", Pearson Education.

[MCA-51P] Computer Network Lab

Course outcome:

1. Programs using TCP Sockets (like date and time server & client, echo server & client, etc.)
2. Programs using UDP Sockets (like simple DNS)
3. Programs using Raw sockets (like packet capturing and filtering)
4. Programs using RPC
5. Simulation of sliding window protocols

NMCAE25*: COMPUTER NETWORK

Unit -I

Introduction Concepts: Goals and Applications of Networks, Network structure and architecture, The OSI reference model, services, Network Topology Design - Delay Analysis, Back Bone Design, Local Access Network Design, Physical Layer Transmission Media, Switching methods, ISDN, Terminal Handling.

Unit-II

Medium Access sub layer: Medium Access sub layer - Channel Allocations, LAN protocols - ALOHA protocols - Overview of IEEE standards - FDDI. Data Link Layer - Elementary Data Link Protocols, Sliding Window protocols, Error Handling.

Unit - III

Network Layer: Network Layer - Point - to Pont Networks, routing, Congestion control Internetworking -TCP / IP, IP packet, IP address, IPv6.

Unit - IV

Transport Layer: Transport Layer - Design issues, connection management, session Layer- Design issues, remote procedure call. Presentation Layer-Design issues, Data compression techniques, cryptography - TCP - Window Management.

Unit-V

Application Layer: Application Layer: File Transfer, Access and Management, Electronic mail, Virtual Terminals, Other application. Example Networks - Internet and Public Networks.

Text Books :

1. Forouzen, "Data Communication and Networking", TMH
2. A.S. Tanenbaum, Computer Networks, Pearson Education
3. W. Stallings, Data and Computer Communication, Macmillan Press

References :

1. Anuranjan Misra, "Computer Networks", Acme Learning
2. G. Shanmugarathinam, "Essential of TCP/ IP", Firewall Media

