Revised
STUDY & EVALUATION SCHEME

&

SYLLABI

For

MASTER OF COMPUTER APPLICATIONS
[MCA]

REGULAR PROGRAMME
[2017-18]

Offered by

University Institute of Engineering & Technology
C.S.J.M University
Kanpur – 208024[INDIA]
www.kanpuruniversity.org

Master of Computer Applications
Study and Evaluation Scheme
[Effective from the academic session 2017-18]
First Year

First Semester

Sr. No.	Code No.	Paper	Periods			Internal Assessment			ESE	Subject Total
		Theory Papers	L	T	P	CT	TA	Total		
1	MCA-101	Professional Communication	**3**	**1**	**0**	30	20	50	100	150
2	MCA-102	Organizational Behavior	3	1	0	30	20	50	100	150
3	MCA-103	Computer Concepts & Programming in C	3	1	0	30	20	50	100	150
4	MCA-104	Discrete Mathematics	3	1	0	30	20	50	100	150
5	MCA-105	Computer Organization	3	1	0	30	20	50	100	150
		Practicals								
6	MCA-151	Linux & C-Programming Lab	0	0	6	30	20	50	50	100
7	MCA-152	Professional Communication Lab	0	0	6	30	20	50	50	100
		Total								**950**

Second Semester

Sr. No.	Code No.	Paper	Periods			Internal Assessment			ESE	Subject Total
		Theory Papers	L	T	P	CT	TA	Total		
1	MCA-201	Computer Based Numerical and Statistical Techniques	**3**	**1**	**0**	30	20	50	100	150
2	MCA-202	Accounting & Financial Management	3	1	0	30	20	50	100	150
3	MCA-203	Data Structures Using C	3	1	0	30	20	50	100	150
4	MCA-204	E- Commerce	3	1	0	30	20	50	100	150
5	MCA-205	Operating system	3	1	0	30	20	50	100	150
		Practicals								
6	MCA-251	Data Structures Lab	0	0	6	30	20	50	50	100
7	MCA-252	CBNST/E - Commerce Lab	0	0	6	30	20	50	50	100
		Total								**950**

Revised Syllabus of MCA, UIET,C.S.J.M University, Kanpur meeting of BoS on 26th June- 2017 & Approved in AC on 5th July, 2017 w.e.f. Academic Session 2017-18

Master of Computer Applications
Study and Evaluation Scheme
[Effective from the academic session 2017-18]
Second Year

Third Semester

Sr. No.	Code No.	Paper	Periods			Internal Assessment			ESE	Subject Total
		Theory Papers	**L**	**T**	**P**	**CT**	**TA**	**Total**		
1	MCA-301	Object Oriented System Modeling	**3**	**1**	**0**	30	20	50	100	150
2	MCA-302	Computer Networks	3	1	0	30	20	50	100	150
3	MCA-303	Internet and Java Programming	3	1	0	30	20	50	100	150
4	MCA-304	Design and Analysis of Algorithms	3	1	0	30	20	50	100	150
5	MCA-305	Software Engineering	3	1	0	30	20	50	100	150
		Practicals								
6	MCA-351	Internet and Java Programming Lab	0	0	6	30	20	50	50	100
7	MCA-352	SE / OOSM Lab	0	0	6	30	20	50	50	100
		Total								**950**

Fourth Semester

Sr. No.	Code No.	Paper	Periods			Internal Assessment			ESE	Subject Total
		Theory Papers	**L**	**T**	**P**	**CT**	**TA**	**Total**		
1	MCA-401	Optimization Techniques	**3**	**1**	**0**	30	20	50	100	150
2	MCA-402	Theory of Computation	3	1	0	30	20	50	100	150
3	MCA-403	Database Management Systems	3	1	0	30	20	50	100	150
4	MCA-404	Computer Graphics and Animation	3	1	0	30	20	50	100	150
5		Elective -I	3	1	0	30	20	50	100	150
		Practicals								
6	MCA-451	DBMS Lab	0	0	6	30	20	50	50	100
7	MCA-452	Computer Graphics and Animation Lab	0	0	6	30	20	50	50	100
		Total								**950**

Master of Computer Applications
Study and Evaluation Scheme
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Third Year

Fifth Semester

Sr. No.	Code No.	Paper	Periods			Internal Assessment			ESE	Subject Total
			L	T	P	CT	TA	Total		
		Theory Papers								
1	MCA-501	Information Security & Cyber Laws	3	1	0	30	20	50	100	150
2	MCA-502	Mobile Computing	3	1	0	30	20	50	100	150
3	MCA-503	Artificial Intelligence	3	1	0	30	20	50	100	150
4		Elective - II	3	1	0	30	20	50	100	150
5		Elective – III	3	1	0	30	20	50	100	150
		Praticals								
6	MCA-551	Mobile Computing Lab	0	0	6	30	20	50	50	100
7	MCA-552	Minor Project (AI / ISCL)	0	0	6	30	20	50	50	100
		Total								**950**

Sixth Semester

Sr.No.	Code No.	Paper	Internal Assesment	ESE	Evalution Component
		Theory Papers	360	240	Problem Identification, Self-Study and Development / Field Work / Progress Report (Analysis & Design)
1	MCA-601	Project (4-6 month duration)			
		Total			**600**

*Students will be required to pursue a dissertation allotted to them in accordance with their preference subject to approval of Departmental Committee. They will have to submit the synopsis at the beginning of the semester and dissertation done by them at the End of the semester. Progress report will be send by the student through e-mail to the Departmental Committee. Internal assessment will be done by the Departmental Committee on the basis of performance in various components including a mid-semester presentation by the students.

List of Electives

Electives-I
    1. [MCA-411] Data Warehousing & Mining
    1. [MCA-412] Managerial Economics & IPR
    2. [MCA-413] Distributed System
    3. [MCA-414] Simulation Modeling
    4. [MCA-415] Cloud Computing
    5. [MCA-416] Information Theory and Coding
    6. [MCA- 417] Soft Computing

Electives-II
    1. [MCA-511] Compiler Design
    2. [MCA-512 Distributed Systems
    3. [MCA-513] Big Data Analytics
    4. [MCA-514] Computer Architecture
    5. [MCA- 515] Client Server & Computing
    6. [MCA- 516] Neural Network
    7. [MCA – 517] Social Network Analysis

Electives-III
    1. [MCA- 521] Software Project Management
    2. [MCA-522] Network Security & Cryptography
    3. [MCA-523] Software Testing
    4. [MCA-524] Digital Image   Processing
    5. [MCA-525] Machine Learning
    6. [MCA-526] Real Time Systems
    7. [MCA-527] Multimedia Technology
    8. [MCA-528] Bio-Informatics

NOTE:

- To run an elective paper in the Department minimum 20 students, have to opt it.
- Each student shall be required to appear in both Theory and Practical Examinations in all courses.

1.   MCA-101   PROFESSIONAL COMMUNICATION   L   P   T
                                                          3   0   1

UNIT 1

Types of Communication, Oral Communication skills: clarity, speed, tone & pitch, speech & sounds, Introduction to syllable, stress, Pronunciation and Accent

Phonetics; Diphthongs, Vowel and consonant. Business communication; Informal vs Formal communication, Communication Barriers and remedies.

Language skills: Vocabulary, language fluency, Word match, Reading and Listening Skills, Comprehension, Art of condensation and expansion. Written Communication skill, Grammar; Parts of speech, Phrase, Clause, Sentence Media/channels for communication.   (10 hrs)

UNIT 2

Personality Development,; Self analysis through SWOT, Johari window, Intra personal communication vs. Inter personal Communication, Leadership Skills, Team Building, Individual and Group Communication, Public speaking, Self advertising, Over stating and under stating, Time Management.

Non Verbal Communication skills: Body language, Voice Modulation, Posture and gesture, Eye contact, Dress codes, Verbal cliches, Contextualization: creating and understanding contexts, Aura words.   (10Hrs)

UNIT 3

Interview: Types of Interview, Preparing for the Interviews, Attending the Interview,

Interview Process, Employers Expectations, General Etiquette. Group Discussions: Guidelines, Expressions, Evaluation. Video conferencing, Telephone skills, Teleconferencing, Participation in meetings: chairing sessions. Presentation Skills; Types of presentation, Power point, Capturing Data, Guidelines to make an effective presentation, pictorial and graphics, Audience Awareness, Presentation Plan, Visual Aids, Forms of Layout, Styles of Presentation, Management presentations.   (10Hrs)

UNIT 4

Letter writing: Types of Letters, Business letters, E-mail, Fax, Pro-forma culture, Drafting the Applications, Format, Style, Effectiveness, study of sample letters, Elements of structure, Preparing a CV / Resume, Statement of Purpose, Web chat, Greeting, Memos, Reports, Minutes, Business correspondence.   (10 hrs)

(A) Study of the following essays from the text book with emphasis on writing skills:

1. Man and Nature   by J. Bronowski

2. The Language of Literature and Science   by Aldous Huxley

3. The Aims of Science & The Humanities   by Moody E Prior

4. Gods in this Godless Universe by Bertrand Russell

5. Science and Survival   by Barry Commoner

(B) Readings of selected short stories:

1. The Renunciation by Rabindranath Tagore

2. The Lament   by Anton P. Chekhov

3. The Barber's Trade Union by Mulk Raj Anand

4. The Eyes Are Not Here by Ruskin Bond

Text Books:

1. Rajendra Pal, JS Korlahhi. Essentials of Business Communication,

2. Andre J. Rutherford: Pearson Education Asia; Basic Communication Skills for Technology,

3. KR Lakshiminarayana: English for Technical Communication.

Reference Books:

1. RK Madhukar Business Communication, , Vikas Publishing House Pvt. Ltd.

2. Edmund H Weiss: Writing Remedies: Practical Exercises for Technical Writing. Universities Press.

3. Herbert Puchta and Jeff Stranks, Cambridge. English in Mind.

4. Raymond V. Lesikav, John D. Pettit Jr.: Business Communication; Theory and Application.

5. Bovee, Thill and Shatzman; Business Communication Today.

2. MCA-102   ORGANIZATIONAL BEHAVIOR   L   T   P
                                                                3   1   0

UNIT 1

Introduction: Definition, Nature, scope of OB, definition of personality ,determinants of personality, types of personality, personality traits: MBTI, The big five traits, personality attributes influencing organizational behavior, models of OB.   (10 hrs)

UNIT 2

Perception, value, attitude, Leadership: Meaning, process of perception, factors influencing perception, behavioral aspect of perception, Value: Importance of value ,types of value, Attitude : Meaning, types, components, theory of attitude formation and attitude change, Job satisfaction, Nature of Leadership, Leadership styles, traits of effective leader.   (10 hrs)

UNIT 3

Motivation, Group Behavior: Meaning and Definition, Traditional theories of motivation: Maslow's, Herzberg's, McClelland, Theory X and Theory Y, Contemporary Theory of Motivation : ERG Theory, Self efficacy theory, Vroom's of expectancy theory, Equity theory, Reinforcement theory, Meaning, types of groups, stages of group development, structural variables of groups, group decision making, interpersonal behavior, Transactional analysis, Johari window.   (10 hrs)

UNIT 4

Organizational Culture, Change and Stress Management :Meaning of change, resistance of change, resistance of change, managing organizational changes, implementation of change, definition of organizational culture, determinants of organizational culture, transmission of culture into employee, Meaning and definition of stress,   potential sources of stress, managing stress.   (10 hrs)

References Books:
1. Fred Luthans, "Organizational Behavior", 12th Edition, McGraw Hill International Edition
2. Stephen P. Robbins, "Organizational Behavior", 12th Edition, Prentice Hall
3. Aswathappa K, "Organizational Behavior (Text, Cases and Games)", Himalaya Publication
4. Udai Pareek, "Organizational Behavior", Oxford University Press

3. MCA-103 COMPUTER CONCEPTS & C PROGRAMMING L   T   P
                                                      3   1   0

UNIT 1

Computer fundamentals, Computer hardware & software components, peripherals and their functions, Concept of an algorithm; termination and correctness. Flow Charts, Overview of the compiler, Assembler, linker and loader, Structure of a simple HelloWorld Program in C ,Overview of compilation and execution process in an IDE. Introduction to the design and implementation of correct, efficient and maintainable programs.
 Data Types and Sizes, Declaration of variables, Modifiers, Identifiers and keywords, Symbolic constants, Storage classes (automatic, external, register and static), Enumerations, command line parameters, Macros, The C Preprocessor.   (10 hrs)

UNIT 2

Operators: Unary operators, Arithmetic & logical operators, Bit wise operators, Assignment operators and expressions, Conditional expressions, Precedence and order of evaluation. Control statements: if-else, switch, break, and continue, the comma operator, goto statement. Loops: for, while, do-while. Functions: built-in and user-defined, function declaration, definition and function call, and parameter passing: call by value, call by reference, recursive functions, Storage Classes.   (10hrs)

UNIT 3

Arrays: linear arrays, multidimensional arrays, passing arrays to functions, and strings. Matrix computation. , Pointers, relationship between array and pointer, Argument passing using pointers, Array of pointer, passing arrays as arguments. Structure and Union, Pointers: value at (*) and address of (&) operator, pointer to pointer, (10 hrs)

UNIT 4

Dynamic   memory   Allocation functions, array of pointers, function of pointers, structures and pointers. File Handling in C: File Pointers, fopen( ), fclose( ), Input and Output using file pointers, Character Input and Output with Files.   (10hrs)

Text Books:
1. Schildt, Herbert. "C: the complete reference". Tata McGraw-Hill Education , 1988.
2. Forouzan, Behrouz A., and Richard F. Gilberg. "Computer science: A structured programming approach using C". Brooks/Cole Publishing Company, 2000.
3. Yashwant Kanitkar, "Let us C", BPB
4. E. Balagurusamy, "Programming in ANSI C", TMH

Reference Books:
1. Kernighan, Brian W., and Dennis M. Ritchie. "The C programming language". Vol. 2. Englewood Cliffs: prenticeHall, 1988.
2. Salaria, R. S. "Application Programming in C." Khanna Publishers, 2010.
3. Kanetkar, Yashavant P. "Test Your C Skills". BPB Publications, 2003.
4. http://www.codeblocks.org/

4. MCA-104 DISCRETE MATHEMATICS   L   T   P
                                                                 3   1   0

UNIT 1

Set Theory: Notations, Types of sets, Ordered pairs, Cartesian product, Combination of sets, Set Algebra, Relations Representation, Relation types and properties, Operations on relations, Equivalence relations, Equivalence Partitions, Equality of relations, Order of relations, Partial ordering, Recursive definition of relation, Closure, Warshall's algorithm to compute transitive closure of a relation, Composite Relations, Functions, Classification of functions, Operation on functions.

Partially Ordered Sets and Lattices: Posets, lattices, Combination of partial order sets, Hasse's diagram, Properties of lattices, Lattices as Algebraic systems, Sub lattices, Homomorphism, Bounded, Complemented, Modular and Complete lattice.

(10Hrs)

UNIT 2

Combinatorics: Principle of mathematical induction, Selected problems on mathematical induction, Fundamental principles of counting, Pigeonhole principle, Principle of inclusion and exclusion. Recurrence Relations, Linear recurrence relations with constant coefficients, Solution of linear recurrence relations using generating functions.

Logic: Propositional logic, Tautology, Predicate Algebra, Quantifiers, Operators, Methods of proofs: direct, formal, informal, contradict ion, induction, contraposition, exhaustive.

(10Hrs)

UNIT 3

Algebraic Structures: Definition, Groups, Subgroups and order, Cyclic Groups, Cosets, Lagrange's theorem, Semi groups and monoids, Cyclic semigraphs and submonoids, Congruence relations on semigroups, Normal Subgroups, Permutation and Symmetric groups, Group Homomorphisms, Properties of Rings and Fields, Integers Modulo n.

(10Hrs)

UNIT 4

Graph theory: Path, cycles, handshaking theorem, bipartite graphs, sub-graphs, graph isomorphism, operations on graphs, Eulerian graphs and Hamiltonian graphs, planar graphs, Euler formula, traveling salesman problem, shortest path algorithms. Graphs, Euler tours, planar graphs, Hamiltonian graphs, Euler's formula, applications of Kuratowski's theorem, graph coloring, chromatic polynomials, trees, weighted trees, shortest path algorithms, spanning trees, the max-flow min-cut theorem.

(10 Hrs)

Textbooks:

1. J. P. Tremblay and R. Manohar, "Discrete Mathematical Structure with
2. Application to Computer Science", TMH, New Delhi, 2000.
    Koshy, Discrete Structures, Elsevier Pub. 2008
3. Kenneth H. Rosen, "Discrete Mathematics & Applications", TMH, 6th Ed., 2007.

References:

1. B. Kolman, R.C. Busby, and S.C. Ross, Discrete Mathematical Structures, 5/e, Prentice Hall, 2004.
2. Kenneth Bogart Clifford and Stein Robert Drysdale, "Discrete Mathematics for

MCA 105   COMPUTER ORGANIZATION

	L	T	P
	3	1	0

UNIT 1

Introduction to Computer, Computer hardware generation, Number System: Binary, Octal, Hexadecimal, Character Codes (BCD, ASCII, EBCDIC), Logic gates.

Boolean Algebra: Introduction, Boolean functions, Representations and simplification of Boolean functions, Theorems of Boolean algebra, Algebraic manipulation of Boolean expressions, Logic implications, Karnaugh maps, Application of Boolean functions to synthesis of circuits

 Half Adder, Full Adder, Subtractor, Decoder, Encoders, Multiplexer, De-multiplexer, Carry look ahead adder, Combinational logic Design.   [10 hrs]

UNIT 2

Flip-Flops, Registers, Counters (synchronous & asynchronous), ALU, Micro-Operation. ALU- chip, Faster Algorithm and Implementation (multiplication & Division).

Von Neumann Architecture, Operational flow chart (Fetch, Execute), Instruction Cycle, Organization of Central Processing Unit, Hardwired & micro programmed control unit, Single Organization, General Register Organization, Stack Organization, Addressing modes, Instruction formats, data transfer & Manipulation, I/O Organization, Bus Architecture, Programming Registers   [10hr]

UNIT 3

Memory Organization, Memory Hierarchy, Main memory (RAM/ROM chips), Auxiliary memory, Associative memory, Cache memory, Virtual Memory, Memory Management Hardware, hit/miss ratio, magnetic disk and its performance, magnetic Tape etc. [10 hrs]

UNIT 4

Peripheral devices, I/O interface, Modes of Transfer, Priority Interrupt, Direct Memory Access, Input-Output Processor, and Serial Communication. I/O Controllers, Asynchronous data transfer, Strobe Control, Handshaking.   [10hrs]

Text and Reference Books:

1. William Stalling, "Computer Organization & Architecture", Pearson education Asia
2. Mano Morris, "Computer System Architecture", PHI
3. Zaky & Hamacher, "Computer Organization", McGraw Hill
4. B. Ram, "Computer Fundamental Architecture & Organization", New Age
5. Tannenbaum, "Structured Computer Organization", PHI.

MCA-151 LINUX & C PROGRAMMING LAB

	L	P	T
	0	6	0

1. Write C program to find largest of three integers.
2. Write C program to check whether the given string is palindrome or not.
3. Write C program to find whether the given integer is
    (i). a prime number
    (ii). an Armstrong number.
4. Write C program for Pascal triangle.
5. Write C program to find sum and average of n integer using linear array.
6. Write C program to perform addition, multiplication, transpose on matrices.
7. Write C program to find fibbonaci series of iterative method using user-defined function.
8. Write C program to find factorial of n by recursion using user-defined functions.
9. Write C program to perform following operations by using user defined functions:
    (i) Concatenation
    (ii) Reverse
    (iii) String Matching
10. Write C program to find sum of n terms of series:
    n – n*2/2! + n*3/3! - n*4/4! + ...
11. Write C program to interchange two values using
    (i). Call by value.
    (ii). Call by reference.
12. Write C program to sort the list of integers using dynamic memory allocation.
13. Write C program to display the mark sheet of a student using structure.
14. Write C program to perform following operations on data files:
    (i) read from data file.
    (ii) write to data file.
15. Write C program to copy the content of one file to another file using command line argument.

Introduction of MS-DOS, Internal Command, external Command, WINDOWS, and LINUX Operating Systems, Functional Knowledge of these operating systems. Introduction of Basic Commands of MS DOS, Files and Directories.

MCA 152   PROFESSIONAL COMMUNICATION LAB

	L	P	T
	0	6	0

1. Introduction
2. Software -I
   a) Listening exercises
   b) Pronunciation improvement through self- testing
   c) Vocabulary improvement through word games
3. Software – II
   a) Conversational skills
   b) Exercises based on Language Skills/ Small talk
   c) Cultural movies
4. Phonetic Alphabet and Phonetic Transcriptions
5. Intonation and Stress
6. Framing Questions
7. Group Discussion and Group Presentation
8. Situational Conversation (social language, emergency situation, seeking help, inquiries, communicating bad news)
9. Negotiation
10. Mock Interview Exercises
11. Audio Video recording and dialogue sessions on current topics, economy, education system, environment,politics.

1. MCA-201 COMPUTER BASED NUMERICAL &STATISTICALTECHNIQUES

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                                        L    T    P
                                        3    1    0
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UNIT 1

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.   (10 hrs)

UNIT 2

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.   (10 hrs)

UNIT 3

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.   (10 hrs)

UNIT 4

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

Time series and forecasting: Moving averages, smoothening 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.   (10 hrs)

Text Books:

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 International

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. Pradip Niyogi, "Numerical Analysis and Algorithms", TMH

7. Francis Scheld, "Numerical Analysis", TMH

8. Gupta S. P., "Statistical Methods", Sultan and Sons

2. MCA-202 ACCOUNTING AND FINANCIAL MANAGEMENT

	L	T	P
	3	1	0

UNIT 1

Meaning and Scope of Accounting, Definition, functions, characteristics, objectives, advantages and limitations of accounting, users of accounting information, branches of accounting, accounting concepts and conventions, Accounting standards in India, Capital and revenue classification of income, expenditure & receipts.   (10 hrs)

UNIT 2

Double entry system of Accounting, Journal, Ledger and Trial balance, concept of Trading, Profit and loss account and Balance sheet, Ratio Analysis: Solvency ratio, profitability ratio, activity ratio, liquidity ratio.   (10 hrs)

UNIT 3

Definition, nature, Objectives of Financial Management, Sources of Finance, Introductory idea about capitalization and capital structure, Meaning, concept, Significance, classification of cost of capital, cost of debt, concept of leverage.

(10 hrs)

UNIT 4

Concept and Component of working capital ,factors influencing the composition of working capital ,Meaning of budget ,budgetary control, classification and types of budget, Cash Management, Inventory management and receivable management.
(10 hrs)

Text Books:
1-Maheshwari & Maheshwari: An Introduction to Accounting.
2-Khan & Jain: Financial Accounting
3- Khan & Jain: Financial Management
4- D. Chandra Bose: Fundamentals of Financial Management

3. MCA-203   DATA STRUCTURE USING C

	L	T	P
	3	1	0

UNIT 1

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

Arrays: Array Definition, Representation, 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, Applications of stack: Conversion of Infix to Prefix and Postfix Expressions, Evaluation of postfix expression using stack and Applications.   [10 hrs]

UNIT 2

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

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.   [10 hrs]

UNIT 3

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.
Binary Search Tree (BST), Insertion and Deletion in BST, Complexity of Search Algorithm, Path Length, AVL Trees, B-trees.   [10 hrs]

UNIT 4

Sorting: Insertion Sort, Bubble Sort, Quick Sort, Two Way Merge Sort, Heap Sort, Sorting.

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, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files.   [10 hrs]

Text Books:
1. A. S. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.
2. Horowitz and Sahani, "Fundamentals of data Structures", Galgotia Publication Pvt. Ltd., New Delhi.

Reference Books:
1. R. Kruse et. al, "Data Structures and Program Design in C", Pearson Education Asia,Delhi-2002
2. K Loudon, "Mastering Algorithms with C", Shroff Publisher & Distributors Pvt. Ltd.
3. Bruno R Preiss, "Data Structures and Algorithms with Object Oriented Design Pattern in C++", Jhon Wiley & Sons, Inc.

4. MCA-204   E-COMMERCE   **L   T   P**
                                                                     3   1   0

UNIT 1
Introduction: Electronic Commerce - Technology and Prospects, Definition of E-Commerce, Economic potential of electronic commerce, Incentives for engaging in electronic commerce, forces behind E-Commerce, Advantages and Disadvantages, Architectural framework, Impact of E-commerce on business.
Network Infrastructure for E- Commerce: Internet and Intranet based E-commerce-Issues, problems and prospects, Network Infrastructure, Network Access Equipments, Broadband telecommunication (ATM, ISDN, FRAME RELAY).   (10Hrs)

UNIT 2
Mobile Commerce: Introduction, Wireless Application Protocol, WAP technology, Mobile Information device, Mobile Computing Applications.

Web Security: Security Issues on web, Importance of Firewall, components of Firewall, Transaction security, Emerging client server, Security Threats, Network Security, Factors to consider in Firewall design, Limitation of Firewalls.   (10Hrs)

UNIT 3
Encryption: Encryption techniques, Symmetric Encryption- Keys and data encryption standard, Triple encryption, Asymmetric encryption- Secret key encryption, public and private pair key encryption, Digital Signatures, Virtual Private Network.   (10Hrs)

UNIT 4
Electronic Payments: Overview, The SET protocol, Payment Gateway, certificate, digital Tokens, Smart card, credit card, magnetic strip card, E-Checks, Credit/Debit card based EPS, online Banking EDI Application in business, E- Commerce Law, Forms of Agreement, Govt. policies and Agenda.   (10Hrs)
Text and Reference Books:
1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley.
2. Bajaj and Nag, "E-Commerce the cutting edge of Business", TMH
3. P. Loshin, John Vacca, "Electronic commerce", Firewall Media, New Delhi

5.MCA-205   **OPERATING SYSTEM**   **L   T   P**
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UNIT 1

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.

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

UNIT 2

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 3

Memory 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, Thrasing, Page Size and other considerations, Demand segmentation.

UNIT 4

File System and I/O Management: 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. Security Issues: 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.

Text and Reference Books:
1. Abraham Siberschatz and Peter Baer Galvin, "Operating System Concepts", Fifth Edition, Addision-Wesley
2. Milan Milankovic, "Operating Systems, Concepts and Design", McGraw-Hill.

6.MCA- 251 DATA STRUCTURE LAB

	L	P	T
	0	**6**	**0**

Write Program in C/C++ for following:
1. Stack using arrays, Evaluation of prefix/postfix expression and its conversion
2.
3. Sorting programs: Bubble sort, Merge sort, Insertion sort, Selection sort, and Quick sort.
2. Searching programs: Linear Search, Binary Search.
3. Array implementation of Stack, Queue, Circular Queue, and Linked List.
4. Implementation of Stack, Queue, Circular Queue, Linked List using dynamic memory allocation.
5. Implementation of Binary tree.
6. Program for Tree Traversals (preorder, inorder, postorder).
7. Program for graph traversal (BFS, DFS).
8. Program for minimum cost spanning tree, shortest path.

7.MCA- 252 CBNST/E-COMMERECE LAB

	L	P	T
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Develop Programs of the following techniques in C/C++ Language:
1. To implement iterative methods to solve nonlinear equations.
2. To implement iterative methods to solve a system of linear equations.
3. To implement Newton's divided difference and Lagrange's interpolation formulae.
4. To implement Numerical differentiation.
5. To implement Numerical integration using Trapezoidal, Simpson 1/3 and Simpson 3/8 rules.
6. To implement single step/ multi step methods to solve initial value problems.
7. To implement least squares method for curve fitting.
8. To find correlation coefficient, regression coefficients and lines of regression.
9. To implement tests of hypothesis and significance.
10. To implement non parametric tests.
11. To determine the confidence interval to implement ANOVA
12. Some exercise based on the concept of E-commerec.

1. MCA-301   OBJECT ORIENTED SYSTEM MODELING

	L	P	T
	3	0	1

UNIT – 1

Classes and Objects: Objects, Classes, Encapsulation, Data Abstraction, Role of private and public access specifier, Memory organization of class, Member functions   inline and static member variables, Friend functions, Class vs Structure, Constructors default, parameterized, copy and dynamic, Destructors, Assignment operator.
Polymorphism: Function overloading, Constructor overloading, Compile time polymorphism, Overloading Rules, Operator Overloading (Unary and Binary) as member function/friend function.   (10Hrs)

UNIT - 2

Inheritance: Inheritance, Types of Inheritance, Use of protected access specifier, Virtual base class, Ambiguity resolution using scope resolution operator and Virtual base class, Overriding inheritance methods, Constructors and Destructor in derived classes.   Runtime polymorphism, Pointer to objects, Virtual Functions, pure virtual functions, Abstract Class.

UNIT 3

Object Oriented Design and Modeling: Object oriented fundamentals, Objects and Classes, Links and Associations, Generalization and Inheritance, Aggregation, Abstract Classes, Object-Oriented Design Process, importance of modeling, principles of modeling, OOAD Methods. Introduction to UML: UML Terminology, conceptual model of the UML, Architecture, Software Development Life Cycle.
Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams. Advanced Structural Modeling: Advanced classes, advanced relationships, Interfaces, Types and Roles, Packages. Class & Object Diagrams: Terms, concepts, modeling techniques for Class & Object Diagrams.   (10Hrs)

UNIT 4

Behavioral Modeling: Interactions and Interaction diagrams, Use Cases and Use Case Diagrams, Activity Diagrams. Events and Signals, State Machines, Nested State Diagrams, Processes and Threads, Time and Space, State Chart Diagrams. Advanced Dynamic Modeling Concepts.
Architectural Modeling: Component, Deployment, Component diagrams and Deployment diagrams. .

Text and Reference Books:
1. Grady Booch, James Rumbaugh, Ivar Jacobson: The Unified Modeling Language User Guide, Pearson Education.
2. Atul Kahate: Object Oriented Analysis & Design, TheMcGraw-Hill Companies.
3. Meilir Page-Jones: Fundamentals of Object Oriented Design in UML, Pearson Education.
4. Pascal Roques: Modeling Software Systems Using UML2, WILEY-Dreamtech India Pvt. Ltd.
5. E. Balaguruswamy, "Object Oriented Programming with C++", 4th Edition, TMH.
6. Appling UML and Patterns: An introduction to Object – Oriented Analysis and Design and Unified Process, Craig Larman, Pearson Education.

2. MCA-302   COMPUTER NETWORKS

	L	**P**	**T**
	3	**0**	**1**

UNIT-1

Introduction: Introductory Concepts: History, Goals and Applications of Networks, Layered Network Architecture, Review of ISO-OSI Model, Introduction to TCP/IP Model, Data Communication Techniques, Pulse Code Modulation (PCM), Multiplexing Techniques; Frequency Division, Time Division, Statistical Time Division Multiplexing.
Physical Layer **:** Transmission Media: Wires, Cables, Radio Links, Satellite Link, Fiber Optic, Error Detection and Correction: Single and Burst Error, Parity Check Codes, Cyclic Redundancy Code & Hamming Code.

UNIT-2

Data Link Layer Protocols: Stop and Wait Protocols: Noise free and Noisy channels, performance and efficiency, Sliding Window Protocols; Go Back n and Selective Repeat ARQS, performance and efficiency

Medium access sub layer: Channel allocations, LAN protocols, ALOHA Protocols-Pure ALOHA, slotted ALOHA, Carrier Sense Multiple Access Protocols, CSMA with Collision Detection, Collision free Protocols, IEEE standards, FDDI, Data Link Layer-elementary data link protocols, error handling, High Level Data Link Control, DQDB.
HDLC data link protocols, ISDN, Channel Structure, Asynchronous Transfer Mode ATM.

UNIT-4

Network and Transport Layer Protocols: General Principles, Virtual Circuits and datagram's, Windows flow control, Packet Discarding, Traffic Shaping, Choke RSVP, Network Layer in ATM, Internetworking using Bridge, Router and Gateways, Routing Algorithms: shortest path routing, Quality of Services, Primitives Connection Management: Addressing, Connection Establishment and Releases, Flow Control and Buffering, Crash recovery, Element of TCP/IP protocol: User Data gram Protocol, (UDP/TCP) Layering. TCP/IP packet, IP addresses, IPv6
Transport Layer: Design issues, connection management, TCP window Management, User Datagram Protocol, Transmission Control Protocol.

Application Layer: Network Security, DES, RSA algorithms, Domain Name System, Simple Network Management Protocol, Electronic mail, File Transfer Protocol, Hyper Text Transfer Protocol, Cryptography and compression Techniques.

Text and Reference Books:

1. A. S Tanenbaum, "Computer Networks, 3rd Edition", PHI
2. W. Stallings, "Data and Computer Communication", Macmillan Press
3. Comer, "Computer Networks & Internet", PHI.
4. Comer, "Internetworking with TCP/IP", PHI
5. Forouzan, "Data Communication and Networking", TMH

3. MCA-303   INTERNET & JAVA PROGRAMMING   L   P   T
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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 EMail, Voice and Video Conferencing.

Core Java: Introduction, Operator, Data type, Variable, Arrays, 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.   (10Hrs)

UNIT 2

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

JDBC: The connectivity Model, JDBC/ODBC Bridge, java.sql package, connectivity to remote database, navigating through multiple rows retrieved from a database. (10Hrs)

UNIT 3

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.   (10Hrs)

UNIT 4

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). Introduction to XML, Service-Oriented Architectures SOAP, SOAP message structure, handling errors.   (10Hrs)

Text Books:
1. Margaret Levine Young, "The Complete Reference Internet", TMH
2. Naughton, Schildt, "The Complete Reference JAVA2", TMH
3. Balagurusamy E, "Programming in JAVA", TMH
Reference Books:
1. Dustin R. Callway, "Inside Servlets", Addison Wesley
2. Mark Wutica, "Java Enterprise Edition", QUE
3. Steven Holzner, "Java2 Black book", dreamtech
4. Elliott Rusty Harold and W. Scott Means, O'Reilly, "XML in a Nutshell", 2001
5. James Cooper, "Java Design Pattersn: A Tutorial", Addison Wesley
6. Govind Sesadri, "Enterprise java Computing: Application and Architectures", Cambridge University Publications, 1999 .

4. MCA-304   DESIGN ANALYSIS & ALGORITHM   L   T   P
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UNIT 1

Introduction to Algorithm, The role of algorithms in computing, Asymptotic notation, asymptotic analysis of recurrence relations, probabilistic analysis and randomized algorithm, the hiring problem, indicator random variables. Divide and conquer paradigm – Merge sort. Dynamic Programming – Matrix Chain multiplication, Longest Common subsequence, optimal binary search trees. Greedy Algorithm –Activity Selection problem, Theoretical foundation of greedy algorithm, Task Scheduling problem, Comparison of dynamic programming and Greedy algorithm with Knapsack as case study.   (10Hrs)

UNIT 2

Matrix Operation (Properties, Strassen's Algorithm, Solution of linear equation, Matrix inversion) Polynomial and FFT, Representation of polynomials, The DFT and FFT, efficient FFT implementation Number–Theoretic Algorithm, Elementary number-theoretic notion, Greatest common divisor, modular arithmetic, solving modular linear equation, the Chinese remainder theorem.   (10Hrs)

UNIT 3

Graphs: Review of Graphs Algorithm (Representation, Depth First Search, Breath First search, Kruskal and Prim Algorithm, Dijkstra's Algorithm) Flow networks: Ford-Fulkerson method, comparison Networks   (10Hrs)

UNIT 4

 NP-Completeness, Polynomial time, Polynomial time verification, NP-completeness and reducibility. Approximation Algorithms- the vertex-cover problem, The Traveling-Salesman Problem, The set covering problem.   (10Hrs)

Text Books:
1.   T. H. Cormen, C. E. Leiserson, R.L. Rivest, C. Stein, "Introduction to Algorithms", 2nd Edition, PHI.

 Reference Books:
1.   A.V. Aho, J. E. Hopcroft, J.D. Ulman, "The Design & Analysis of Computer Algorithms", Addison Wesley.
2.   V. Manber, "Introduction to Algorithms – A Creative Approach", Addison Wesley.
3.   Ellis Harwitz and Sartaz Sahani, "Fundamentals of Computer Algorithms", Galgotia.

MCA-305   **SOFTWARE ENGINEERING**   **L   P   T**
                                                          3   0   1

UNIT 1
Introduction: Software Crisis, Software Processes & Characteristics, Software life cycle models, Waterfall, Prototype, Evolutionary and Spiral Models, Overview of Quality Standards like ISO 9001, SEI – CMM.
Software Requirements analysis & specifications: Requirement engineering, requirement elicitation techniques like FAST, QFD & Use case approach, requirements analysis using DFD, Data dictionaries & ER Diagrams, Requirements documentation, Nature of SRS, Characteristics & organization of SRS.   (10 hrs)

UNIT 2
Software Project Planning Size Estimation like lines of Code & Function Count, Cost Estimation Models, Static single & Multivariable Models, COCOMO, COCOMO-II, Putnam resource allocation model, Risk Management.
Software Design:
Cohesion & Coupling, Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented Design, User Interface Design.   (10 hrs)
UNIT 3
Software Metrics: Software measurements: What & Why, Token Count, Halstead Software Science Measures, Design Metrics, Data Structure Metrics, Information Flow Metrics
Software Testing: Testing process, Design of test cases, functional testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing, Path Testing, Data flow and mutation testing, Unit Testing, Integration and System Testing, Debugging, Alpha & Beta Testing, Regression Testing, Testing Tools & Standards.   (10 hrs)

UNIT 4
Software Reliability: Importance, Hardware Reliability & Software Reliability, Failure and Faults, Reliability Models, Basic Model, Logarithmic Poisson Model, Calender time Component.
Software Maintenance: Management of Maintenance, Maintenance Process, Maintenance Models, Reverse Engineering, Software Re-engineering, Configuration Management, Documentation.   (10 hrs)
Test Books:
1.   K. K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International, 2001.
2.   R. S. Pressman, "Software Engineering – A practitioner's approach", 5th Ed., McGraw Hill Int. Ed., 2001.
Reference Books:
1.   R. Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997.
2.   P. Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
3.   Stephen R. Schach, "Classical & Object Oriented Software Engineering", IRWIN, 1996.
4.   James Peter, W. Pedrycz, "Software Engineering", John Wiley & Sons., 1999
5.   I. Sommerville, "Software Engineering", Addison. Wesley, 1999

MCA-351   Internet and Java Programming Lab

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1. Write Java program to check if a number is palindrome in Java .

2. How to find if a number is power of 2 in Java.

3. Write program to sort an integer array without using API methods .

4. Write a program in Java to reverse any String without using StringBuffer .

5. Write a program in Java to print Fibonacci series up to given number? Write both iterative and recursive version.

6. Write a Java program to get the character at the given index within the String.

7. Write a Java program to concatenate a given string to the end of another string.

8. Write a Java program to find the number of even and odd integers in a given array of integers.

9. Write a Java program to compute the average value of an array of integers except the largest and smallest values.

10. Write a Java program to reverse an array of integer values.

11. Write a Java program to get the maximum value of the year, month, week, date from the current date of a default calendar.

12. Write Java program to read input from java console.

13**.** Write a Java program to read first 3 lines from a file.

14**.** Write a Java program to store text file content line by line into an array.

15 .Write a program to solve the producer consumer problem using thread .

16. Write a program to get the Id of the running thread .

17. Write a program to create an event listener in Applet .

18. Write a program to display image using Applet .

19. Write a program to read a file using Applet .

20. Write a program to write to a file using Applet .

21. Write a program to connect to a database using JDBC . Assume that

database name is testDb and it has table named employee which has 2 records.

22. Write a program to edit(Add or update) columns of a Table and how to delete a table
.23. Write a program to join contents of more than one table & display .

24.Write a program to make a socket displaying message to a single client .

25.Write a program to find proxy settings of a System .

26. Write a program to creates a border layout with the given horizontal and vertical

   gaps between the components.

27. Write a program to display a pie chart using a frame .

28. Write a program to create a transparent cursor .

29. Write a program to check whether antialiasing is enabled or not .

30.Write a servlet to upload file on server.

31.Write a program to handle exceptions thrown by application with another servlet.

MCA-352   SE/OOSM LAB

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Lab Exercise based on Software Engineering and OOSM concepts.

MCA-401   OPTIMIZATION TECHNIQUES   L   T   P
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UNIT 1

Linear Programming and Sequencing Models: Linear programming: various definitions, statements of basic theorems and properties, Advantages, Limitations and Application areas of Linear Programming, LPP Formulation, Graphical Solution methods of Linear Programming problem, Simplex Method – Two phase method and the BigM method. Transportation Problem and its solution, Assignment Problem and its solutions.
Sequencing Models: Sequencing problem, Johnson's Algorithm for processing n jobs through 2 machines.

UNIT 2

PERT and CPM: Project Management: PERT and CPM: Project management origin and use of PERT, origin and use of CPM, Applications of PERT and CPM, Project Network, Diagram representation, Critical path calculation by network analysis and critical path method (CPM), Determination of floats, Construction of time chart and resource labelling, Project cost curve and crashing in project management, Project Evaluation and review Technique (PERT).

UNIT 3

Queuing Models: Queuing Models: Essential features of queuing systems, operating characteristics of queuing system, probability distribution in queuing systems, classification of queuing models, solution of queuing Model – I [(M/M/1) : (FCFS / ∞ /∞)].

UNIT 4

Inventory Models and Replacement Theory: Introduction to the inventory problem, Deterministic Models, the classical EOQ (Economic Order Quantity) model, Inventory models with deterministic demands (no shortage allowed), Inventory models with probabilistic demand. **Replacement Theory:** Replacement of items that deteriorates. Replacement of items that fails suddenly, Individuals and Group Replacement Policy.

Books and References:

1. Gillet B.E.: Introduction to Operation Research, Computer Oriented Algorithmic approach - Tata

    McGraw Hill Publishing Co. Ltd. New Delhi.

2. P.K. Gupta & D.S. Hira, "Operations Research", S.Chand & Co.

3. J.K. Sharma, "Operations Research: Theory and Applications", Mac Millan.

4. S.D. Sharma, "Operations Research", Kedar Nath Ram Nath, Meerut (UP).

5. Operation Research: An Introduction – 8rd, Hamdy a. Taha, Prentice Hall of India.

6. Kanti Swarup, Gupta P.K., Man Mohan, Operations Research, Sultan Chand & Sons.

MCA-402   THEORY OF COMPUTATION   L   T   P
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UNIT 1

Automata and Language Theory: A brief history of computing, Need of Automata, Overview of Theoretical Computer Science and its application including various phases / Modules in the design of a typical compiler, Chomsky Classification. Basic concepts of Automata Theory: Alphabets, Strings and Languages, Deterministic Finite Automata (DFA) and Nondeterministic Finite Automata (NFA) – Definition, Representation using Transition Tables and State Diagrams, Language of DFA and NFA. NFA with ε-transitions, Language of NFA with ε-transitions, Equivalence of NFA and DFA. (10Hrs)

UNIT 2

Regular Expressions and Languages: Introduction, Definition of regular expression, Kleen's Theorem, Equivalence of regular expression and Finite Automata, Pumping Lemma for regular Languages, Closure properties of Regular Languages, Decision properties of Regular Languages, Finite Automata with Output: Moore and Mealy Machine, Equivalence of Moore and Mealy Machines.   10Hrs)

UNIT 3

Non-Regular Grammars: Definition of Grammar, Classification of Grammars, Chomosky's Hierarchy. Context Free Grammars (CFG) and Context Free Languages (CFL) - Definition, Examples, Derivation trees, Ambiguous Grammars, Simplification of Grammars, Normal forms of CFGs: CNF and GNF, Closure properties of CFLs, Decision Properties of CFLs, Pumping lemma for CFLs. Push Down Automata (PDA): Definition and Description, Language of PDA and its applications.   (10Hrs)

UNIT 4

Turing Machines: Introduction, Basic Features of a Turing Machine, Language of a Turing Machine, Variants of Turing Machine: Multitapes, Nondeterministic Turing Machine, Universal Turing Machine. Turing Machine as Computer of Integer functions, Halting problem of Turing Machine, Church-Turing Thesis.
Undecidability: Introduction, Undecidable problems about Turing Machines, Rice's Theorem, Post's Correspondence problem (PCP).   (10Hrs)

Text Books:

1. Introduction to Automata theory, Languages and Computation, J.E.Hopcraft, R.Motwani, and Ullman. 2nd edition, Pearson Education Asia
2. Introduction to languages and the theory of computation, J Martin, 3rd Edition, Tata McGraw Hill
3. Elements and Theory of Computation, C Papadimitrou and C. L. Lewis, PHI
4.Mathematical Foundation of Computer Science, Y.N.Singh, New Age International

Reference Books:

 1. Susan H. Rodger, "JFLAP: An interactive Formal Languages and Automata Package",Jones & Bartlett, 2009.
 2. H. R. Lewis and C. H. Papadimi Triou, "Elements of the Theory of Computation," Pearson, 2nd Ed., 1997.
3. Peter Linz, "Introduction to Formal Languages and Automata", Narosa Publishing, 4 th ed. 2006.

Revised Syllabus of MCA, UIET,C.S.J.M University, Kanpur meeting of BoS on 26th June- 2017 & Approved in AC on 5th July, 2017 w.e.f. Academic Session 2017-18

MCA-403 DATA BASE MANAGEMENT SYSTEMS L P T
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UNIT 1

Basic concepts: Database & database users, characteristics of the database, database systems, concepts and architecture, date models, schemas & instances, DBMS architecture & data independence, database languages & interfaces, data modeling using the entity-relationship approach. Overview of hierarchical, Network & Relational Data Base Management Systems. (10Hrs)

UNIT 2

Relational model, languages & systems: Relational data model & relational algebra: relational model, Tuple calculus, concepts, constraints, relational algebra, SQL- a relational database language: date definition in SQL, view and queries in SQL, specifying constraints and indexes in sql, a relational database management systems.

Logical Data Structures Physical Data Structure, Instances, Table Spaces, Types of Tablespaces, Internal Memory Structure, Background Processes, Data Types, Roles & Privileges, Stored Procedures, User Defined Functions, Cursors, Error Handling, Triggers. (10Hrs)

UNIT 3

Relational data base design: Function dependencies & normalization for relational databases: functional dependencies, normal forms based on primary keys, (1NF, 2NF, 3NF & BCNF), lossless join and dependency preserving decomposition. (10Hrs)

UNIT 4

Concurrency control & recovery techniques: Transaction Management-ACID properties, schedules and concurrent execution of transactions, Concurrency control-lock based protocol, Serializability, recoverability, dealing with deadlocks and Concurrency control without locking. Concurrency control techniques, locking techniques, time stamp ordering, granularity of data items, recovery concepts, database backup and recovery from catastrophic failures. Security and Authorization- Access control, Direct access control and Mandatory access control. (10Hrs)

Text Books:
1. Date C J, "An Introduction To Database System", Addision Wesley
2. Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
3. Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007

Reference Books:

1.   Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2.   Singh S.K., "Database System Concepts, design and application", Pearson Education,2006
3.   Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
4.   Rob, Coronell, "Database Systems Design, Implementation and Management", 5th edition, Thomson Course Technology, 2003.
5.   Oracle Reference Manual.
6.   Michael J. Donahoo, Gregory D. Speegle,"SQL practical guide for developers", Elsevier Inc., 2005
7.   Sams Teach yourself MySQL in 21 days, 2nd edition, Pearson Education, 2004.
8.   Raghu Ramakrishnan, Johannes Gehrke, Database Management Systems, 3rd Edition, McGraw Hill, 2003.

MCA-404   COMPUTER GRAPHICS & ANIMATION   L   P   T
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UNIT 1
Line generation: Points and Lines, Planes, Pixels and Frame buffers, vector and character generation. Graphics Primitives: Display devices, Primitive devices, Display File Structure, Display control text, Line-drawing Algorithms: DDA Algorithm Bresenham's line Algorithm, Circle-generating Algorithm: Bresenham's, Midpoint, Polygon Filling Algorithm.   (10 hrs)

UNIT 2
2-D Viewing and Clipping: Point Clipping, Line Clipping, Cohen-Sutherland Line Clippings, Cyrus-Beck Line Clipping Algorithm, Polygon Clipping: Sutherland Hodgman Algorithm. Polygon: Polygon Representation, Entering polygons, Filling polygons. Segments: Segments table, Creating deleting and renaming segments, Visibility.   (10hrs)

UNIT 3
2-D and 3-D Transformations: Basic Transformations: Translation, Rotation, Scaling, Shear, Composite Transformations: Rotations about a point, Reflection about a line, Homogeneous Coordinate Systems, 3-D Transformations, 3-D geometry primitives, Viewing Transformation, Projections: Parallel Projection, Orthographic & Oblique Projections, Perspective Projections. Interaction: Hardware input devices handling algorithms, Event handling echoing, Interactive techniques.   (10hrs)

UNIT 4
Hidden Line and Surface: Back face removal algorithms, hidden line methods. Rendering and Illumination: Introduction to curve and Surfaces generation, Bezier, Hermite and B-spline algorithms.
Multimedia and Animation: Introduction and Types of Animation, Tools, Multimedia Applications,   Concepts   of Hypertext/Hypermedia, Images, Audio and Video, Multimedia Tools.   (10hrs)

Text Books:
1.   Foley - Computer Graphics Principles & Practice, 2nd ed. Pearson Education., 2000
2.   Hearn & Baker - Computer Graphics C version, 2nd ed. Pearson Education., 1986

References Books:
1.   Roger and Adams - Mathematical Element for Computer Graphics, 2nd ed., Tata McGraw Hill, 1989
2.   David F. Rogers, "Procedural Element for computer graphics", McGraw Hill Book Company, 1985.
3.   Steven Harrington, "Computer Graphics", A Programming Approach, 2nd Edition

MCA-451   DBMS Lab   L   P   T
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Database schema design, database creation, SQL programming and report generation using a commercial RDBMS like ORACLE/SYBASE/DB2/SQL-Server/INFORMIX. Students are to be exposed to front end development tools, ODBC and CORBA calls from application Programs.

The programme to be implemented using SQL

1. Create Table, SQL for Insertion, Deletion, Update and Retrieval using aggregating functions.

2. Write Programs in PL/SQL, Understanding the conceptof 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.

9. 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-452   COMPUTER GRAPHICS & ANIMATION LAB   L   P   T
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Write Program in C or C++ for following.
1. Implementation of line generation using slope's method, DDA and Bresenham's algorithms.
2. Implementation of circle generation using Mid-point method and Bresenham's algorithm.
3. Implementation of ellipse generation using Mid-point method.
4. Implementation of polygon filling using Flood-fill, Boundary-fill and Scan-line algorithms.
4. Implementation of 2D transformation: Translation, Scaling, Rotation, Mirror Reflection   and Shearing (write a menu driven program).
6. Implementation of Line Clipping using Cohen-Sutherland algorithm and Bisection Method.
7. Implementation of Polygon Clipping using Sutherland-Hodgman algorithm.
8. Implementation of 3D geometric transformations: Translation, Scaling and rotation.
9. Implementation of Curve generation using Interpolation methods.
10.Implementation of Curve generation using B-spline and Bezier curves.
11.Implementation of any one of Back face removal algorithms: Depth-Buffer algorithm, Painter's algorithm, Warnock's algorithm, Scan-line algorithm.

MCA 501   INFORMATION SECURITY & CYBER LAWS   L   P   T
3   0   1

UNIT-1

Concept of Cyberspace & Netizens Technology, Law and Society Object & Scope of the Information Technology Act, 2000 Electronic Records, Electronic Governance and Electronic Commerce. (10Hrs)

UNIT-II

Jurisdiction under the IT Act-Territorial and Extra-Territorial Jurisdiction of the IT Act 2000 Concept of Digital Signatures and Cryptography, Digital Signature Certificate and Public Key Infrastructure, Authorities under the Act. (10Hrs)

UNIT-III

Nature and scope of computer crime, Types of Cyber crimes- Hacking, Tampering with Computer source documents, cyber pornography, cyber stalking, cyber terrorism, cyber squatting, Cyber contraventions Penalties under the Act, Investigation, Procedure for search & Seizure, Liability of Network Service Providers. (10Hrs)

UNIT-IV

Intellectual Property Right issues in Cyberspace, Concept of property in Cyberspace, Copyright and related issues, Issues relating to Trademarks and Domain names, Liability for Hyperlinking and Metatags, Domain Name Dispute Resolution Policy, Role of ICANN. (10Hrs)

Text and Reference Books:
1. Rodney Ryder - Guide to Cyber Laws.
2. Mr. Vakul Sharma - Handbook of Cyber Laws.
3. Justice Yatindra Singh - Cyber Laws.
4. Dr. Sundeep Oberoi - E-Security and you.

MCA-502   **MOBILE COMPUTING**

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UNIT – I

Introduction to Mobile Communications and Computing - Mobile Computing (MC): Introduction to MC, applications, limitations, and architecture.
Cellular Overview - Cellular networks, Cellular concept, location management, Handoffs
Wireless LANs and Application overview - WLAN, Wireless applications, Mac issues(Hidden and exposed terminals,Near and far terminals),Mobile IP, Mobile ad -hoc networks(MANET), TCP Issues, Disconnected operations, Data broadcasting, Mobile agents.

UNIT –II

WAP – Architecture, Protocol stack, Application environment, Application.
Access Technologies - Blue Tooth, GPRS, 802.11, CDMA 3, Mobile Phone Technologies (1G, 2G, 2.5G, 3G).
Database Issues - Hoarding techniques, Caching invalidation mechanisms, Client server computing with adaptation, Power-aware and context-aware computing, Transactional models, query processing, recovery and quality of service issues.
Platform/Operating Systems for application development - Palm OS, Windows CE, Embedded Linux, J2ME (Introduction), Symbian (Introduction)

UNIT – III

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.

UNIT – IV

Android application development - Overview of Android, Devices running android, Why Develop for Android, Features of android, Architecture of Android, Libraries, Software development kit. Designing the user interface - Introducing views and view groups, Introducing layouts, Creating new views, Creating and using Menus.

UNIT – V

Peer to peer to communication - Accessing Telephony Hardware, Introducing Android Instant Messaging, GTalk Service : Using, binding & Making connection, Managing chat Sessions, Sending and receiving Data messages, Introducing SMS, Using, sending & Listening SMS Messages. Accessing Android Hardware - Audio, Video and Using the camera, Introducing Sensor Manager, Android Telephony, Using Bluetooth, Manage network and Wi-Fi connections.

References:

1. Mobile Communications J. Schiller, Addition Wesley Publication
2. GSM System Engineering A.Mehrotra, Addition Wesley Publication

3. Understanding WAP M. Heijden, M. Taylor, Artech House Publication
4. Professional Android™Application Development Wrox Publications, Reto Meier
5. Hello Android, Introducing Google's Mobile Development Platform, Ed-Burnette, Pragmatic Programmers,ISBN: 978-1-93435-61 7-3
6. Sams teach yourself Android application development, Lauren Dercy and Shande Conder, Sams publishing
7. Mobile Computing: Asoke K Talukdar, Roopa R. Yavagal, TataMcGrawHill
8. Hansmann, Merk, Nicklous, Stober, "Principles of Mobile Computing", Springer, second edition

3. MCA-503   ARTIFICIAL INTELLIGENCE

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UNIT-1

INTRODUCTION: Definitions, Basic Elements of Artificial Intelligence, Artificial Intelligence application Areas, Intelligent Agents, Structure of Intelligent Agents, natural language, automated reasoning, visual perception.   (10Hrs)

UNIT-2

INTRODUCTION TO SEARCH: search knowledge, Problem solving: Solving problems by searching: state space formulation, depth first and breadth first search, iterative deepening production systems, search space control; depth-first, breadth-first search. Heuristic Based Search: Heuristic search, Hill climbing, best-first search, branch and bound, Problem Reduction, Constraint Satisfaction End and Means-End Analysis.

(10Hrs)

UNIT-3

KNOWLEDGE REPRESENTATION AND 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).

(10Hrs)

UNIT-4

NATURAL LANGUAGE PROCESSING: Introduction, Syntactic Processing, Semantic Processing, Pragmatic Processing. **Game Playing:** Minimax, alpha-beta pruning Probabilistic reasoning systems, Bayesian networks.

Learning from observations:

Inductive learning, learning decision trees, computational learning theory, Explanation based learning.

Applications: Environmental Science, Robotics, Aerospace, Medical Scioence etc.

(10Hrs)

Text Books:
  1. E. Rich and K. Knight," Artificial Intelligence", Tata McGraw Hill.
References
  1. E. Charnaik and D. McDermott," Introduction to artificial Intelligence", Addison-Wesley   Publishing Company.
  2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI.
  3. W.F. Clofisin and C.S. Mellish, "Programming in PROLOG", Narosa Publishing Co.
  4. Sanjiva Nath, "Turbo PROLOG", Galgotia Publications Pvt. Ltd.
  5. Neural Networks in Computer Intelligence" by KM Fu, McGraw Hill
  6. "AI: A modern approach" by Russel and Norvig, Pearson Education

MCA 551 MOBILE COMPUTING LAB

Lab Exercise based on Mobile Computing concepts.

MCA 552 MINOR PROJECT (AI/ISCL)

Minor project based on the concept of AI/ISCLs. Students will be required to submit the report in the format (Spiral Binding Copy) specified by the Department.

MCA 601 MAJOR PROJECT

Students will be required to pursue a dissertation allotted to them in accordance with their preference subject to approval of Departmental Committee. They will have to submit the synopsis at the beginning of the semester for the approval to the Department project committee in a specified format and dissertation done by them at the End of the semester, in a specified format. Progress report will be send by the student through e-mail to the Departmental Committee. Internal assessment will be done by the Departmental Committee on the basis of performance in various components including a mid-semester presentation by the students. Students will be required to submit the report (Hard Copy)in the format specified by the Department.

MCA-411 DATA WAREHOUSING & DATA MINING　　　**L　P　T**
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UNIT 1
Overview, Motivation for Data Mining, Data Mining-Definition & Functionalities, Data Processing, Form of Data Preprocessing, Data Cleaning: Missing Values, Noisy Data,(Binning, Clustering, Regression, Computer and Human inspection), Inconsistent Data, Data Integration and Transformation. Data Reduction, Data Cube Aggregation, Dimensionality reduction, Data Compression, Numerosity Reduction, Clustering, Discretization and Concept hierarchy generation.　　　　　　　(10Hrs)

UNIT 2
Concept Description:- Definition, Data Generalization, Analytical Characterization, Analysis of attribute relevance, Mining Class comparisons, Statistical measures in large Databases. Measuring Central Tendency, Measuring Dispersion of Data, Mining Association Rules in Large Databases, Association rule　mining,　mining　Single-Dimensional Boolean Association rules　from Transactional Databases–Apriori Algorithm, Mining Multilevel Association rules from Transaction Databases and Mining Multi-Dimensional Association rules from Relational Databases.　　　(10Hrs)

UNIT 3
Classification and Predictions: What is Classification & Prediction, Issues regarding Classification and prediction, Decision tree, Bayesian Classification, Classification by Back propagation, Multilayer feed -forward Neural Network, Back propagation Algorithm, Classification methods K-nearest neighbor classifiers, Introduction to Genetic Algorithm.　　　　　　　　　　　　　　　　　　　　(10Hrs)

Cluster Analysis:
Data types in cluster analysis, Categories of clustering methods, partitioning methods. Hierarchical Clustering and its application Chameleon. Density　Based Methods and its application DBSCAN. Grid Based　Methods and its application STING. Model Based Method Statistical Approach, Neural Network approach, Outlier Analysis
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UNIT 4
Data Warehousing: Overview,　Definition, Delivery Process, Difference between Database System and Data Warehouse, Multi Dimensional Data Model, Data Cubes, Stars, Snow Flakes, Fact Constellations, Concept hierarchy, Process Architecture, 3 Tier Architecture,
Aggregation, Historical information, Query Facility, OLAP function and Tools. OLAP Servers, ROLAP, MOLAP, HOLAP, Data Mining interface, Security, Backup and Recovery.　　　　　　　　　　　　　　　　　　　　　　　　　　(10Hrs)

Text and Reference Books:
1. M. H. Dunham, "Data Mining: Introductory and Advanc ed Topics", Pearson Education
2. Jiawei Han, Micheline Kamber, "Data Mining Concepts & Techniques", Elsevier
3. Sam Anahory, Dennis Murray, " Data Warehousing in the Real World : A Practical Guide for Building Decision Support Systems, 1/e " Pearson Education
4. Mallach, "Data Warehousing System", McGraw –Hill

MCA-412   Managerial Economics & IPR   **L   P   T**
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Unit-1
    1.1 Managerial Economics and Economic Theory
    1.2 Demand, Supply and Market Equilibrium
    1.2.1 Changes in Market Equilibrium
    1.2.2 Price Elasticity of Demand
    1.2.3 Factors affecting Price Elasticity of Demand
    1.2.4 Calculating Price Elasticity of Demand
    1.3 Demand Forecasting
    1.3.1 Meaning and Objectives
    1.3.2 Characteristics of Good Demand Forecasting
    1.3.3 Methods of Demand Forecasting
Unit-2
    2.1 Theory of Consumer's Behaviour
    2.1.1 Basic assumptions of Consumer's Theory
    2.1.2 Indifference Curves
    2.1.3 Utility Maximisation
    2.2 Price Effect, Income Effect and Substitution Effect
Unit-3
    3.1 Production and Cost in the Short-Run
    3.1.1 Basic Concepts of Production Theory
    3.1.2 Law of Variable Proportion
    3.1.3 Relation between Short-run Production and Cost
    3.2 Production and Cost in the Long-Run
    3.2.1 Isoquants
    3.2.2 Iso cost Curves
    3.2.3 Finding the Optimal Combination of Inputs
    3.2.4 Returns to Scale
    3.2.5 Long-Run Costs
    Unit-4
    4.1 Perfect Completion
    4.1.1 Characteristics of Perfect Competition
    4.1.2 Profit Maximisation in Short-Run and Long-Run
    4.2 Profit Maximisation under Monopoly
    4.2.1 Output and Pricing Decisions
    4.2.2 Price Discrimination: Capturing Consumer's Surplus
    Unit-5
    5.1 Monopolistic Competition
    5.2 Strategic Decision Making under Oligopoly
    5.3 Distinction between Risk and Uncertainty
    Unit-6
    6.1 Intellectual Property Rights (IPR)
    6.1.1 Introduction to IPR
    6.1.2 Types of IPR
    6.2.1 International Organisations and Treaties
    6.2.2 Importance of IPR

Revised Syllabus of MCA, UIET,C.S.J.M University, Kanpur meeting of BoS on 26ᵗʰ June- 2017 & Approved in AC on 5ᵗʰ July, 2017 w.e.f. Academic Session 2017-18

MCA-413   DISTRIBUTED SYSTEM   **L   P   T**
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UNIT 1
Foundation and Characterization of Distributed Systems: Introduction, Architecture of Distributed Systems, Distributed Operating System, Examples of distributed Systems, System Models: Architectural models and Fundamental Models, Limitation of Distributed system.
Theoretical Foundation for Distributed System:, Clock Synchronization, absence of global clock, shared memory, Logical clocks, Lamport's & vectors logical clocks. Causal Ordering of messages, termination detection. 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.
UNIT 2
Distributed Deadlock Detection: system model, resource Vs communication deadlocks, deadlock prevention, avoidance, detection & resolution, centralized deadlock detection, distributed deadlock detection, path pushing algorithms, edge chasing algorithms. Agreement Protocols: Introduction, System models, classification of Agreement Problem, Byzantine agreement problem, Consensus problem, Interactive   consistency   Problem,   Solution to Byzantine Agreement problem, Applications of Agreement problem.
UNIT 3
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.Distributed Scheduling: Issues in Load Distribution, Requirements of Load Distributing Policies, Load Balancing versus Load Sharing, Components of a Load Distribution Algorithm.
Failure Recovery in Distributed Systems: Classification of Failure, Concepts in Backward and Forward recovery, Recovery in Concurrent systems, Checkpoints and Roll Back Recovery Algorithm.

UNIT 4
Fault Tolerance: Issues in Fault Tolerance, Fault - Tolerant services, Commit Protocols, Voting protocols, Dynamic voting protocols. Role of Replica in Fault Tolerance. Transactions and Concurrency Control: Transactions, Nested transactions, Flat and nested distributed transactions, Concurrency control, Comparison of methods for concurrency control, Atomic Commit protocols, Concurrency control in distributed transactions. Distributed Objects and Remote Invocation: Remote Procedure Call and RMI, Case Study: CORBA RMI.
References:
1. Singhal & Shivaratri, "Advanced Concept in Operating Systems", McGraw Hill
2. Ramakrishna, Gehrke," Database Management Systems", Mc Grawhill
3. Coulouris,Dollimore, Kindberg, "Distributed System: Concepts and Design", Pearson Education
4.Tenanuanbaum, Steen," Distributed Systems", PHI
6. Gerald Tel, "Distributed Algorithms", Cambridge University Press

MCA 414   SIMULATION MODELING   L   P   T
                                                          3   0   1

Unit 1

Introduction to Simulation and Modeling, Simulation – introduction, appropriate and not appropriate, advantages and disadvantage, application areas, history of simulation software, an evaluation and selection technique for simulation software, general – purpose simulation packages.

System definition and components, stochastic activities, continuous and discrete systems, system modeling, types of models, static and dynamic physical models, static and dynamic mathematical models, full corporate model, types of system study.

Unit 2

System simulation, why & when to simulate, nature and techniques of simulation, comparison of simulation and analytical methods, types of system simulation, real time simulation, hybrid simulation, simulation of pure-pursuit problem, single-server queuing system and an inventory problem, Monte-Carlo simulation, Distributed Lag models, Cobweb model.

Unit 3

Simulation of continuous systems, analog vs. digital Simulation, Simulation of water reservoir system, Simulation of a servo system, simulation of an autopilot, Discrete system simulation, fixed time-step vs. even to even model, generation of random numbers, test for randomness, Monte-Carlo computation vs. stochastic simulation.

System dynamics, exponential growth models, exponential decay models, modified exponential growth models, logistic curves, generalization of growth models, system dynamic diagrams.

Unit 4

Introduction to SIMSCRIPT: Program, system concepts, origination, and statements, defining the telephone system model. Simulation of PERT Networks, critical path computation, uncertainties in activity duration ,resource allocation and consideration. Simulation languages and software, continuous and discrete simulation languages, expression based languages, object oriented simulation, general purpose vs. application - oriented simulation packages, CSMP-III, MODSIM-III.

References

1. Geoftrey Gordon, " System Simulation", PHI

2. Jerry Banks, John S. C Barry L. Nelson David M. Nicol, "Discrete Event System Simulation", Pearson Education

3. V P Singh, "System Modeling and simulation", New Age International.

4. Averill M. Law, W. David Kelton, "System Modeling and simulation and Analysis",TMH

MCA 415   CLOUD COMPUTING   L   P   T

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UNIT - 1

Introduction : Introduction of cloud computing, History of cloud computing, NIST definition, properties and characteristics, Cloud as green and smart, Cloud as IaaS, PaaS, Saas, BPaaS, HaaS, Public, Private, Hybrid and community cloud, Benefits and Challenges, Application availability, performance, security and disaster recovery; next generation Cloud Applications, Technology providers vs. Cloud providers vs. Cloud vendors   [10 Hrs]

UNIT - 2

Cloud Architecture: Virtualization concept, cloud building blocks, ROI Model, Service models, deployment models, storage models, security model.
Introduction to IaaS: Resource Virtualization, Server, Storage, Network
Introduction to PaaS: Cloud platform & Management, Computation, Storage
Introduction to SaaS: Web services, Web 2.0, Web OS.
Cloud Storage Infrastructue: Storage strategy and governance; security and regulations Storage Network Design: Architecture of storage, analysis and planning. Storage network design considerations, Cloud Optimized Storage, Designing backup/recovery solutions   [10 Hrs]

UNIT - 3

Cloud issues and challenges : Cloud provider Lock-in, Security challenges and approaches (Infrastructure security, Network level security, Host level security, Application level security, Data security and Storage, Data privacy and security Issues, Jurisdictional issues raised by Data location, Identity & Access Management, Access Control,Trust, Reputation, Risk Authentication in cloud computing, Client access in cloud, Cloud contracting Model, Commercial and business considerations.   [10 Hrs]

UNIT - 4

Application Development: Service creation environments to develop cloud based applications, Development environments for service development; Amazon, Azure, Google App, Salesforce.com, IBM Cloud, Google MapReduce, Yahoo Hadoop, Eucalyptus, Nimbus, OpenStack.   [10 Hrs]

TEXT BOOKS:

1. Barrie Sosinsky, "Cloud Computing Bible", Wiley-India 1 st edition, 2011
2. Gautam Shroff, "Enterprise Cloud Computing Technology Architecture Applications" Cambridge University Press 1st edition, 2010
3. Greg Schulz, "Cloud and Virtual Data Storage Networking", Auerbach Publications, 1st edition, 2009

REFERENCE BOOKS:

1. Miller Michael, "Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online", Pearson Education India ,1st edition, 2008,
2. Ronald L. Krutz, Russell Dean Vines, "Cloud Security: A Comprehensive Guide to Secure Cloud Computing", Wiley-India 1st edition, 2010
3. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, "Cloud Computing: Principles and Paradigms", Wiley-India , 2011

MCA 416   INFORMATION THEORY AND CODING   L   P   T
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UNIT 1
Measure of Information, Information contents of discrete memoryless sources, Entropy & Mutual Information, Source coding theorem: Huffman coding, Shannon-Fano coding, Lempel-Ziv algorithm, Prefix codes.

UNIT 2
Channel Coding theorem, Channel capacity theorem, Channel models, BSC, DMC, Lossless, Noiseless channels, Linear Block codes, Systematic & Non-Systematic codes, Repitition codes, Hamming codes, Cyclic codes, Cyclic Redundancy check (CRC) codes, Golay codes, BCH Codes, Read-Solomon codes.

UNIT 3
Convolution codes, Polynomial representation of Convolution codes, Tree, State and Trellis diagrams, Maximum-likelihood/Viterbi Decoding of Convolutional codes, Concept of Interleaving, Turbo Codes, Turbo decoding.

UNIT 4
Combined coding and Modulation, Trellis Coded Modulation (TCM), Mapping by set partitioning, TCM decoder, TCM for fading channels, Concept of Space time Trellis Codes.

Text Books:
1. Information Theory, Coding and Cryptography By Ranjan Bose, Tata McGraw Hill, 2002.
2. Introduction to Error Control Codes by Salvatore Gravano, Oxford University Press

Reference Books:
1. Information Theory, Inference, and Learning Algorithms By David J.C. MacKay, Cambridge University Press, 2003.
2. Entropy & Information Theory by Robert M Gray, Springer-Verlag, Newyork, INC, 1990.

MCA 417   SOFT COMPUTING   **L   P   T**
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 UNIT 1 Neural Networks:

History, overview of biological Neuro-system, Mathematical Models of Neurons, ANN architecture, Learning rules, Learning Paradigms-Supervised, Unsupervised and reinforcement Learning, ANN training Algorithms-perceptions, Training rules, Delta, Back Propagation Algorithm, Multilayer Perceptron Model, Hopfield Networks, Associative Memories, Applications of Artificial Neural Networks.

UNIT 2 Fuzzy Logic:

Introduction to Fuzzy Logic, Classical and Fuzzy Sets: Overview of Classical Sets, Membership Function, Fuzzy rule generation.

Operations on Fuzzy Sets: Compliment, Intersections, Unions, Combinations of Operations, Aggregation Operations.

Fuzzy Arithmetic:

Fuzzy Numbers, Linguistic Variables, Arithmetic Operations on Intervals & Numbers, Lattice of Fuzzy Numbers, Fuzzy Equations.

UNIT 3

Fuzzy Logic:

Classical Logic, Multivalued Logics, Fuzzy Propositions, Fuzzy Qualifiers, Linguistic Hedges.

Uncertainty based Information: Information & Uncertainty, Nonspecificity of Fuzzy & Crisp Sets, Fuzziness of Fuzzy Sets. Introduction of Neuro-Fuzzy Systems:

Architecture of Neuro Fuzzy Networks. Application of Fuzzy Logic: Medicine, Economics etc.

UNIT 4

Genetic Algorithm: An Overview, GA in problem solving, Implementation of GA

 Text:

1.   "An Introduction to Neural Networks", Anderson J.A., PHI, 1999.
2.   "Introduction to the Theory of Neural Computation", Hertz J. Krogh, R.G. Palmer, Addison-Wesley, California, 1991.
3.   "Fuzzy Sets & Fuzzy Logic", G.J. Klir & B. Yuan, PHI, 1995.
4.   "An Introduction to Genetic Algorithm", Melanie Mitchell, PHI, 1998.

Reference:

1.   "Neural Networks-A Comprehensive Foundations", Prentice-Hall International, New Jersey, 1999.
2.   "Neural Networks: Algorithms, Applications and Programming Techniques", Freeman J.A. & D.M. Skapura, Addison Wesley, Reading, Mass, (1992).

MCA 511   COMPILER DESIGN

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UNIT – I

Compiler Structure: Introduction to Compiler, Phases and passes, cross compiler, Bootstrapping. Programming Languages: High level languages, the lexical and syntactic structure of a language.

Lexical Analysis: The role of Lexical Analyzer, A simple approach to the design of Lexical Analyzer, Finite state machines ,regular expressions and their applications to lexical analysis, Transition Diagrams, Implementation of Lexical Analyzer, Lexical Analyzer Generator: LEX, Capabilities of Lexical Analyzer.   (10Hrs)

UNIT – II

The syntactic specification of programming languages: Context free grammars, derivation and parse trees, ambiguity, capabilities of CFG. Syntax Analyzer Generator: YACC Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers.   (10Hrs)

UNIT – III

Automatic Construction of efficient Parsers: LR parsers, the canonical Collection of LR(0) items, constructing SLR parsing tables, constructing Canonical LR parsing tables, Constructing LALR parsing tables.

Intermediate Code Generation: Different Intermediate forms: three address code,

Quadruples & Triples. Syntax Directed translation mechanism and attributed definition. Translation of Declaration, Assignment, Control flow, Boolean expression, Array References in arithmetic expressions, procedure calls, case statements, postfix translation.   (10Hrs)

UNIT – IV

Symbol Tables: Data structure for symbols tables, representing scope information. RunTime Administration: Implementation of simple stack allocation scheme, storage allocation in block structured language. Error Detection & Recovery: Lexical Phase errors, syntactic phase errors, semantic errors.

Code Generation: Design Issues, the Target Language. Addresses in the Target Code, Basic Blocks and Flow Graphs, Optimization of Basic Blocks, Code Generator. Code optimization: Machine-Independent Optimizations, Loop optimization, DAG representation of basic blocks, Global Data-Flow analysis.   (10Hrs)

Books and References:
1. Aho, Sethi & Ullman, "Compilers: Principles, Techniques and Tools", Pearson Education
2. V Raghvan, " Principles of Compiler Design", TMH
3. Kenneth Louden," Compiler Construction", Cengage Learning.
4.. Charles Fischer and Ricard LeBlanc," Crafting a Compiler with C", Pearson Education

MCA 512 ADVANCED DATABASE MANAGEMENT SYSTEMS

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UNIT 1
Relational Databases
Integrity Constraints revisited, Extended ER diagram, Relational Algebra & Calculus, Functional, Muiltivalued and Join Dependency, Normal Forms, Rules about functional dependencies.

Query Processing and Optimization
Valuation of Relational Operations, Transformation of Relational Expressions, Indexing and Query Optimization, Limitations of Relational Data Model, Null Values and Partial Information.
Deductive Databases
Datalog and Recursion, Evaluation of Datalog program, Recursive queries with negation.

UNIT 2
Objected Oriented and Object Relational Databases
Modeling Complex Data Semantics, Specialization, Generalization, Aggregation and Association, Objects, Object Identity, Equality and Object Reference, Architecture of Object Oriented and Object Relational Databases

Parallel and Distributed Databases
Distributed Data Storage – Fragmentation & Replication, Location and Fragment Transparency Distributed Query Processing and Optimization, Distributed Transaction Modeling and concurrency Control, Distributed Deadlock, Commit Protocols, Design of Parallel Databases, and Parallel Query Evaluation.

Advanced Transaction Processing
Nested and Multilevel Transactions, Compensating Transactions and Saga, Long Duration Transactions, Weak Levels of Consistency, Transaction Work Flows, Transaction Processing Monitors.

UNIT 3
Active Database and Real Time Databases
Triggers in SQL, Event Constraint and Action: ECA Rules, Query Processing and Concurrency Control, Compensation and Databases Recovery

Image and Multimedia Databases
Modeling and Storage of Image and Multimedia Data, Data Structures – R-tree, k-d tree, Quad trees, Content Based Retrieval: Color Histograms, Textures, etc., Image Features,

Spatial and Topological Relationships, Multimedia Data Formats, Video Data Model, Audio & Handwritten Data, Geographic Information Systems (GIS)

UNIT 4
WEB Database: Accessing Databases through WEB, WEB Servers, XML Databases, Commercial Systems.
Data Mining : Knowledge Representation Using Rules, Association and Classification Rules, Sequential Patterns, Algorithms for Rule Discovery
Data Warehousing: Data Warehousing Architecture, Multidimensional Data Model, Update Propagation OLAP Queries.
Case Study: Oracle Xi

Text Books:
1.   Elmarsi, Navathe, Somayajulu, Gupta, "Fundamentals of Database Systems", 4th Edition, Pearson Education, 2007
2.   Garcia, Ullman, Widom, "Database Systems, The complete book", Pearson Education, 2007
3.   R. Ramakrishnan, "Database Management Systems", McGraw Hill International Editions, 1998

References:
1.   Date, Kannan, Swaminathan, "An Introduction to Database Systems", 8th Edition Pearson Education, 2007
2.   Singh S.K., "Database System Concepts, design and application", Pearson Education, 2006.
3.   Silberscatz, Korth, Sudarshan, "Database System Concepts", Mcgraw Hill, 6th Edition, 2006
4.   W. Kim, "Modern Database Systems", 1995, ACM Press, Addision – Wesley,
5.   D. Maier, "The Theory of Relational Databases", 1993, Computer Science Press, Rokville, Maryland
6.   Ullman, J. D., "Principals of database systems", Galgotia publications, 1999
7.   Oracle Xi Reference Manual

MCA 513   BIG DATA ANALYTICS   **L   P   T**

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Overview of Big Data, Stages of analytical evolution, State of the Practice in Analytics, The Data Scientist, Big Data Analytics in Industry Verticals, Data Analytics Lifecycle, Operational zing Basic Data Analytic Methods Using R, Advanced Analytics - Analytics for Unstructured Data - Map Reduce and Hadoop, The Hadoop Ecosystem, In-database Analytics, Data Visualization Techniques, Stream Computing Challenges, Systems architecture, Main memory data management techniques, energy-efficient data processing, Benchmarking, Security and Privacy, Failover and reliability.

Reading:

1. Bill Franks, Taming The Big Data Tidal Wave, 1st Edition, Wiley, 2012.
2. Frank J. Ohlhorst, Big Data Analytics,1st Edition, Wiley, 2012

MCA-514   COMPUTER ARCHITECTURE   **L   P   T**
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Parallel computer models:
The state of computing, Classification of parallel computers, Multiprocessors and multicomputers, Multivector and SIMD computers.

Program and network properties:
Conditions of parallelism, Data and resource Dependences, Hardware and software parallelism, Program partitioning and scheduling, Grain Size and latency, Program flow mechanisms, Control flow versus data flow, Data flow Architecture, Demand driven mechanisms, Comparisons of flow mechanisms

System Interconnect Architectures:
Network properties and routing, Static interconnection Networks, Dynamic interconnection Networks, Multiprocessor system Interconnects, Hierarchical bus systems, Crossbar switch and multiport memory, Multistage and combining network.

Advanced processors:
Advanced processor technology, Instruction-set Architectures, CISC Scalar Processors, RISC Scalar Processors, Superscalar Processors, VLIW Architectures, Vector and Symbolic processors

Pipelining:
Linear pipeline processor, nonlinear pipeline processor, Instruction pipeline Design, Mechanisms for instruction pipelining, Dynamic instruction scheduling, Branch Handling techniques, branch prediction, Arithmetic Pipeline Design, Computer arithmetic principles, Static Arithmetic pipeline, Multifunctional arithmetic pipelines

Memory Hierarchy Design:
Cache basics & cache performance, reducing miss rate and miss penalty, multilevel cache hierarchies, main memory organizations, design of memory hierarchies.

Multiprocessor architectures:
Symmetric shared memory architectures, distributed shared memory architectures, models of memory consistency, cache coherence protocols (MSI, MESI, MOESI), scalable cache coherence, overview of directory based approaches, design challenges of directory protocols, memory based directory protocols, cache based directory protocols, protocol design tradeoffs, synchronization,

Enterprise Memory subsystem Architecture:
Enterprise RAS Feature set: Machine check, hot add/remove, domain partitioning, memory mirroring/migration, patrol scrubbing, fault tolerant system.

Text Books:
1.   Kai Hwang, "Advanced computer architecture"; TMH. 2000
2.   D. A. Patterson and J. L. Hennessey, "Computer organization and design", Morgan Kaufmann, 2nd Ed. 2002

Reference Books:
1.   J.P.Hayes, "computer Architecture and organization"; MGH. 1998

2. Harvey G.Cragon,"Memory System and Pipelined processors"; Narosa Publication. 1998
3. V.Rajaranam & C.S.R.Murthy, "Parallel computer"; PHI. 2002
4. R.K.Ghose, Rajan Moona & Phalguni Gupta, "Foundation of Parallel Processing", Narosa Publications, 2003
5. Kai Hwang and Zu, "Scalable Parallel Computers Architecture", MGH. 2001
6. Stalling W, "Computer Organisation & Architecture", PHI. 2000
7. D.Sima, T.Fountain, P.Kasuk, "Advanced Computer Architecture-A Design space Approach,"Addison Wesley,1997.
8. M.J Flynn, "Computer Architecture, Pipelined and Parallel Processor Design"; Narosa Publishing. 1998
9. D.A.Patterson, J.L.Hennessy, "Computer Architecture :A quantitative approach"; Morgan Kauffmann feb,2002.
10. Hwan and Briggs, " Computer Architecture and Parallel Processing"; MGH. 1999

MCA 511   CLIENTS SERVER COMPUTING   **L   P   T**
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UNIT 1

Components of Client/Server application: The client: services, request for services Client/Server Computing: DBMS concept and architecture, Single system image, Client Server architecture, mainframe-centric client server computing, downsizing and client server computing, preserving mainframe applications investment through porting, client server development, RPC, windows services, print services, remote boot services, other remote services, Utility Services & Other Services, Dynamic Data Exchange (DDE), Object Linking and Embedding (OLE), Common Object Request Broker Architecture (CORBA). The server: Detailed server functionality, the network operating system, available platforms, the server operating system.

UNIT 2

Client/Server Network: connectivity, communication interface technology, Interposes communication, wide area network technologies, network topologies (Token Ring, Ethernet, FDDI, CDDI) network management, Client-server system development: Software, Client–Server System Hardware: Network Acquisition, PC-level processing unit, Macintosh, notebooks, pen, UNIX workstation, x-terminals, server hardware.

UNIT 3

Data Storage: magnetic disk, magnetic tape, CD-ROM, WORM, Optical disk, mirrored disk, fault tolerance, RAID, RAID-Disk network interface cards. Network protection devices, Power Protection Devices, UPS, Surge protectors.

Client Server Systems Development: Services and Support, system administration, Availability, Reliability, Serviceability, Software Distribution, Performance, Network management, Help Disk, Remote Systems Management Security, Network Management issues.

UNIT 4

Client/Server System Development: Training, Training advantages of GUI Application, System Administrator training, Database Administrator training, End-user training. The future of client server Computing Enabling Technologies, The transformational system.

References: -
1. Patrick Smith & Steave Guengerich, "Client / Server Computing", PHI
2. Dawna Travis Dewire, "Client/Server Computing", TMH
3. Majumdar & Bhattacharya, "Database management System", TMH
4. Korth, Silberchatz, Sudarshan, "Database Concepts", McGraw Hill
5. Elmasri, Navathe, S.B, "Fundamentals of Data Base System", Addison Wesley

MCA-516   NEURAL NETWORKS

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Unit-I: Neurocomputing and Neuroscience

Historical notes, human Brain, neuron Model, Knowledge representation, Al and NN. Learning process: Supervised and unsupervised learning, Error correction learning, competitive learning, adaptation, statistical nature of the learning process.

Unit-II: Data processing

Scaling, normalization, Transformation (FT/FFT), principal component analysis, regression, co-variance matrix, eigen values & eigen vectors. Basic Models of Artificial neurons, activation Functions, aggregation function, single neuron computation, multilayer perceptron, least mean square algorithm, gradient descent rule, nonlinearly separable problems and bench mark problems in NN.

Unit-III

Multilayered network architecture, back propagation algorithm, heuristics for making B Palgorithm performs better. Accelerated learning BP (like recursive least square, quick prop, RPROP algorithm), approximation properties of RBF networks and comparison with multilayer perceptran. Recurrent network and temporal feed-forward network, implementation with BP, self organizing map and SOM algorithm, properties of feature map and computer simulation.

Unit-IV

Principal component and Independent component analysis, application to image and signal processing. Complex valued NN and complex valued BP, analyticity of activation function, application in 2D information processing, Complexity analysis of network models, Soft computing, Neuro-Fuzzy-genetic algorithm Integration.

Text and Reference Books:

1. Jang J.S.R., Sun C.T. and Mizutani E, "Neuro-Fuzzy and Soft computing", Prentice Hall 1998.

2. Laurene Fausett, "Fundamentals of Neural Networks", Prentice Hall, 1994.

MCA-521 SOFTWARE PROJECT MANAGEMENT   **L**   **P**   **T**
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UNIT-1: Introduction and Software Project Planning

Fundamentals of Software Project Management, Need Identification, Vision and Scope document, Project Management Cycle, SPM Objectives, Management Spectrum, SPM Framework, Software Project Planning, Planning Objectives, Project Plan, Types of project plan, Structure of a Software Project Management Plan, Software project estimation, Estimation methods, Estimation models, Decision process.

UNIT-2: Project Organization and Scheduling

Project Elements, Work Breakdown Structure (WBS), Types of WBS, Functions, Activities and Tasks, Project Life Cycle and Product Life Cycle, Ways to Organize Personnel, Project schedule, Scheduling Objectives, Building the project schedule, Scheduling terminology and techniques, Network Diagrams: PERT, CPM, Bar Charts: Milestone Charts, Gantt Charts.

UNIT-3: Project Monitoring and Control

Dimensions of Project Monitoring & Control, Earned Value Analysis, Earned Value Indicators: Budgeted Cost for Work Scheduled (BCWS), Cost Variance (CV), Schedule Variance (SV), Cost Performance Index (CPI), Schedule Performance Index (SPI), Interpretation of Earned Value Indicators, Error Tracking, Software Reviews, Types of Review: Inspections, Deskchecks, Walkthroughs, Code Reviews, Pair Programming.

UNIT-4: Software Quality Assurance and Testing

Testing Objectives, Testing Principles, Test Plans, Test Cases, Types of Testing, Levels of Testing, Test Strategies, Program Correctness, Program Verification & validation, Testing Automation & Testing Tools, Concept of Software Quality, Software Quality Attributes, Software Quality Metrics and Indicators, The SEI Capability Maturity Model CMM), SQA Activities, Formal SQA Approaches: Proof of correctness, Statistical quality assurance.

UNIT-5: Project Management and Project Management Tools

Software Configuration Management: Software Configuration Items and tasks, Baselines, Plan for Change, Change Control, Change Requests Management, Version Control, Risk Management: Risks and risk types, Risk Breakdown Structure (RBS), Risk Management Process: Risk identification, Risk analysis, Risk planning, Risk monitoring, Cost Benefit Analysis, Software Project Management Tools.

Text and Reference Books:

1. Software Project Management, M. Cotterell, Tata McGraw-Hill Publication.
2. Information Technology Project Management, Kathy Schwalbe, Vikas Pub. House.
3. Software Project Management, S. A. Kelkar, PHI Publication.

MCA-522 CRYPTOGRAPHY & NETWORK SECURITY   L   P   T
3   0   1

UNIT 1

Introduction and Mathematical Foundations: Introduction to group, field, finite field of he form GF(p), modular arithmetic, prime and relative prime numbers, Extended Euclidean algorithm, Modular Arithmetic, Overview on Modern Cryptography, Number Theory, probability and Information Theory. Introduction To Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services.

Classical Cryptosystems: Classical Cryptosystems, Cryptanalysis of Classical Cryptosystems, Shannon's Theory: I, Shannon's Theory: II, Shannon's Theory: III.

Symmetric Key Ciphers: Symmetric Key Ciphers, Modern Block Ciphers (DES), Modern Block Cipher (AES), Block Cipher Design Principles, Block Cipher Modes of Operation. Cryptanalysis of Symmetric Key Ciphers: Linear Cryptanalysis, Differential Cryptanalysis, Other Cryptanalytic Techniques, Overview on S-Box Design Principles, Modes of operation of Block Ciphers.

UNIT 2

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data encryption Algorithm, RCS, CAST-128, RC2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement Of Encryption Function, Fermat's & Euler's Theorem, The Chinese Remainder Theorem. Discrete Logarithmic Problem.

Public Key Encryption: Public-Key Cryptography: Principles Of Public-Key Cryptosystems, RSA Algorithm, Key Management, Diffie-Hellman Key Exchange. Modern Trends in Asymmetric Key Cryptography: Elliptic curve based cryptography: I Elliptic curve based cryptography: II

UNIT 3

Hash Functions: Message Authentication & Hash Functions: Authentication Requirements, Authentication Functions, Message Authentication Codes, Hash Functions, Birthday Attacks, Security Of Hash Function & MACS, MD5 Message Digest Algorithm, Secure Hash Algorithm (SHA), Digital Signatures: Digital Signatures, Authentication Protocol, Digital Signature Standard (DSS), Proof Of Digital Signature Algorithm.

UNIT 4

Network & System Security: Authentication Applications: Kerberos X.509, Directory Authentication Service, Electronic Mail Security, Pretty Good Privacy (PGP), S / Mime, Security: Architecture, Authentication Header, Encapsulating Security Payloads, Combining Security Associations, Key Management, Web Security: Secure Socket Layer & Transport Layer Security, Secure Electronic Transaction (Set), System Security: Intruders, Viruses, Firewall Design Principles, Trusted Systems.

Reference Books:
1. Johannes A. Buchmann, "Introduction to cryptography", Springer- Verlag.
2. Atul Kahate, "Cryptography and Network Security", TMH
3. Douglas Stinson, "Cryptography Theory and Practice", 2nd Edition, Chapman & Hall/CRC.
4. William Stallings, "Cryptography and Network Security: Principles and Practice", Prentice Hall, New Jersey.
5. B. A. Forouzan, "Cryptography & Network Security",Tata Mc Graw Hill.

MCA-523   **SOFTWARE TESTING**   **L**   **P**   **T**
                                                      3   **0**   **1**

UNIT 1:

What is software testing and why it is so hard? Faults, Errors, and Failures, Basics of software testing, Testing objectives, 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.
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, Differences between white box and Black box testing.   (10 hrs)

UNIT 2

Requirements based testing, Boundary value analysis, Equivalence partitioning, state/graph based testing, Model based testing and model checking, 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.   (10 hrs)

UNIT 3:

Scalability testing, Reliability testing, Stress testing, Acceptance testing: Acceptance criteria, test cases selection and execution
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.   (10hrs)

UNIT 4

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.
Object Oriented Testing: Issues in Object Oriented Testing, Class Testing, GUI Testing, Object Oriented Integration and System Testing.   (10 hrs)
Testing Tools: Static Testing Tools, Dynamic Testing Tools, Characteristics of Modern Tools.
Text Books:
1. William Perry, "Effective Methods for Software Testing", John Wiley & Sons, New York, 1995.
2. Cem Kaner, Jack Falk, Nguyen Quoc, "Testing Computer Software", Second Edition, Van Nostrand Reinhold, New York, 1993.

3. Boris Beizer, "Software Testing Techniques", Second Volume, Second Edition, Van Nostrand Reinhold, New York, 1990.
4. Louise Tamres, "Software Testing", Pearson Education Asia, 2002

Reference Books:

1. K.K. Aggarwal & Yogesh Singh, "Software Engineering", New Age International Publishers, New Delhi, 2005
2. Roger S. Pressman, "Software Engineering – A Practitioner's Approach", Fifth Edition, McGraw-Hill International Edition, New Delhi, 2001.
3. Boris Beizer, "Black-Box Testing – Techniques for Functional Testing of Software and Systems", John Wiley & Sons Inc., New York, 1995.
4. Marc Roper, "Software Testing", McGraw-Hill Book Co., London, 1994.
5. Gordon Schulmeyer, "Zero Defect Software", McGraw-Hill, New York, 1990.
6. Watts Humphrey, "Managing the Software Process", Addison Wesley Pub. Co. Inc., Massachusetts, 1989.
7. Boris Beizer, "Software System Testing and Quality Assurance", Van Nostrand Reinhold, New York, 1984.
8. Glenford Myers, "The Art of Software Testing", John Wiley & Sons Inc., New York, 1979.

MCA 524   DIGITAL IMAGE PROCESSING   **L   P   T**
                                                             3   0   1

UNIT 1: Introduction And Digital Image Fundamentals

The origins of Digital Image Processing, Examples of Fields that Use Digital Image Processing, Fundamentals Steps in Image Processing, Elements of Digital Image

Processing Systems, Image Sampling and Quantization, Some basic relationships like Neighbours, Connectivity, Distance Measures between pixels, Linear and Non Linear Operations.   (10hrs)

UNIT 2: Image Enhancement in the Spatial Domain

Some basic Gray Level Transformations, Histogram Processing, Enhancement Using Arithmetic and Logic operations, Basics of Spatial Filters, Smoothening and Sharpening Spatial Filters, Combining Spatial Enhancement Methods. Image Enhancement in the Frequency Domain.   (10hrs)

UNIT 3: Introduction to Fourier Transform and the frequency Domain, Smoothing and Sharpening Frequency Domain Filters, Homomorphic Filtering. Image Restoration A model of The Image Degradation / Restoration Process, Noise Models, Restoration in the presence of Noise Only Spatial Filtering, Pereodic Noise Reduction by Frequency Domain Filtering, Linear Position-Invarient Dedradations, Estimation of Degradation Function, Inverse filtering, Wiener filtering, Constrained Least Square Filtering, Geometric Mean Filter, Geometric Transformations.   (10hrs)

UNIT 4: Image Compression

Coding, Interpixel and Psychovisual Redundancy, Image Compression models, Elements of Information Theory, Error free comparison, Lossy compression, Image compression standards.

Image Segmentation

Detection of Discontinuities, Edge linking and boundary detection, Thresholding, Region Oriented Segmentation, Motion based segmentation.

Representation and Description Representation, Boundary Descriptors, Regional Descriptors, Use of Principal

Components for Description, Introduction to Morphology, Some basic Morphological Algorithms. Object Recoginition Patterns and Pattern Classes, Decision-Theoretic Methods, Structural Methods.   (10hrs)

Text & Reference Books:

1. Rafael C. Conzalez & Richard E. Woods, "Digital Image Processing", 2nd edition, Pearson Education, 2004

2. A.K. Jain, "Fundamental of Digital Image Processing", PHI, 2003

1. Rosefield Kak, "Digital Picture Processing", 1999

2. W.K. Pratt, "Digital Image Processing", 2000

MCA 525   MACHINE LEARNING   **L   P   T**
                                                                        3   0   1

UNIT 1: Introduction – Well defined learning problems, Designing a Learning System, Issues in Machine Learning; - The Concept Learning Task - General-to-specific ordering of hypotheses, Find-S, List then eliminate algorithm, Candidate elimination algorithm.   (10hrs)

UNIT 2: Inductive bias -Decision Tree Learning - Decision tree learning algorithm Inductive bias- Issues in Decision tree learning; Artificial Neural Networks Perceptions, Gradient descent and the Delta rule, Adeline, Multilayer networks, Derivation of back propagation rule-Back propagation Algorithm- Convergence, Generalization; – Evaluating Hypotheses – Estimating Hypotheses Accuracy.
                                                                           (10hrs)

UNIT 3: Basics of sampling Theory, Comparing Learning Algorithms; Bayesian Learning – Bayes theorem, Concept learning, Bayes Optimal Classifier, Naïve Bayes classifier, Bayesian belief networks, EM algorithm; - Computational Learning Theory – Sample Complexity for Finite Hypothesis spaces, Sample Complexity for Infinite Hypothesis spaces, The Mistake Bound Model of Learning.   (10hrs)

UNIT 4: Instance-Based Learning – k-Nearest Neighbor Learning, Locally Weighted Regression, Radial basis function networks, Case-based learning - Genetic Algorithms – an illustrative example, Hypothesis space search, Genetic Programming, Models of Evolution and Learning; Learning first order rules-sequential covering algorithms-General to specific beam search-Foil; Reinforcement Learning - The Learning Task, Q Learning.   (10hrs)

Reference Books:

1. Tom.M.Mitchell, Machine Learning, McGraw Hill International Edition
2. Ethern Alpaydin, Introduction to Machine Learning. Eastern Economy Edition, Prentice Hall of India, 2005.

MCA 526   REAL TIME SYSTEMS   **L   P   T**
                                                       3   0   1

UNIT 1

Real-Time Systems, Typical Real-Time Applications, Hard Versus Soft Real-Time Systems, A Reference Model of Real-Time Systems.   (10hrs)

UNIT 2

Commonly Used Approaches to Hard Real-Time Scheduling, Clock-Driven Scheduling, Priority-Driven Scheduling of Periodic Tasks, Scheduling Aperiodic and Sporadic Jobs in Priority- Driven Systems.   (10hrs)

UNIT 3

Resources and Resource Access Control, Multiprocessor Scheduling and Resource Access Control.Scheduling Flexible Computations and Tasks with Temporal Distance Constraints.   (10hrs)

UNIT 4

Real-Time Communications, Operating Systems.   (10hrs)

Reading:

1. Jane Liu, Real-Time Systems, Prentice Hall, 2000.
2. Philip.A.Laplante, Real Time System Design and Analysis, 3rd Edition, PHI, 2004.

MCA 527   MULTIMEDIA TECHNOLOGY   **L   P   T**
                                                             3   0   1

UNIT 1 Introduction:
Concept of Multimedia ,Media & data stream, main properties of multimedia system ,
Data stream characteristics &for continuous media MultimediaApplications, Hardware
Software requirements, Storage Technologies: RAID, Optical Media.   (10hrs)

UNIT 2 Components of multimedia and file formats:
Text, Basic sound concepts , MIDI , Speech ,Basic concept of Images, Graphics format
,Basic concepts of Video & animation, Conventional system,Computer based animation,
Authoring Tools, Categories of Authoring Tools.   (10hrs)

UNIT 3 Compression Techniques
Lossless and Lossy compression, Run length coding, Statistical Coding, Transform
Coding, JPEG, MPEG, Text compression using static Huffmann technique,
Dynamic Huffmann Technique, Arithmetic Technique.   (10hrs)

UNIT 4 Animation:
Introduction, Basic Terminology techniques, tweaning & morphing, Motion Graphics 2D
& 3D animation.
Introduction to MAYA(Animating Tool): Fundamentals, Modeling: NURBS, Polygon,
Organic. Animation:Key frame animation,reactive animation,path animation,Skelton
animationetc., deformers.. Dynamics: soft bodies, Rigid bodies and its usages in the
scene etc., Rendering: soft,Hard renering. IPR rendering, Line and box rendering etc.,
Special Effects: Shading & Texturing Surfaces, Lighting, Special effects.
Working with MEL: Basics & Programming   (10hrs)

Text Book:
1. David Hillman, "Multimedia Technology & Applications", Galgotia Publications,
   2000
Reference Books:
1. Nigel Chapman & Jenny Chapman, "Digital Multimedia", Wiley Publications,
   2000
2. D.P. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI,
   2001
3. Maya manuals.

MCA 528   BIO-INFORMATICS   **L   P   T**
                                                               3   0   1

UNIT 1 – Basic Biology
Concept of gene, genetic material and genome. Chemistry of nucleic acids - structure and chemical composition of DNA and RNA. Molecular biology of gene functions (transciption and translation. Concepts of "ome" and "omics".

UNIT 2 - Dynamic Programming and Pattern Matching Algorithm
Introduction to Algorithms, Dynamic Programming, Sequence Alignment: Edit distance, LCS. PAM and BLOSUM Scoring Matrices. Global alignments: Needleman Wunsch Algorithm, Local Alignments: Smith Waterman Algorithm, Gap Penalties.
Algorithms for derivation of and searching sequence patterns: MEME, PHI-BLAST, SCanProsite and PRATT Algorithms for generation of sequence profiles: Profile Analysis method of Gribskov, HMMer, PSIBLAST, Multiple Sequence Alignment: CLUSTAL W., Clustering Basics: Hierarchical Clustering,

UNIT 3- Evolutionary Tress and Phylogeny
Molecular Phylogeny: Concepts, rooted and Unrooted tree; Evolutionary Trees and Ultrametrics, Distance and Character based method algorithm, concept of bootstrapping

Hidden Markov Models
Hidden Markov Models: Basics, Forward and Backward (Viterbi) Algorithms, Randomized algorithms and their applications.

UNIT 4
Big Data Analytics
Big data, Structured data, Unstructured data, Storage and indexing, of massive databases, Big Data Visualisation, Big Data Analytics, Applications of Machine learning techniques. Statistical and Computational Challenges of Big Data in Bioinformatics, Software used in Big data analytics.

R programming
Introduction to R, Language Fundamental of R, I/O in R, Foreign Language Interface, R package, Bioconductor, Data Technologies, Debugging and Profiling, Application of R in Bioinformatics

REFERENCES
1. Phillip Compeau, Pavel Pevzner, Bioinformatics Algorithms: an Active Learning Approach
2. Neil C. Jones, Pavel Pevzner, Introduction to Bioinformatics Algorithms, ANE Books, 1st Edition edition (1 December 2009)
3. Molecular Cell Biology (4th Edition) by Daid Baltimore, Lodish etc, WH Freeman, NY, 200.
4. Neil C. Jones and Pavel A. Pevzner, "An Introduction to Bioinformatics Algorithms", MIT Press, 2005. 2. Gusfields D, "Algorithms on strings, trees and sequences: Computer Science and Computational Biology", Cambridge University Press, 1997.
5. Steffen Schulze-Kremer, "Molecular Bioinformatics: Algorithms and Applications", Walter de Gruyter, 1996.

6. Gary Benson, Roderic Page (Eds.), "Algorithms in Bioinformatics", Springer International Edition, 2004. 5. Richard Durbin, Sean R. Eddy, Anders Krogh, Graeme Mitchison. "Biological Sequence Analysis: Probabilistic Models of Proteins and Nucleic Acid", Cambridge University Press, 1999.

7. Wang, Baoying, "Big Data Analytics in Bioinformatics and Health Care" Medical Information Science Reference, IGI Global, 2015.

8. Vignesh Prajapati, "Big Data Analytics with R and Hadoop (Paperback)", Packet Publishing Ltd, UK, 2013.

9. EMC Education Services, "Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley and Sons Inc, 2015.

10. Robert Gentleman, "R Programming for Bioinformatics" CRC press Taylor and Francis Group, A Chapman and Hall book, 2008.

MCA-601	**Project Work**	**L**	**T**	**P**
		0	**0**	**9**

The student will submit a synopsis at the beginning of the semester for the approval to the Department project committee in a specified format. The student will have to present the progress of the work through seminars and progress report. A report must be submitted to the Department for evaluation purpose at the end of the semester in a specified format.

MCA-602	**Seminar and Progress Report**	**L**	**T**	**P**
		0	**0**	**9**

The student will have to present the progress of the dissertation work through seminars and progress report. A report must be submitted to the Computer Application Deptartment for evaluation purpose at the end of the semester in a specified format.