

COURSE STRUCTURE & SYLLABUS
FOR
1ST to 3RD YEAR

MCA PROGRAMME
w.e.f. 2009-10 Academic Session



SIKSHA 'O' ANUSANDHAN UNIVERSITY
INSTITUTE OF TECHNICAL EDUCATION & RESEARCH
BHUBANESWAR

SIKSHA 'O' ANUSANDHAN UNIVERSITY
INSTITUTE OF TECHNICAL EDUCATION & RESEARCH
DEPARTMENT OF COMPUTER APPLICATION

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Siksha 'O' Anusandhan University

Department of Computer Application Curriculum for MCA Programme (w.e.f. 2009-2010)

1 st Year							
1 st Semester				2 nd Semester			
Subject Code	Theory	Contact Hrs. L-T-P	Credit	Subject Code	Theory	Contact Hrs. L-T-P	Credit
CA-701	Problem Solving & Programming	3-1-0	4	CA-703	Data Structure	3-1-0	4
MA-701	Discrete Mathematics	3-1-0	4	MA-702	Statistical & Computational Techniques	3-0-0	3
HS-701	Organization Structure & Human Resource Management	3-0-0	3	CA-704	Objet Oriented Programming	3-0-0	3
HS -702	English for Communication	2-0-0	2	CA-705	Software Engineering	3-1-0	4
CA-702	Computer Organization & Architecture	3-1-0	4	HS-703	Accounting & Financial Management	3-0-0	3
SUB TOTAL		17	17	SUB TOTAL		17	17
Subject Code	Sessionals	Contact Hrs. L-T-P	Credit	Subject Code	Sessionals	Contact Hrs. L-T-P	Credit
CA-771	Programming Lab Using C	0-0-6	4	CA-780	Data Structure Lab using 'C'	0-0-3	2
HS-771	English for communication lab	0-0-3	2	CA-782	OOPs & Statistical & Computational Programming.	0-0-6	4
				HS-780	Corporate Skills	0-0-3	1
SUB TOTAL		9	6	SUB TOTAL		12	7
TOTAL		26	23	TOTAL		29	24

1st Semester MCA

(CA 701) PROBLEM SOLVING & PROGRAMMING (3-1-0)

Module –I

(12 hours)

Programming Techniques and System Software: Problem solving aspects (Definition & understanding a problem, algorithm, flowchart, Pseudo Code). Compilation process (Source code, Object code, executable code). Type of Software. Evolution of Programming languages. Various programming techniques (monolithic, structured programming, OOP)

C Language Fundamentals : Character set, Identifiers, Keywords, Data Types, Constant and Variables, Statements, Expressions, Operators, Precedence of operators. Input Output Assignments, Control structures (If-Else, Else-if, Switch, Loops-while and For, Loops- Do-while, Break, Continue)

Module –II

(18 hours)

Arrays: Declarations, One dimensional, two dimensional, Multidimensional and their applications, Manipulation, String as Character array.

C Functions: Monolithic vs. Modular programs, User defined vs. standard functions, formal vs. Actual arguments, Functions category, function prototypes, and parameter passing Recursion, Storage Classes: Auto, Extern, Global, and Static.

Pointers: Pointer variable and its importance, Pointer Arithmetic, Array of Pointers, Pointers as Function parameters.

Module –III

(10 hours)

Structures, Union and File handling: Basics of structures, Structures & Functions, Array of structures, pointer to structure, Unions, Files (Open, Close, I/O operations)

Text Books Recommended

1. R.G. Dromey , "How to Solve it by Computer", PHI.
2. B.W. Kernighan & D.M. Ritchie, "C Programming Language", PHI.
3. B.A. Forouzan & R. F. Gilbarg, "Computer Science : A Structured Programming Approach using 'C'", Cengage learning 2007.

Reference Books:

1. A. Kelvi & I Pohe, "A Book on 'C'" Pearson Education.

(MA 701)

DISCRETE MATHEMATICS

(3-1-0)

Module –I

(12 hours)

Sets, relations and functions: Basic operations on Sets, Cartesian products, disjoint union (sum), and power sets, Different types of relations their compositions and inverse, Different types of functions, their compositions and inverses, Arbitrary Union, intersection and product.

Propositional Logic: Syntax and semantics proof systems, satisfiability, validity, soundness, completeness, deduction theorem, etc. Decision problems of propositional logic, Introduction to first order logic and first order theory, axiom of choice.

Size of Set: Finite and infinite sets, countable and uncountable, Cantor's diagonal argument and power set theorem, non-computability of all number theoretic functions.

Module –II **(12 hours)**

Partially order sets: Complete partial ordering, chain and lattice. Complete, distributive modular and complemented lattices. Boolean and pseudo Boolean lattices. Different sub-lattices, monoton map and morphisms, quotient structures, filter, Tarski's fixed point's theorem.

Algebraic Structures: Algebraic structures with one binary operation semi group, monoic and group. Congruence relation and quotient structures. Morphisms. Free and cyclic monoids and groups. Permutation group. Substructures, normal subgroup, Error correction code. Algebraic structures with tow binary operations – ring, integral domain, and field Boolean algebra and Boolean ring.

Module –III **(16 hours)**

Introduction to Counting: Basic counting techniques – inclusion and exclusion, pigeonhole, principle, permutation, combination, summations. Introduction to recurrence relation and generating function.

Introduction to graph: Graph and their basic properties – degree, path, cycle, sub-graph, isomorphism, Eulerian and Hamiltonian walk, graph coloring, planar graph, trees.

Text Books Recommended:

1. Kenneth Rosen, "Discrete Mathematics and Its Applications", TMH.
2. C.L.Liu, "Elements of Discrete Mathematics" , Mc Graw Hills.

Reference Books:

1. R. P. Grimaldi & B.V. Ramana, "Discrete and Combinatorial Mathematics -An Applied Introduction", Pearson Education.
2. Tremly and Manohar, "Discrete Mathematics", Mc Graw Hills.
3. Birkoff and Barlee, "Modern Applied Algorithm".

(HS 701) ORGANISATION STRUCTURE & HUMAN RESOURCE MANAGEMENT **(3-0-0)**

Module –I **(14 hours)**

Forms of Organization: Name of Organization – Proprietorship, Partnership, Co-operative and statutory corporations, companies- concepts of holding and subsidiaries companies, comparison and choice of structures, features of international organizations and multinational companies.

Organizational Structure: Formal & informal organization – Line and staff organization, delegation, decentralization, structural configurations of functional, divisional, matrix, network, virtual and learning organizations; principles underlying designing of a structure.

Module –II **(13 hours)**

Human Resource Management: Introduction, concept, nature & scope of human resource management, Challenges in HRM, PM vs HRM.

Acquisition of HR: Job analysis & design, Human resource planning, recruitment and selection, Orientation & Socialization, transfer, promotion & separation.

Module –III

(13 hours)

Developing and Evaluation of Human Resources: Training & Development – Concept, objective uses, types of training, Methods of training & development, Management Development Program on interpersonal skill, Team building & mentoring, Performance and potential appraisal – concept, objectives, uses, modern methods of performance appraisal. Human Resource Audit & Research.

Books Recommended:

1. V.S.P. Rao, “Human Resource Management”, Excel Books.
2. T. N. Chhabra, “Text and Cases in HRM”, Dhanpat Rai & Co.
3. C.B. Mamoria, “Personnel Management”, Himalaya Publication.
4. P. Jyothi & D. N. V, “Human Resource Management”, Oxford Univ. Press.
5. K. Aswathappa, “Human Resource Management”, TMH
6. Sharma & Gupta, “Business Studies”, Kalyani Publication.
7. Stoner & Free Man, "Management", PHI.

(HS 702) ENGLISH FOR COMMUNICATION

(2-0-0)

Module-I

(12 hours)

Basic of Communication: Communication as a process, models of communications, Human aspects of communication, 4 aspects of communication-Listening, Speaking, Reading, Writing.

Barriers of communication: Noise, Emotions Judgments, Inattention, Moods-Feedback.

Use of technology: Internet, X-net, 3G, Email, Cell Phones, Software, Technology influencing language use.

Qualities of good communication: Intelligibility, Reciprocity, Correct use of language, proper use of language, Proper use of non-verbal communication, deep and active listening in the cross cultural contexts, regional and linguistic variations.

Aspects of Communication: Reading - **Scanning, Skimming, Intensive**, Speaking-**Physiological and situational**, Writing-**Narrative, Expository, Argumentative, Personal, Professional**

Module-II

(12 hours)

Language as method and medium: **Grammar creating meaning**

Language functions: **MAK Holliday’s model**

Plain and bias-free English- an international need.

Growing trend of informality

Englishness of English

Problems of Indian speakers: **consonants and vowels**

Stress order and voice modulation

Accent neutralization

Module-III

(6 hours)

Concrete, compact, cheerful, considerate, coherence, cohesion, clarity

Use and abuse of words: **Jargons, slang’s and technical words.**

Structuring of Ideas and writing paragraphs, Business letter, Email, Fax, memos

Business Report, Business Proposals, Preparation of Agenda, minutes, motion, resolution,

Presentation, Group Discussion

Role of Chair Person

Job Oriented: Job Application – Dos and Don'ts, Curriculum Vitae and Covering letter, Job Interviews

Text Books Recommended :

1. Bovee et al, "Business Communication Today", Pearson Education. 2005.
2. Lani Arredondo, "Communication Effectively", Tata McGraw Hill, New Delhi 2005.
3. R.K. Bansal & J.B. Harrison, "Spoken English, Orient Longman", New Delhi.
4. Shirley Taylor, "Communication for Business: A Practical Approach", Pearson Education, New Delhi 2005
5. Geoffrey Leech and Jean Svartvik, "A Communicative Grammar of English", Longman Publishing Group 1975.

(CA 702) COMPUTER ORGANISATION AND ARCHITECTURE (3-1-0)

Module –I (13hours)

Fundamental Concepts: Difference between architecture and organization, basic organization of the computer and block level description of the functional units, bus structure, multiprocessor & Multi Computer, numbers representation, arithmetic operations. Von-neumann concept.

Digital Logic: Logic gates Boolean algebra, map simplification, flip-flops, decoders. Multiplexer, registers, shift registers, counters.

Module –II (13 hours)

Basic Processing unit; Instruction set, execution of a complete instruction, instruction sequencing, instruction cycle, addressing modes, bus organization, Hardwired control, micro-programmable control,

I/O organization: Memory and I/O access, I/O mapped I/O, memory mapped I/O, Synchronous and asynchronous data transfer, DMA transfer.

Module-III (14 hours)

The Memory System: Some basic concepts, semiconductor RAM, ROM, speed, size and cost, memory location and address, memory operation, memory interleaving, cache memories, Cache memory mapping, associative memory, virtual memory, Secondary Storage.

Parallel Processing: Architectural classification of parallel processing (FLYNN'S), Pipelining: Basic concepts, Types of pipeline, various types of hazards in pipelining and their resolution techniques, Superscalar Operations.

Text Books Recommended

1. V.Carl Hamacher, Zvanko Vranesic & Safwatzaky, "Computer Organization", McGraw-Hill
2. M. Morris Mano, "Computer System Architecture", TMH

Reference Books:

1. Hannesy and Patterson, "Computer Organisation"
2. John P. Hayes, "Computer Architecture and Organization", TMH.

(CA 771) PROGRAMMING LAB USING C

(0-0-6)

Introduction to OS: LINUX/UNIX , DOS, WINDOWS

Vi Editor on UNIX

File handling: directory structures, file permissions, creating and editing 'C' programming, compilation and execution.

C Programming: variables and expression assignment, simple arithmetic.

Loops, if else, case statements, break, continue, goto.

Single and multidimensional arrays.

Functions, recursions, file handling in C.

Pointers, address operators, declaring pointers and operations on pointers.

Address of an array, structures, pointers to structures, dynamic memory allocation.

(HS 771) ENGLISH FOR COMMUNICATION LAB (0-0-3)

1. Ice Breaking Session
2. Role Play & Simulation
3. Peer Group Activity
4. Group Talk
5. Reading Skill Practice
6. Group Discussion
7. Writing Paragraphs- argumentative, expository, descriptive, professional etc.
8. Writing CV & covering letter
9. Presentation
10. Mock Interview

2nd Semester MCA

(CA 703) DATA STRUCTURE (3-1-0)

Module-I (12 hours)

Development of Algorithms: Notation and Analysis, Introduction to data structure, Description, Operations, ADT, Arrays (1D, 2D), Character arrays & Strings, Sparse matrices, structures and arrays of structures, Stacks and Queues, Array representation of Stacks, queues and their applications.

Module-II (20 hours)

Linked Lists: Singly linked lists- operations – Double Linked Lists- Circularly Linked Lists. Dynamics storage management, Header Linked List, Linked list vs. arrays, Representation of stacks and queues using linked list.

Trees: Binary Trees, Binary Search Trees, General Trees, Tree Traversing methods (both recursive and non-recursive), Operations on Binary Trees, heights Balanced Trees. Graphs, Representation of Graphs, Graph Traversing (BFS, DFS)

Module-III (8 hours)

Sorting Techniques : Selection, Bubble, Insertion, Merge, Radix. Linear Searching, Binary Searching, Hashing.

Text Books Recommended

1. R. Gilberg & B. A. Forouzan , "Data Structure: Pseudocode Approach with 'C'", Thomson Course Technologies 2007 (Indian Reprint)

Reference Books:

1. Langsan, Augenstein, Tanenbom, "Data Structure using C and C++", PHI.
2. Lipsuz, "Datastructure", TMH
3. Sahani, "Fundamental of Datastructures", Galgotia.
4. ISRD Group, "Data Structures Using C", TMH
5. M. A. Weiss, "Data Structure & Algorithm and Analysis in 'C'", Pearson Education.

(MA 702) STATISTICAL AND COMPUTATIONAL TECHNIQUES (3-0-0)

Module- I (15 hours)

Probability of events, conditional probability, Bayes' rule discrete distributions, continuous distributions mean and variance, Cheiyshev theorem, joint distribution, linear regression and correlation, correlation coefficients

Module- II (13 hours)

Approximation of function by poly nominal interpolation, Lagrange Newton and hermitte interpolation ,Orthogonal polynomials, properties, Economization of power series, Root of equations by secant, Newton and Muller methods, solution of linear systems by direct and iterative methods. Numerical determination of eigen values of matrices.

Module- III

(12 hours)

Numerical Evaluation and Integrals by Newton cotes rules, compound rules and Gauss rules, Romberg method, Numerical evaluation of multiple integrals by product rules, Solution of I.V.P by Euler Taylor , modified Euler and Runge – Kutta methods (rules 2,3 and hp)

Text Books Recommended:

1. R. Walpokle. R. Mayers, S.Myers, and K.Ye, "Probability and Statistics for Engineers and Statistics", 8th Edition
2. J.A.Rice, "Mathematical Statistics and Data Analysis", 3rd Edition Thomson
3. S.D. Coule. DeBoor, "Elements of Numerical Analysis Algorithmic Approach"
4. R.L.Burden, J.D.Faires, Numerical Analysis, Thomson India Edition 2007.

(CA 704) OBJECT ORIENTED PROGRAMMING

(3-0-0)

Module-I

(12 hours)

Introduction to object oriented programming: object oriented concepts (Class, object, encapsulation, aggregation, inheritance, polymorphism). How to write a C++ program. Data types, expressions, operators, control structures.

Functions: definition, parameter passing, inline function, function overloading.

Classes: data members, function members, static data members, constant members function, and friend function.

Module-II

(18 hours)

More about classes: Constructors, destructors, friend classes, nested classes, local classes, this pointer, namespaces.

Overloading: Operator overloading (binary, unary, String Concatenation, increment, decrement), operator overloading using friend function (Stream operators). Type conversion (Using constructor, Operator function).

Inheritance: Derived classes, member accessibility, forms of inheritance, virtual base classes.

Polymorphism: Pointers to objects, virtual functions, Abstract class, virtual destructors.

Module-III

(10 hours)

Sreams & Files: streams, hierarchy of stream classes. Unformatted I/O operators, formatted i/o operations manipulators, user defined manipulators, exception handling. templates, Standard template Library.

Text Books Recommended

1. Behrouz A. Forouzan & Richard F. Gilberg “A Structured approach using C++” Cengage Learning Indian Edition.
2. Bjarne Stroustrup, "C++ Programming Language", Pearson Education, The 3rd Edition.

Reference Books:

1. A.N. Kamthane, “Object Oriented Programming with ANSI & Turbo C++”, Pearson Education.
2. E. Balguruswamy, “Object Orientd Programming with C++”, TMH Publisher.

(CA 705) SOFTWARE ENGINEERING (3-1-0)

Module-I (15 hours)

Introduction to Information System Development: Overview of System Analysis and Design, Categories of Information Systems, System development Strategies, Implementation and Evaluation, Tools for System development

Introduction to software Engineering: Basic concepts about software and program and Evolution of Software Engineering, Basic concepts on process and life cycle models.

Models: Waterfall, Prototype, Evolutionary, Incremental, spiral, V, RADM etc.

Requirement Analysis: Introduction to software specification, its needs and importance, formal specification methods.

SRS: attributes of good SRS and organization of SRS document.

Module-II (15 hours)

Software design: Methods and strategies, desirable design attributes, Concept of good design, Cohesion and coupling.

Function-Oriented Software Design: structured system analysis and structured design, formal approach design, data flow oriented design.

Software coding and testing: coding standard and guidelines, code review, software inspection

Testing: Unit, integration, system testing, black box and white box testing Incremental testing, formal proof of correctness, software matrix. Introduction to software verifications.

Module-III (10 hours)

Software Reliability and Quality Management: S/W and H/W reliability, Reliability Matrices, S/W quality, ISO 9000

Software engineering management: introduction to capability maturity model, quality assurance and software cost estimation (Delphi, COCOMO). Introduction to computer-aided software engineering.

Software reuse and maintenance.

Text Books Recommended:

1. Rajib Mall, "Fundamentals of Software Engineering", PHI.
2. James A. Senn, "Analysis and Design of Information Systems", McGraw Hill

Reference Books:

1. R.S. Pressman, "Software Engineering – A Practitioner's Approach", McGraw Hill.
2. P. Jalote, "An Integrated Approach To Software Engineering", Narosa, New Delhi.
3. G. Booch, "Object-Oriented Analysis and Design", Benjamin / Cumming Publishing Co. New York.

(HS 703) ACCOUNTING AND FINANCIAL MANAGEMENT (3-0-0)

Module-I (10 Hrs)

Process of Accounting :

Concepts, Conventions and Standards, Preparation of Journals, Trial Balance, Profit and Loss A/c and Balance Sheets, User of Accounting Information.

Module-II: (12 Hrs)

Financial Statement Analysis:

Ratio Analysis (Liquidity, Leverage and Profitability Ratios), Funds Flow and Cash Flow Analysis,

Basic of Financial Management: Meaning, Nature and Scope of Financial Management, Role and Functions of Financial Management, objectives of Financial Management.

Module-III: (12 Hrs)

Short Term and Long Term Investment Decisions.

Working Capital Management: Meaning, Objectives, Determinants, Estimation and Financing of Working Capital.

Capital Budgeting : Meaning and Nature of Capital Budgeting. The Concept of Cash Flow, Project Evaluation Criteria (Pay Back Period Method, Accounting Rate of Return Method, Net Present Value Method and Internal Rate of Return Methods)

Books Recommended:

1. Jain & Narang, "Financial Accounting", Kalyani
2. Sharma & Gupta, "Financial Management", Kalyani
3. Prasanna Chand, "Financial Management"
4. I.M Pandey, "Financial Management"
5. Bal & Others S. Chand, "Accounting"

(CA 780) DATA STRUCTURE LAB. USING ‘C’ (0-0-3)

Array: Problem on sparse matrix, String pattern matching

Stack: Problems of stack, Evaluation of arithmetic expressions in infix, prefix, postfix forms.

Queue: Problems of queue, circular queue, insertion and deletion of queues.

List: Problems on single linked list, doubly linked list with list operations , circular list.

Trees: Creation of binary trees, determination of depth of binary tree, counting nodes, tree traversals, balanced tree.

Graph: Problems on graphs, breadth first search, depth first search.

Heap: Problems on heaps, operations on heaps, heap sort, Priority queues.

Searching & Sorting: Problems on binary search, selection sort, insertion sort, quick sort, bubble sort, merger sort.

**(CA 782) OOPS & STATISTICAL & COMPUTATIONAL (0-0-6)
PROGRAMMING**

OOPs:

Concepts of classes and objects, Programs using inheritance and polymorphism, Use of operator overloading, memory management etc.

Exception handling, use of templates, file handling in C++.

Design Problems- stock and accounting of a small organization, railway reservation, payroll preparation , optimization problems.

Simulation:

Lab for queuing (M/M/1): (FIFO/ ∞ / ∞)

Lab for inventory models

(HS-780) CORPORATE SKILLS

(0-0-3)

Objective: To enhance the employability of the students of MCA by developing in them the required communication competence and etiquettes for corporate adaptability.

Course Description

Development of soft skills requires the participation of students in a wide range of practice activities. So in the lab sessions practice will be followed by review and discussion and the students will infer the underlying theoretical principles. Students will be tested for their skills and not their knowledge of theoretical concepts.

Sessions:

1. Rapport Building
2. Personal Grooming
3. Etiquettes
4. Meeting: Simulated meetings will be conducted
5. Interview: Interviews will be conducted
6. Role play activities simulating communication in different situations
7. Writing Reports: factual and analytical, routine and special, formal and informal
8. Writing scientific and technical papers
9. Cultural elements of communication: factors in cross-cultural communication; adjusting communication to cultural variation; the need to understand and accept cultural diversity
10. Maintaining inter-personal communication in crisis situations.

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2 nd Year							
3 rd Semester				4 th Semester			
Course Code	Theory	Contact Hrs. L-T-P	Credit	Course Code	Theory	Contact Hrs. L-T-P	Credit
CA-806	Design & Analysis of Algorithm	3-1-0	4	CA-810	Object Oriented Analysis & Design with UML	3-0-0	3
CA-807	Relational Database	3-0-0	3	CA-811	Principles of Programming Languages	3-1-0	4
CA-808	Operating System	3-1-0	4	CA-812	Computer Networks	3-1-0	4
CA-809	Theory of Computation	3-1-0	4	MA-804	Optimization Techniques	3-0-0	3
MA-803	Simulation & Decision Theory	3-0-0	3		Elective – I	3-0-0	3
				CA-813	Compiler Design		
				CA-814	Advanced OS		
				CA-815	Patter recognition		
				CA-816	Algorithm for Bioinformatics		
				CA-817	Selected Topics in CS-		
SUB TOTAL		18	18	SUB TOTAL		17	17
Sessionals				Sessionals			
CA-871	Relational Database Lab	0-0-6	4	CA-880	Programming Using JAVA	0-0-6	4
CA-873	UNIX & Shell Programming Lab.	0-0-3	2	CA-882	Networking Lab	0-0-3	2
CA-875	Design & Analysis of Algorithm Lab.	0-0-3	2	CA-884	OOAD Lab	0-0-3	2
HS-871	Life style comm. for corporate readiness	0-0-2	1	CA-890	Seminar	0-0-3	2
SUB TOTAL		14	9	SUB TOTAL		15	10
TOTAL		32	27	TOTAL		32	27

3rd Semester MCA

(CA 806) DESIGN & ANALYSIS OF ALGORITHMS (3-1-0)

Module-I (12 hours)

Introduction to design and analysis of algorithms: Growth of functions, Asymptotic notations, standard notations and common functions

Recurrences: Solutions of Recurrences by Substitution, Recursion Tree method and Master methods.

Design and Analysis of Divide and Conquer Algorithms (Binary Search, Merge sort and Quick sort), Heap sort: Heaps, Building Heaps, Heap sort Algorithm and Priority Queue.

Module-II (18 hours)

Dynamic Programming Algorithms: Matrix Chain Multiplication, Elements of Dynamic Programming, Longest Common Subsequence.

Greedy Algorithms: Activity Selection Problems, Elements of Greedy Strategy, Fractional Knapsack Problem, Huffman Codes.

Graph Algorithms: Representation of Graphs, Breadth-first Search, Depth-first Search, Minimum Spanning Trees, Prim's algorithm and Kruskal's Algorithm, Single –Source Shortest Paths (Bellman-Ford and Dijkstra's Algorithms). All-Pairs Shortest Paths (Floyd-Warshall Algorithm).

Module-III (10 hours)

String Matching: The naive string-matching algorithm, Robin-Karp algorithm, String Matching with Finite Automata.

NP-Completeness: Polynomial time, Polynomial-time verification, NP-Completeness and Reducibility, NP-Complete Problems (without proof).

Approximation Algorithm (Traveling Sales man problem).

Text Books Recommended:

1. T.H. Cormen, C.E. Leiserson, R.L. Rivest & C. Stein "Introduction to Algorithms" PHI (2nd Edition)
2. Kenneth A. Berma, Algorithms, Cengage Learning INDIA EDITION

Reference Books:

1. Horowitz E. & Sahni S., "Fundamentals of Computer Algorithms", Galgotia Publications.
3. Aho, Hopcroft & Ullman, "The Design & Analysis of Algorithm", Addison – Wesley.
4. Goodrich Tamassia, "Algorithm Design: Foundations Analysis & Internet Examples", John Wiley & Sons
5. Dasgupta Papadimitriou Vazirani, "Algorithms", TMH

(CA 807) RELATIONAL DATABASE

(3-0-0)

Module-I

(12 hours)

Introduction to Database: Characteristics of the Database approach, Advantages of using DBMS approach.

Database System Architecture: Data abstraction, Schema, Instances, Three Schema Architecture and data Independence

Data base languages, Data Models: DML, DDL, DCL, Entity Relationship(ER), Relational mapping ER model to Relational Model, Network and Object oriented data model.

Module-II

(17 hours)

Relational Query Language: Relational algebra, Tuple and Domain Calculus, QBE and SQL.

Relational Database Design: Informal Design Guidelines for Relational schema

Normalization: Functional Dependencies, Normal forms, Properties of Relational Decompositions, Algorithms for Relational Database Schema Design, Multivalued Dependencies & 4NF.

Query Processing and Optimization: Evaluation of Relational Algebra Expression, Query Equivalence, Join strategy, Query optimization algorithms.

Module-III

(11 hours)

Storage Strategies: Indices, B-Trees, Hashing

Introduction to Transaction Processing: Transaction, Properties of Transaction, Serializability

Concurrency Control Techniques: Locking, Timestamp ordering, Multiversion and Optimistic concurrency control techniques and **Introduction to Distributed Database concepts.**

Text Books Recommended:

1. Elmasri & Navathe, "Fundamental of Database Systems", 4th Edition, Pearson Education.

Reference Books:

1. C.J. Date "An Introduction to Database Systems", Pearson Education.
2. Bipin Desai "An Introduction to Database System" Galgotia publication.
3. A. Seilberschatc, H. Korth, S Sudharsan, "Database System Concepts", MGH

(CA 808) OPERATING SYSTEMS

(3-1-0)

Module-I

(12 hours)

Introduction: What is an Operating System, Simple Batch Systems, Multiprogramming and Time Sharing systems. Personal Computer Systems, Parallel Systems, Distributed Systems and Real time Systems.

Operating system structures: O.S. Services, system calls, operating system structure

Process Management: Process concept, Process Scheduling, Operation on Processes, Cooperating Processes. Interprocess communication. Threads.

CPU Scheduling: Basic concepts, scheduling criteria, scheduling algorithms.

Module-II

(18hours)

Process synchronization: Background , Critical section problem, Semaphore, Overview of classical synchronization problem, Monitors

Deadlocks: System model, Deadlock Characterization Methods for Handling Deadlocks, Deadlock Prevention, Deadlock avoidance, Deadlock Detection, Recovery from Deadlock.

Memory management: Background, address Binding, Logical versus Physical Address space, Overlays, contiguous Allocation. Paging, Segmentation. Segmentation with paging

Virtual Memory: Background, Demand paging, performance of Demand paging, Page Replacement Algorithms. Allocation of frames, Thrashing,

Module – III

(10 hours)

File-system: File concept, Access Methods, Directory structure & implementation, Allocation Method, Free space management.

I/O systems: Overview, I/O Hardware, Application of I/O interface, Kernel I/O - subsystem Transforming I/O requests to Hardware Operations. Secondary storage Structure: Disk Structure, Disk Scheduling, Disk Management, Swap space Management, Disk Reliability.

Recommended Text Books:

1. Abraham Silberschatz and Peter Bear Galvin, "Operating System Concepts", Addison Wesley.

Reference Books:

1. P. Blkeiahn Prasad. Moswen, SCITECH, "Operating Systems and System Programming",
2. Milenkovic, "Operating Systems Concepts and Design", Tata Mcgrawhill
3. Andrew, S Tannenbaum , "Operating System", PHI
4. BRIAN L. STUART “Operating Systems Principles”, Design and applications Cengage Learning.

(MA 803) SIMULATION AND DECISION THEORY (3-0-0)

Module –I

(10 hours)

Introduction, system & components, Discrete and continuous simulation with examples, model and types of models, discrete event simulation steps in simulation, Monte-Carol technique, Random numbers. generation, Random variables inverse transform and rejection techniques, tests for randomness. Statistical Inference.

Module –II

(14 hours)

Inventory control, inventory models, inventory simulation of inventory systems with and without lead-time

Queuing theory, characteristics and notation, single server and two server queues, formulas for L_s , L_q , W_s , W_q , simulation of queuing system.

Variance reduction techniques.

Output Analysis.

Module – III

(14 hours)

Decision Theory: Different kinds of decision making, decision trees, sensitivity analysis of decision trees, Utility theory, Markov process, Markov chains, Chapman-Kolmogorov equations, classification of states, Long run properties of Markov chains, first passage time, Absorbing states, Markov models for decision making. Time Series Analysis

Text Books Recommended:

1. Banks, Earson, Nelson and Nicol, "Discrete Event System Simulation", Pearson Education.
2. G. Gyrdib, "System Simulation", PHI
3. N. Deo, "System Simulation with Digital Computers", PHI
4. Hillier and Liberman, "Introduction to Operations Research (concepts and cases)" (TMH)

(CA 809) THEORY OF COMPUTATION

(3-1-0)

Module-I

(12 hours)

Introduction to Automata Theory: Finite Automata (DFA & NFA), Finite Automata with Epsilon-Transitions, Conversion of NFA to DFA, Mealy and Moore Models, Conversion of Mealy to Moore and Moore to Mealy Regular Expressions and Languages, Finite Automata & Regular Expression, Properties of Regular Languages, Pumping Lemma for regular languages, Chomsky Classification of grammar.

Module- II

(16 hours)

Context-Free Grammars (CFG) and Languages: Context-Free Grammars, Parse Trees, Ambiguity in Grammars and Languages. Pushdown Automata, Languages of PDA, Equivalence of PDA's and CFG's, Properties of Context-Free Languages

Introduction to Turing Machine: Problems that Computers cannot Solve, The Turing Machine. Programming Techniques for Turing Machines, Extensions to Basic Turing Machine, Restricted Turing Machines, Turing Machines and Computers.

Module-III

(12 hours)

Undecidability: A Language that is not Recursively Enumerable, An Undecidable Problem that is Regular Expression, Undecidable Problems about Turing Machine.

Reducibility , The Classes P and NP, NP-Complete Problems without proof.

Text Books Recommended:

1. J. E. Hopcroft, R. Motwani & J.D. Ullman "Introduction to Automata Theory, Languages and Computation", Pearson Education Asia-2002.

Reference Books:

1. Peter Linz, "Introduction to Formal Language and Automata", Narosa Publishing House(Third Edition)-2004.
2. Michael Sipser, " Introduction to the theory of Computation", Cengage Learning
3. John. C Martin, " Introduction to Languages and the Theory of Computation", The McGraw- Hill Companies
4. Eitan Gurari, "An Introduction to the Theory of Computation", Computer Science Press

(CA 871) RELATIONAL DATABASE LAB

(0-0-6)

1. Use of SQL syntax: insertion, deletion, join, Updating using SQL.
2. Program segments in embedded SQL using C as host language to find average grade point of a student, etc.
3. Program for log based data recovery techniques.
4. Program on data recovery using check point technique.
5. Concurrency control problem using lock operations.
6. Use of package (ORACLE) for programming approaches.
7. Use of package (DB2) for programming approaches.
8. Programs on JDBC/ODBC to print employ's / student's/ information of a particular department.

(CA 873)UNIX & SHELL PROGRAMMING LAB

(0-0-3)

Operating System:

Shell Programming, Sed, awk, grep.

Process creation & Execution, Interprocess communication.

Process signaling.

File System Mounting, Disk organization.

Semaphore, creation and management of shared memory among process.

Statistical & Computational Programming:

Statistical Computation using Matlab.

Numerical Computations using Matlab.

(CA 875) DESIGN AND ANALYSIS OF ALGORITHM LAB. (0-0-3)

All the problems have to be implemented either writing C programs or writing C++ programs

Elementary Problems : (8 is compulsory and any four among the rest)

1. Using a stack of characters, convert an infix string to a postfix string.
2. implement polynomial addition using a single linked list
3. Implement insertion, deletion, searching of a BST, Also write a routine to draw the BST horizontally.
4. implement insertion routine in an AVL tree using rotation.
5. Implement binary search and linear search in a program
6. Implement heap sort using a max heap.
7. Implement DFS/ BFS routine in a connected graph
8. Implement Dijkstra's shortest path algorithm using BFS

Greedy Algorithm (Any Two)

1. Given a set of weights, form a Huffman tree from the weight and also find out the code corresponding to each weight.
2. Take a weighted graph as an input, find out one MST using Kruskal/ prim's algorithm
3. Given a set of weight and an upper bound M – Find out a solution to the Knapsack problem

Divide and Conquer Algorithm (any Two)

1. Write a quick sort routine, run it for a different input sizes and calculate the time of running. Plot in graph paper input size verses time.
2. Implement two way merge sort and calculate the time of sorting
3. Implement Strassen's matrix multiplication algorithm for matrices whose order is a power of two.

Dynamic programming (Any one)

1. Find out a solution for 0/1 knapsack problem
2. given two sequences of character, find out their longest common subsequence using dynamic programming

NP Complete and NP Hard problems

1. Find out a solution to Traveling Sales Man problem of an input graph

Backtracking Algorithm

1. Find out a solution for 0/1 knapsack problem
2. Game Trees

(HS 871) LIFE- STYLE COMMUNICATION FOR (0-0-2) CORPORATE READINESS

Aim:

Motivating the students to function efficiently and independently in a professional surrounding. Communication competence is the main focus of the recruiters today and so is the most important skill indispensable to a technocrat. The course addresses that need.

Learning Strategies:

1. Lectures
2. Case-Studies
3. PowerPoint slides
4. Student Presentation
5. Discussion Session

Unit I

(10 hours)

Corporate communication

- i. Understanding interpersonal relationship in the work **place**: communicating in teams; leadership roles and responsibilities; communicating in organizational setting; barriers
- ii. Understanding Cross-cultural communication: global marketplace; multicultural workforce; recognizing cultural differences; legal and ethical differences, ethnocentrism; language differences
- iii. Understanding Communication flow in corporate houses; and employee communication network

Unit II

(10 hours)

Speaking and Writing in a Corporate World

- i. Understand and participate in Group Discussions; appreciate the nuances of the Group Decision-making process; understand the basics of how to make a presentation.
- ii. Techniques of writing Business messages: goodwill messages; bad messages; persuasive messages; news releases.
- iii. Writing for the web; communicating through the electronic media.

Unit III

(10 hours)

Living a Corporate Life

- i. Understanding the need of corporate grooming and dressing.
- ii. Understand the importance of business etiquette.
- iii. Understand and appreciate the dilemmas of business ethics.
- iv. Value of Community Goodwill to Corporate Viability; Corporate Social Responsibility.
- v. Handling Communication challenges and crisis.

COMMUNICATION PRACTICE LAB ACTIVITIES

Five Sessionals will be conducted. The activity for each sessional has been clearly defined. Each sessional will carry 20 marks.

I. Group Discussion

Students will practice from more than 300 topics for Group Discussion-(especially compiled that are mostly used by the industry today in campus drives). Size: 6-8 members (ideal)

Procedure: Guidelines by the teacher

10 minutes for a group of six

Video –Audio recording for review by the members of the group.

II Campaign with Special Events

Students will work in a group to plan, organize, and articulate a corporate communication campaign with a special programme and present it to the audience. [MS Office-Power Point].

III Reaction Papers

Students will be assigned reading material and they will be asked to write a reaction paper. The 5 page write-up should be appropriately documented as [per Chicago Manual style].

IV Professional Interview

Students to conduct a face to face/telephone interview with corporate professionals and submit a 2-page summary for review by the classmates.

V Corporate Communication Writing

Students will have to take up small writing assignments like press releases, business proposals etc

Reading List : Books

1. Bovee et al. Business Communication Today. Pearson Education.
2. Shirley Taylor. Communication for Business. Pearson Education.
3. Lani Arrendodono. Communicating Effectively, Pearson Education.
4. Principles of Management. Peter Druker.
5. Edward de Bono. Lateral Thinking.
6. Daniel Goleman. Emotional Intelligence.
7. Professional Ethics

Journals and Magazines:

1. Harvard Business Review
2. Bikalp, IIM, Ahmedabad
3. USP
4. Four Ps
5. India Today
6. Business Today
7. frontline
8. Yojana
9. Kurukshet

4th Semester MCA

(CA 810) OBJECT ORIENTED ANALYSIS AND DESIGN WITH UML (3-0-0)

Module –I (8 Hours)

Overview of Object Oriented Concepts: Basic mechanisms, Key concepts, related technical terms, Advantages of OOD.

Object-Oriented S/W design: Object oriented vs. function-oriented design, Object oriented modeling.

Introduction to UML: Overview, conceptual model Architecture, software development life cycle, RUP

Module –II (15Hours)

Basic structural Modeling: Classes, Relationships, Common mechanisms, Diagrams, class diagrams.

Advanced structural Modeling: Interfaces, types and Roles Object diagrams, packages

Module –III (17 Hours)

Basic behavioral Modeling: Use cases, use case diagrams, Interaction diagram, Activity diagrams, state chart diagrams, component diagrams, deployment diagrams, patterns and frame works.

A Case Study:

(Ex: - ATM, Trading System, Banking System, Library Information System, Student Information System etc.)

Text Books Recommended:

1. Grady Booch, Rumbaugh, Ivar Jacobson, "Unified Modeling Language", User Guide Pearson.
2. Rajib Mall, "Introduction to S/W Engineering", PHI.

Reference Books:

1. Pankaj Jalote, "An Integrated Approach to SW Engineering"
2. H. Srimathi, H. Sriram, A. Krishnamurthy, Scitech, "Object Oriented Analysis & Design Using UML"
3. Craig Larman , "Applying UML and Patterns".
4. Satzinger, Jackson, Burd, "Object-Oriented Analysis & Design with the Unified Process" Cengage Learning

(CA 811) PRINCIPLES OF PROGRAMMING LANGUAGE (3-1-0)

Module -I (14 Hours)

The study of programming languages: A short history of programming languages, what makes a good language, effects of environment on languages.

Language design issues: The structure and operation of a computer, virtual computers and binding times, language paradigms.

Language translation issues: Programming language syntax, stages in translation, formal translation models.

Module -II **(12 Hours)**

Data types: Properties of types and objects, elementary data types, structured data types.

Abstract data type: Abstract data types, encapsulation by subprograms, type definition, storage management.

Advances in language Design: Variations on subprogram control, parallel programming, formal properties of languages, language semantics, Hardware development, software architecture.

Module -III **(10 Hours)**

Paradigms and languages: Simple procedural languages, block structured procedural languages, object based languages, functional languages, logic programming language.

Text Books:

1. Terrence W. Pratt & Marvin V. Zelkowitz. Programming languages: Design and Implementation, PHI, 3rd Edition.
2. Allen B Tucker & Robert Noonan, Programming languages: Principle and paradigm, MGH,2006

Reference Books:

1. Brace J MacLennan, Principle of Programming languages: Design, Evaluation and implementation OXFORD, 1999.
2. Ravi Sethi, Programming languages: Concept and Construct, Addison Wesley Publication, 1996.

(CA 812) COMPUTER NETWORKS **(3-1-0)**

Module - I **(12 Hours)**

Overview of Data Communications and Networking, Physical Layer: Analog and digital, Analog Signals, Digital Signals, Data Rate Limits, Transmission Impairments, Performance.

Digital Transmissions: D-to-D, A-to-D, Transmission Mode.

Analog Transmission: D-to-A, A-to-D conversion

Multiplexing: FDM,WDM,TDM Spread Spectrum

Transmission Media: Guided Media, Unguided Media (Wireless)

Switching: Circuit Switched Networks, Datagram Networks, Virtual Circuit Networks.

Module - II **(14 Hours)**

Data Link Layer: Introduction, Block Coding, Linear Block Codes, Cyclic Codes, Check Sum

Data Link Control and Protocols: Framing, Flow And Error Control, Protocols, Noiseless Channels, Noisy Channels, HDLC, Point-To-Point Protocol.

Multiple Access: Random Access, controlled Access, Channelization.

Local Area Network: Ethernet, Traditional Ethernet, Fast Ethernet, Gigabit Ethernet

Wireless LANs: IEEE 802.11,Bluetooth

Module - III

(12 Hours)

Network Layer: IPv4 Addresss, IPv6 Addresses,Internetworking,IPv4,IPv6,Transition From IPv4 To IPv6.

Network Layer Protocols:Address aping,ICMP,IGMP

Transport Layer: Process to process Delivery: UDP:TCP congestion control and quality of service,

Application Layer:-Domain Name System(DNS),DNS in Internet,Resolution Electronic Mail(SMTP) and file transfer(FTP),HTTP and WWW.

Text Books Recommended:

1. Behrouz A Forouzan, "Data Communication and Networking", Third Edition, Tata McGraw - Hill Publishing Company Limited

Reference Books:

1. Larry L. Peterson and Bruce S. Davie ELSEVIER, "Computer Networks", Third Edition, A system Approach.
2. A.S. Tannenbaum, "Computers Networks", PHI

(MA 804) OPTIMIZATION TECHNIQUES

(3-0-0)

Module-I

(15 hours)

Linear Programming: Graphical solution of LPP in 2 variables. Simplex method, Simplex table, Primal and dual relationships. Dual simplex method, Transportation models, Solutions of transportation problems, Assignment models, Solution of assignment problems.

Network Minimization : Maximum flow problems, Integer Programming, Cutting plane method, Dynamic Programming model, Examples of DP and solution, Decision theory. Decision under risk and under uncertainty, Game theory, 2 person zero sum games, mixed strategy, principles of dominance and graphical solutions.

Module-II

(9 hours)

Non-Linear programming: Mathematical preliminaries, Calculus on R^n , Vector space, convex analysis.

One dimensional optimisation: Bisection, Fibonacci, Golden Section, quadratic interpolation, secant and Newton methods.

Module-III

(8 hours)

Unconstrained Multi variate optimisation : Unconstrained Multi variate Optimization : Method of steepest descent, Fletcher and Reeves method, Newton method and Marquardt method. Constrained multi variate optimisation: Kuhn- Tucker conditions, Lagrange multiplier method, Penalty function method.

Text Books Recommended:

1. M.C.Joshi and K.M. Moudgalya, "Optimisation- Theory and Practice", NORASA
2. Hiller & Liberman, "Operation Research", TMH.

Reference Books:

1. K. Deb, "Optimisation for Engineering Design", PHI.
2. HA. Taha, "Operations Research", Macmillan.
3. A.M. Natrajan, Balasubramani, Tamilarasi, "Operations Research", Pearson.

(CA 813) COMPILER DESIGN

(3-0-0)

Module -I

(12 hours)

Introduction to Compiling: Analysis of the source program, The phases of a compiler, The grouping of phases, Compiler-construction tools.

A Simple One-pass compiler: Syntax definition, Syntax-directed translation, Parsing, A translator for simple expressions, Lexical analysis, Incorporating a symbol table, Abstract stack machines.

Lexical Analysis: The Role of lexical analyser, Input buffering, Specification of tokens, Recognition of tokens, A language specifying lexical analyzers, Finite automata(DFA & NFA), Design of a lexical analyser generator.

Module –II

(18 hours)

Syntax Analysis: The role of parses, Context-free grammars, Top-down parsing, Bottom-up parsing, Operator-precedence parsing, LR parsers, Using ambiguous grammars.

Syntax- Directed Translation: Syntax directed definitions, Construction of Syntax tree, Bottom-up evaluation, L-attributed definitions., Top-down definition, Bottom-up evaluation, Recursive evaluators, Space for attribute values at compile time.

Type Checking: Type systems, Specification of a simple type checker, Equivalence of type expressions, Type conversions, Overloading of functions and operators, Polymorphic functions, Run-Time Environments: Source language issues, Storage organisation, Storage allocation strategies, **“Intermediate code generation: Intermediate”** languages, Declaration, Assignment statements, Boolean expressions, Case statements, Back patching, Procedure calls.

Module –III

(10 hours)

Code Generation: Issues in the design of a code generator, Target machine, Run-Time storage management, basic blocks and flow graphs, Next-use information, A simple code generator, Register allocation and assignment, The dag representation of basic blocks, Generating code from dags.

Code Optimization: The principal sources of optimization, Optimization of basic blocks, Loops in flow graphs, Introduction to global data-flow analysis, Iterative solution of data-flow equation, Code-improving transformations, Data-flow analysis of structured flow graphs, Efficient data-flow algorithms.

Text Books Recommended:

1. A.V. Aho, R. Sethi & J.D. Ullman “Compilers Principles Techniques and Tools”
Pearson Education
2. Kenneth C. Louden “ Compiler Construction Principles & Practice “ Cengage Learning
Indian Edition.

Reference Books:

1. Torben Ægidius Mogensen, "Basics of Compiler Design DIKU", University of Copenhagen
2. Niklaus Wirth, "Compiler Construction Computer Science-Department", ETH Zurich
Addison-Wesley Pub
3. Pat Terry, "Compilers and Compiler Generators: an Introduction with C++", International Thomson Computer Press.

(CA 814) ADVANCED OPERATING SYSTEM

(3-0-0)

Module-I

(12 Hours)

Process Synchronization: Concept of process, Concurrent process, Threads, Overview of different classical synchronization problem, monitoring communication sequential processes (CSP)

Process deadlocks: Introduction causes of deadlocks, Deadlock handling strategies Models of deadlock.

Distributed operating system: Architectures, issues in Distributed operating systems, Limitation of Distributed Systems, Lamports logical clock, Global states Chandy Lampert's global state recording algorithm, Basic concepts of Distributed Mutual Exclusion, Lamport Algorithm, Ricat-Agrawal Algorithm.

Module-II

(16 Hours)

Distributed File System : Distributed File System Architecture, Design issues, SUN Network File system.

Basic concepts of Distributed shared memory, Basic concepts of Distributed Scheduling, Load balancing, Load sharing.

Distributed OS Implementation: Models, Naming, Process migration, Remote Procedure Calls.

Multiprocessor System: Motivation, Classification, Multiprocessor Interconnections, Types, Multiprocessor OS functions & requirements. Design & implementation Issue. Introduction to parallel programming. Multiprocessor Synchronization.

Module-III

(12 Hours)

Performance & Processor Design

Performance measures, Performance Evaluation Techniques, Bottlenecks & saturation, Feedback loops.

Security and Production: Security-threats & goal penetration attempts, Security Policies & mechanisms, Authentication, Protections & access control Formal models of protection Cryptography worms & viruses

Text Books Recommended:

1. Mukesh singal and Niranjana G. Shivaratri, "Advanced Concepts in Operating System", TMH
2. Milan Milenkovic, "Operating System Concepts & Design", TMH

Reference Books:

3. P.K. Sinha, "Distributed Operating System Concepts & Design" PHI
4. H.M. Deitel, "Operating System", Pearsons.

(CA 815) PATTERN RECOGNITION

(3-0-0)

Module –I

(12 hours)

Introduction: Pattern Recognition, Statistical Pattern Recognition Review of probability theory, Bayes Classifiers, Bayesian decision theory.

Parameter Optimization Algorithms: Parametric Classifiers, Multivariate normal distributions, Maximum Likelihood Estimation, Minimax Classifiers, Hidden Markov Models

Module -II

(16 hours)

Fishers's Discriminant

Non-Parametric Classification and Regression: Kernal Classifiers (and regression), K-NN regression, Nearest neighbor classifiers, Parzen Windows

Linear discriminates: Perceptron, LMS Algorithm, Capacity of a linear discriminate, Chernoff's Bound

Neural Networks: Back propagation algorithm, Capacity of multiplayer, feedorward architecture, Boosting algorithms, Support Vector Machines

Module -III

(12 hours)

Clustering Algorithms, Features Selection: PCA and karhunen-Loive Transformations, Hebbian algorithms

Text Books Recommended:

1. Richard O.Duda, Peter E. Hart, David G. Stork, "Pattern Classification and Scene Analysis", John Wiley & Sons.
2. Simon Haykin, "Neural Network", Pearson Education

Reference Books:

1. Christopher M. Bishop, "Neural Networks for Pattern Recognition", Oxford University Press.
2. Robert J. Schalkoff, "Pattern Recognition", John Wiley & Sons.
3. E.Gose, R..Johasonbaugh, Steve Jost, "Pattern Recognition & Image Analysis", PHI

(CA 816) ALGORITHMS FOR BIO-INFORMATICS

(3-0-0)

Module-I

(13 Hours)

Molecular Biology Primer: Genetic Material, Function of Genes, Structure of DNA, transcription and translation, Protein structure, DNA analysis, Gene variation, Need of Bioinformatics?

Exhaustive Search: Restriction Mapping, Impractical restriction mapping algorithm, A practical restriction mapping algorithm, Regulatory motifs in DNA Sequences, Profiles, The motif finding problem, Search trees, Finding trees, Finding median string.

Greedy Algorithm: A greedy approach to Motif Finding.

Module-II

(14 Hours)

Dynamic Programming Algorithms: The power of DNA sequence comparison, Edit distance and alignments, Longest common sub sequences, Global sequence alignment, Scoring alignments, Local sequence alignments, Alignment with gap penalties, Multiple alignment, Gene prediction, Statistical approaches to gene prediction, Similarity based approaches to gene prediction, Spliced alignment.

Combinational Pattern Matching: Repeat finding, Hash tables, Exact pattern matching, Keyword trees, Suffix trees, Heuristic similarity search algorithms, Approximate pattern matching, BLAST-Comparing a sequence against a database.

Module-III

(13 Hours)

Graph Algorithms: Graphs, Graphs and genetics, DNA sequencing, Shortest super string problem, DNA arrays as an Alternative sequencing technique, Sequencing by hybridization, SBH as an Hamiltonian path problem, SBH as an Eulerian path problem, Fragment assembly in DNA sequencing.

Clustering and Trees: Gene expression analysis, Hierarchical clustering, k-means clustering, Clustering and corrupted cliques, Evolutionary trees, Distance based tree reconstruction, Reconstructing trees from additive matrices, Evolutionary trees and hierarchical clustering, Character based tree reconstruction, Small parsimony problem, Large parsimony problem.

Text Books Recommended:

1. N.C. Jones & P.A. Pevzner, "An Introduction to Bioinformatics Algorithms", The MIT Press – 2004.

Reference Books:

1. A. M. Lesk- "Introduction to Bioinformatics" Oxford University Press.
2. D.E. Karne & M.L. Raymer , "Fundamental concepts of Bioinformatics"

(CA 880) PROGRAMING USING JAVA

(0-0-6)

- Basic java programming (Application and Applet)
- Usage of various data types
- Usage of constructors
- Usage of method overriding
- Usage of method overloading
- Incorporating the concept of inheritance
- Usage of string related operation
- Usage of exception handling
- Multi threaded programming
- Programs involving various methods of creating multithreaded program
- Thread communications and signals
- Programs involving event handling in AWT.
- Use of various layout managers
- Programming to carry out different types of input output
- Graphics programming in AWT / Swing
- Database programming in Java using JDBC
- Network Programming in Java

Books Recommended:

1. Herbert Schildt, "The Complete Reference Java", TMH
2. "SL-275-SE6 JAVA Programming Language", Sun Solaris

(CA 882) NETWORKING LAB

(0-0-3)

Network Programming using Socket (C/JAVA)

1. Introduction to Networking
 - Network Definition & Advantages
 - Network Vs. Standalone PC
 - Study of Various Network Topology
 - Basic Data Communication Equipments
2. Study of Network Componentes
 - Cables, Repeater, Switch, Hub & Router
 - Details of Network Interface Card (NIC)
3. Adaptor Configuration, Services, Clients and Protocols
4. IP Classification and Configuration, Subnetting and Subnet Masking
5. Study of Cable Preparation and Implementation
 - Straight Cable and Cross Cable
6. Configuration of PEER-PEER Network by Configuring
 - Adapter, Protocol, Services, Host Name, Workgrouping
7. File and Printing Sharing
8. Study of Topology through Topology Trainer Kit
 - Star, Bus and Ring
9. Stud of Data Communication with Data Communication Trainer Kit through
 - Fibre Optics, Infra-ray, telephone wire
10. Client-Server Networking with 2000/2003
 - Server Installation, User & Group Management(Active Directory Services)
 - DHCP Service
11. Case Study of ITER Network Structure
12. Socket Programming in Java
 - Day time server
 - Echo server
 - Chart Server
13. General Troubleshooting

(CA 884) OOAD Lab

(0-0-3)

1. Any one case study from the given syllabus has to be discussed thoroughly with the student and make familiar with Rational Rose software.
2. Creation of Use Case diagram.
3. Creation of Class diagram and Interaction diagram.
4. Creation of Interaction and Activity diagram.
5. State chart, Component diagram.
6. Component and Deployment diagram.
7. Specification and Documentation product.
8. One dimensional optimization
 - a. Fibonacci search
 - b. Golden section search
 - c. Cubic interpolatory search
 - d. Newton Rapson search
9. Unconstrained optimization
 - a. Steepest descent search
 - b. Conjugate gradient search

Books Recommended:

1. Patrick Grassle Henriette Baumann Phillippe Baumann “UML 2.0 in Action” SPD

Siksha 'O' Anusandhan University

Department of Computer Application Curriculum for MCA Programme (w.e.f. 2009-2010)

3 rd Year							
5 th Semester				6 th Semester			
Course Code	Theory	Contact Hrs. L-T-P	Credit	Course Code	Theory	Contact Hrs. L-T-P	Credit
CA-918	Computer Graphics	3-0-0					
CA-919	Enterprise Computing with JAVA	3-1-0					
CA-920	Artificial Intelligence	3-0-0					
	Elective – II	3-0-0					
CA-921	Cryptography & Security						
CA-922	Data mining & Application						
CA-923	Distributed DBMS						
MA-905	Advanced Computational Techniques						
CA-924	Wireless N/W						
CA-925	Soft Computing						
CA-926	E Commerce & ERP						
CA-927	Special Course in CS-II						
	Elective – III	3-0-0					
CA-928	Parallel Computing						
CA-929	Mobile computing						
CA-930	Image Processing						
CA-931	Microprocessor Assembly Language Programming						
CA-932	Computational Finance						
CA-933	Software Testing						
CA-934	Special Course in CS-III						
	Sub Total	16	16				
	Sessionals						
CA-971	Advanced Programming Lab Using Java Lab	0-0-6	4	CA-990	Industrial Project Work (20-24 Weeks)		20
CA-973	Computer Graphics Lab	0-0-3	2				
CA-991	Comprehensive Viva	0-0-0	2				
CA-993	Minor Project (*Industrial Course)	0-0-6	5				
	SubTotal	15	13		SubTotal		20
	Total	31	29		Total		20

Total MCA Credit - 150

- Audit Course from Industry (To be finalized after consulting experts from Infosys)

5th Semester MCA

(CA 918) COMPUTER GRAPHICS

(3-0-0)

Module –I

(12 hours)

A survey of Computer Graphics: Computer Aided Design, Presentation Graphics, Computer Art, Entertainment, Education and Training, Visualization, Image processing, Graphical User Interface.

Overview of graphics System: Video Display Devices, Raster-Scan and Random scan systems, Input Devices, Hard Copy Devices.

Graphical User Interface and Interactive Input methods: The User Dialogue, Input of Graphical data, Input Function, Initial Values for input Device parameters, Interactive Picture construction.

Output primitives: points and lines, Bresenham’s Line Algorithm, Mid-Point Circle Drawing Algorithm, Filled Area Primitives.

Module –II

(16 hours)

Two Dimensional Geometric Transformation: Basic transformation (Translation, rotation, Scaling) Matrix Representation and Homogeneous coordination, Composite Transformations, Reflection, shears, Transformation between coordinate system.

Two Dimensional viewing: the viewing Pipeline, Viewing coordinate reference frame, window-to-view port coordinate Transformation.

Line Clipping (Cohen-Sutherland Algorithm) and polygon clipping (Sutherland-Hodgeman Algorithm)

Three Dimensional Object Representations: Polygon Surface, quadratic surface, spline representative, Bezier Curves and surfaces. B-spline Curve

Module –III

(12 hours)

Three Dimensional Geometric and Modeling Transformations: Translation Rotation, Scaling, Reflections, shear, Composite Transformation, Modelling and Coordinate Transformation.

Three Dimensional viewing: Viewing Pipeline, Viewing Coordinates, Projections (Parallel and Prospective)

Visible surface detection method: Back Face detection, depth buffer, scan line, depth sorting, Area subdivision.

Illumination Models: Basic Models, Displaying Light Intensities, Halftone Pattern and dithering Techniques.

Surface Rendering Methods: Polygon Rendering Methods, Gouraud and Phong shading.

Text Books Recommended:

1. D.Hearn & M. Baker: “Computer Graphics”, Pearson Education

Reference Books:

1. Folley and Vaudam, "Computer Graphics"
2. Z.Xiang and R.Plstock, “Computer Graphics”, MGH
3. M.Hanmandlu: “Computer Graphics”, BPB Publication

(CA 919) ENTERPRISE COMPUTING WITH JAVA (3-1-0)

Module-I (12 hours)

Internet Basics: Basic Concepts, Communication on the Internet, Internet Domains, TCP/IP and Internet, Idea of Web Server, Web Browser.

Web Design: HTML and Tags, Image, Color and Background, Image map, Style sheet, table, frame, creating hyperlinks and anchors, text formatting tags, Designing Forms and controls, XHTML, DHTML.

Java Script: Introduction, Programming overview and techniques, detailed of language, Server side and Client side Scripting, Java Script Document Object Model.

Module-II (18 hours)

Introduction to Java Enterprise Edition 5: Programming for the Enterprise, Enterprise Architecture (Single tier, two tier, three tier, N tier, Enterprise) and Technologies, Introduction to Web Application.

CGI: Basics, Why CGI is used? How it Works? Get and Post methods.

Java Servlets: Introduction to Web Containers, Servlet Programming, Servlet vs. Applet, Replacing CGI with Servlets, Servlet API, GenericServlet Class, HttpServlet Class, Servlet Architecture, Servlet life Cycle, Working with Servlet, Working with Databases, Servlet Sessions, Cookies, Context and Collaboration.

Java Server Pages: Basics and Architecture, Life Cycle of JSP Page, JSP Directives, Scripting Elements, Standard Action Elements of JSP, Implicit Objects and scope, Writing JSP application with standard Tag Libraries, Connecting to Databases.

XML: Introduction, XML Document Syntax, Document Type Definition, Parsing valid XML, SAX, DOM.

Module-III (10 hours)

Java Server Faces: Model View Controller Architecture, JSF Basics.

Distributed Computing Using RMI: Basics, RMI Architecture, Locating Remote Objects, RMI Exceptions, and Developing Applications with RMI, Understanding Directory Services and JNDI.

Enterprise Java Beans: Introduction, EJB vs. Java Beans, EJB Architecture, Features/ Benefits of EJB, Types of EJB, Working with Session Beans, Entity Beans.

Architecture and Design of J2EE APIs like JDBC, JMS, JTA.

Text Books Recommended:

1. Ivan Bayross, "Web Technologies", Vol-I and Vol-II
2. Subrajmanyam Allamaraju and others, "Professional Java Server Programming J2EE", 1.3 Edn., Apress, SPD.
3. Ivan Bayross and Others, "Java Server Programming for Professional Covers JAVA EE 5", SPD.

Reference Books:

1. Danny Ayers and others, "Professional Java Server Programming", Wrox Press Ltd, SPD.
2. Dreamtech Press, "Java Server Programming (J2EE 1.4) Black Book"
3. Bruce W. Perry, "Java Servlet & JSP", Cookbook SPD-O'Reilly
4. "SL-134 Web Component with Servlets & JSP Technologies", Sun Solasis.
5. "FJ-310-EE5 Developing Applications for the Java EE Platform", Sun Solaris.
6. "SL-285-SE6 Developing Applications with the Java SE Platform", Sun Solaris.

(CA 920) ARTIFICIAL INTELLIGENCE

(3-0-0)

Module-I

(12 hours)

Introduction to AI: The foundation of AI, The History of AI, The state of Art, Intelligent Agent, How agent should act, Structure of Intelligent Agent, Environments, Solving Problem by Searching, Formulating Problems, Searching for solutions, Uniformed Search Strategies, Avoiding repeated search, Constraint Satisfaction Problem.

Informed Search Methods: Best-First Search, Heuristic Functions, Memory Bounded Search, Iterative Improvement Algorithms.

Module-II

(16 hours)

Knowledge & Reasoning: A Knowledge based Agent, The Wumpus world Environment, Representation Logic and Reasoning, Propositional Logic, An Agent for the Wumpus world.

First Order Logic: Syntax and Semantics, Extensions and Notational variations, Using first order logic, Logical Agent for Wumpus world.

Inference in First-Order Logic: Inference Rules involving Quantifiers, Generalized Modus Ponens, Forward and Backwards Chaining,

Planning- A simple planning agent, From problem solving to planning, Planning in situation calculus, Basic representation for planning.

Module-III

(12 hours)

Uncertainty: Acting under Uncertainty, Basic Probabilistic Notation, Axioms of Probability, Bayes' Rules and its use.

Learning in Neural and Belief Networks: How the brain works, Neural Network, Perceptrons, Multilayer Feed Forward Networks, Application of Neural Networks, Bayesian Methods for Learning Belief Networks. **Natural language Processing**, Practical Application- Efficient Parsing, Scaling up Lexicon, scaling up the grammar, Ambiguity, Discourse Understanding.

Text Books Recommended:

1. S. Russell & P. Norvig, "Artificial Intelligence A Modern Approach", Pearson Education

Reference Books:

1. E. Rich and K. Knight, "Artificial Intelligence", Tata McGraw-Hill
2. Nils J. Nilsson Morgan Kaufmann, "Artificial Intelligence: A New Synthesis"
3. Daniel G. Bobrow, "Artificial Intelligence in Perspective", MIT Press
4. Saroj Kaushik "Artificial Intelligence", Cengage Learning.

(CA 921) CRYPTOGRAPHY & SECURITY

(3-0-0)

Module – I

(12 Hours)

Introduction:- Service, Mechanisms and Attacks Symmetric key Encipherment, Mathematics of cryptography, Traditional symmetric key ciphers, Modern Symmetric key ciphers.

Module – II

(16 Hours)

DES, AES , Encipherment using Modern symmetric-key ciphers. Asymmetric key Encipherment ,Primes, Primality Testing, Factorization ,Quadratic Congruence , RSA Cryptosystem,

Module – III

(12 Hours)

Message integrity and Message Authentication, Digital Signature, Key Management , Security at the Application layer.

Text Books Recommended:

1. Behrouz A.Forouzan, "Cryptography and Network Security", TMH 2007

Reference Books:

1. William Stallings, "Cryptography and Network Security Principles and Practice", Third Edition, Pearson Education.
2. Douglas R. Stinson's, "Cryptography - Theory and Practice".

(CA 922) DATA MINING AND APPLICATIONS

(3-0-0)

Module-I

(12 hours)

Introduction: Fundamentals of data mining, Data Mining Functionalities, Classification of Data Mining systems, Major issues in Data Mining, OLAP Technology for Data Mining, Multidimensional Data Model.

Data Preprocessing: Needs Preprocessing the Data, Data Cleaning, Data Integration and Transformation, Data Reduction, Discretization and Concept Hierarchy Generation.

Data Mining Primitives, Languages, and System Architectures: Data Mining Primitives, Data Mining Query Languages, Designing Graphical User Interfaces Based on a Data Mining Query Language Architectures of Data Mining Systems,

Module-II

(16 hours)

Concepts Description: Characterization and Comparison: Data Generalization and Summarization- Based Characterization, Analytical Characterization: Analysis of Attribute Relevance, Mining Class Comparisons: Discriminating between Different Classes, Mining Descriptive Statistical Measures in Large Databases.

Mining Association Rules in Large Databases: Association Rule Mining, Mining Single-Dimensional Boolean Association Rules from Transactional Databases, Mining Multilevel Association Rules from Transaction Databases, Mining Multidimensional Association Rules from Relational Databases and Data Warehouses, From Association Mining to Correlation Analysis, Constraint-Based Association Mining.

Module-III

(10 hours)

Classification and Prediction: Issues Regarding Classification and Prediction, Classification by Decision Tree Induction, Bayesian Classification, Classification by Back propagation, Classification Based on Concepts from Association Rule Mining, Other Classification Methods, Prediction, Classifier Accuracy.

Cluster Analysis Introduction :Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods.

Text Books Recommended:

1. Jiawei Han & Micheline Kamber Harcourt India., “Data Mining – Concepts and Techniques”.

Reference Books:

1. Arun K Pujari, “Data Mining Techniques”, University Press.
2. David J. Hand, Heikki Mannila and Padhraic Smyth, “Principles of Data Mining”, MIT Press, Fall 2000.
3. Mehmed Kantardzic, Wiley, “Data Mining: Concepts, Models, Methods, and Algorithm”, IEEE Press, 2002.
4. Daniel T. Larose, John Wiley, “Discovering Knowledge in Data : An Introduction to data Mining”, 2004.

(CA 923) DISTRIBUTED DATABASE MANAGEMENT (3-0-0) SYSTEM

Module-I

(12 hours)

Introduction to Distributed Data Processing and Distributed Database system, Relational DBMS Concept-Normalization, Integrity Rules, Relational Data Languages, Functional Layers Of Relational DBMS, Data Communication Concepts-Types Of Computer Networks, Protocol Standards, Broadband Networks, Wireless Networks, Internet, DBMS Standardization, Distributed DBMS Architecture and Models.

Module-II

(16 hours)

Distributed Database Design Strategies and Issues, Fragmentation, Allocation, Semantic Data Control, View Management, Data Security, Complexity of Relational Algebra Operations, Objectives and Characterization Query Processing, Layers of Query Processing, Query Decomposition and Data Localization, Distributed Query Optimization

Introduction to Transaction Management: Properties of Transaction, Types of Transaction, Distributed Concurrency Control, Serialization, Concurrency Control Mechanisms, Concurrency Control Algorithms, Deadlock Management, Relaxed Concurrency Control.

Module-III

(12 hours)

Reliability concepts and Measures: Failures and Fault Tolerance in Distributed Systems, Failures in Distributed DBMS, Local and Distributed Reliability Protocols, Network Partitioning, Fundamental Object Concepts and Models, Object Distribution Design, Client/Server Architecture, Object Management and Storage, Object Query Processing.

Text Books Recommended:

1. OZSU & Valduriez, “Principles of Distributed Database System”, Pearson Education.

Reference Books:

1. C. J. Date “An Introduction to Database Systems”, Pearson Education.

(MA 905) ADVANCED COMPUTATIONAL TECHNIQUES (3-0-0)

Module – I (14 Hours.)

Interpolation and Approximation: Lagrange, Newton and Hermit interpolation, Cubic splines, B-splines, Hermite, B-spline Curves. Least Square Approximation (Discrete and Continuous Cases), Chebyshev Approximation and Economization.

Numerical Solution of Non Linear Equation in one Variable (Bisection, secant and Newton Raphson Methods) and Applications to Optimization Problems Involving Unimodal Functions.

Module – II (18 Hours.)

Solution of Linear System of Equations (Gauss Elimination Matrix Factorization and Iterative Methods) Determination of Eigen Values.

Numerical Quadrature of one Dimensional Integrals (Newton-cotes and Gauss techniques), Two Dimensional Integrals (Product Rules and Monte Carlo Techniques).

Numerical Differentiation (Methods Using Differences, Methods Using Interpolation and Richardson's Extrapolation).

Module – III (8 Hours.)

Numerical Solution of I.V.P (Runge-Kutta Method, Taylor Series Method, Predictor – Corrector Methods), Application.

Text Books Recommended:

1. C.F. Gerald and P.O.Wheatly : "Applied Numerical Analysis", Addison Wesley.
2. R. L. Burden & J. D. Faires, "Numerical Analysis", Thomson Learning, Indian Edition.
3. Davis & Robinowitz, "Methods of Numerical Integration ", CAP.

Reference Books:

1. B.P. Acharya and R.N. Das, "A Course on Numerical Analysis", Kalyani Pub.
2. S.D. Conte and C.de Boon, "Elementary Numerical Analysis", McGraw Hill.

(CA 924) WIRELESS COMMUNICATION AND NETWORKING (3-0-0)

Module-I (10 Hours.)

Introduction

Introduction to wireless networks, Difference between wireless & fixed Telephone networks, Cellular revolution, modern wireless communication systems (2G, 3G, WLL, WLANs, Bluetooth & PANs).

Module-II (18 Hours.)

Wireless communication technology

Antennas & propagation: antennas, propagation modes, line of sight transmission, fading in mobile environment.

Signal encoding techniques: signal encoding criteria, digital data analog signal, analog data analog signal, analog data digital signal.

Spread spectrum: concept of spread spectrum, frequency hopping spread spectrum, direct sequence spread spectrum, CDMA, generation of spreading sequences.

Coding & error control: Error detection, block error correction codes, convolution codes, ARR

Module-3 (12 Hours.)

Wireless Networking

Satellite communications: parameters & configuration, capacity allocation(frequency division & time division).

Cellular wireless networks: principles of cellular networks, generations(first generation analog, second generation TDMA, second generation CDMA, third generation systems). Cordless systems & wireless local loop: cordless systems, wireless local loop, IEEE 802.16 fixed broadband wireless access standard.

Mobile IP, wireless application protocol

Text Books Recommended:

1. Wireless communications and networking by William Stalings, PHI

Reference Books:

1. Wireless communications: principles and practice, by T.S.Rappaport, PHI

(CA 925) SOFT COMPUTING (3-0-0)

Module – I (20 Hours.)

Introduction to Neural Network (Neural network topologies, activation functions, learning algorithms, applications), Single layer perceptrons (Unconstrained optimization techniques, Least-Mean-Squares algorithm, Peceptron, linear seperability, Non-linearly seperable problems.

Multilayer perceptions (Backpropagation learning algorithm, Optimizing network structure, Speeding up learning process, Radial-basis function network(RBF)(Architecture, Learning methods, optimization of network), RBF vs. Multilayer perception.

Principles of self organization, Hebbian-based Principal component Analysis, Kohonen's self organizing network (Topology, learning algorithm and application). Support Vector Machines (SVM) (Optimal hyperplanes for linearly separable and nonseparable patterns, SVMs for pattern recognition.

Module – II (10Hours.)

Fundamentals of fuzzy logic systems(Fuzzy sets, operations on fuzzy sets, Fuzzy relations, Fuzzy logic, Fuzzy Composition, rules and inference), Fuzzy control, Neuro-fuzzy systems, applications.

Module – III (10Hours.)

Evolutionary computing (overview of evolutionary computing, genetic algorithms (GA), GA operators, Schema theorem and building block hypothesis, Integration of GA with neural network and fuzzy logic, applications.

Note: One of the midterm test consists of implementation of some algorithms and techniques using MATLAB.

Text Books:

1. S.Haykin, Neural Networks-a comprehensive foundation, Pearson Education, 1999.

Reference Book:

1. F O Karray and C De Silva, Softcomputing and Intelligent System Design-theory, tools and applications, Pearson Education, 2004.

2. K L Du and M N S Swamy, Neural networks in a Softcomputing Framework, Springer Verlag, 2008

3. J.S.R. Jang. C.T. SUN and E. Mizutani, "Neuro-fuzzy and soft-computing". PHI Pvt. Ltd, New Delhi

4. V Kecman, Learning and Soft Computing-support vector machines, neural networks and fuzzy logic, Pearson Education, 2004.

5 K H Lee, First Course on Fuzzy Theory and Applications, Springer Verlag, 2005

(CA-926) E-COMMERCE & ERP

(3-0-0)

Module - I

(15 Hours)

Electronic Commerce : Overview, Definitions, Advantages & Disadvantages of E-Commerce, Threats of E-Commerce, Managerial Prospective, Rules & Regulations for Controlling E-Commerce, Cyber Laws. Technologies : Relationship Between E-Commerce & Networking, Different Types of Networking for E-Commerce, internet, Intranet, EDI Systems Wireless Application Protocol : Definition, Hand Held Devices, Mobility & Commerce, Mobile Computing, Wireless Web, Web Security, Infrastructure Requirement for E-Commerce. Business Models of E-commerce ; Model Based on Transaction Type, Model Based on Transaction Party - B2B, B2C, C2B, C2C, E-Governance.

Module - II

(15 Hours)

E-Strategy : Overview, Strategic Methods for developing E-Commerce. **Four C's** (Convergence, Collaborative Computing, Content Management & Call Centre). **Convergence** : Technological Advances in Convergence - Types, Convergence and its implications, Convergence & Electronic Commerce. **Collaborative Computing** : Collaborative product development, contract as per CAD, Simultaneous Collaboration, Security. **Content Management** : Definition of content, Authoring Tools and Content Management, Content - partnership, repositories, convergence, providers, Web Traffic & **Traffic management** : Content Marketing. **Call Centre** : Definition, Need, Tasks Handled, Mode of Operation, Equipment, Strength & Weaknesses of Call Centre, Customer Premises Equipment (CPE). [6L] **Supply Chain Management** : E-logistics, Supply Chain Portal, Supply Chain planning Tools (SCP Tools), Supply Chain Execution (SCE), SCE - Framework, Internet's effect on Supply Chain Power.

Module - III

(10 Hours)

E-Payment Mechanism ; Payment through card system, E-Cheque, E-Cash, E-Payment Threats & Protections. **E-Marketing** : Home - shopping, E-Marketing, Tele-marketing Electronic Data Interchange (EDI) : Meaning, Benefits, Concepts, Application, EDI Model, protocols (UN EDI FACT / GTDI, ANSIX - 12, Data Encryption (DES / RSA) **Risk of E-Commerce** : Overview, Security for E-Commerce, Security Standards, Firewall, Cryptography, Key Management, Password Systems, Digital Certificates, Digital Signatures.

Text Books:

1. Bhaskar Bharat ; Electronic Commerce - Technologies & Applications. TMH.
2. E-commerce : Strategy Technologies & Applications, Tata McGraw Hill.

Reference Books:

1. MM Oka : E-commerce, EPH
2. Kalakotia, Whinston : Frontiers of Electronic Commerce, Pearson Education.
3. Loshin pete, Murphy P.A. : Electronic Commerce, Jaico Publishing Housing
4. Murthy : E-Commerce, Himalaya publishing.
5. J. Christopher & T.H.K. Clerk : Global E-Commerce, University Press
6. Reynolds : Beginning E-Commerce, SPD
7. Krishnamurthy: E-Commerce Mgmt. Vikas.
8. Strategy, Technology & Implementation by Gary P. Schneider
9. Enterprise Resource Planning by Ashim Raj Singla

(CA 928) PARALLEL COMPUTING

(3-0-0)

Module-I

(10 hours.)

Introduction to parallel computing Motivation and Scope. Parallel Programming Platforms: Trends in microprocessor Architectures, Limitations of Memory System Performance, Dichotomy of parallel Computing platforms, physical Organization of parallel platforms, communication costs in parallel Machines, Routing Mechanisms for interconnection Network, Impact of Process Processors mapping and mapping Techniques.

Module-II

(20 hours.)

Principles of parallel Algorithm Design: Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Balancing, Methods for containing. Interactions overheads, Parallel Algorithm Models.

Basic Communication Operations: One-to-All Broadcast and All-to-One Reduction, All-to-All Broadcast and reduction All-Reduce and Prefix sum operations, scatter and Gather, All-to-All personalized communication, circular shift, improving the speed of some communication operation.

Analytical Modeling of Parallel Programs: Performance Metrics for Parallel Systems, Effect of Granularity of Performance, scalability of parallel system, Minimum Execution Time and Minimum Cost-optimal execution Time, Asymptotic Analysis of parallel Programs, Other scalability Metrics. Programming using the message passing paradigm.

Module-III

(10hours.)

Dense Matrix Algorithm: Matrix-vector Multiplication, Matrix-Matrix algorithm, Solving a System of linear equations.

Sorting: Bubble Sort and its variants, Quick Sort.

Text Books Recommended:

1. Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, "Introduction to Parallel Computing, Second Edition", Person Education,

Reference Books:

1. M. J. Quinn, "Parallel Computing : Theory & Practise", McGraw-Hill.
2. A. Zomaya, editor, "Parallel & Distributed Computing Hand Book", McGraw Hill
3. Joseph J'a J'a , "An Introduction to Parallel Algorithms" , Addison- Wesley .

(CA 929) MOBILE COMPUTING

(3-0-0)

Module-I

(10 hours)

Mobile Computing, Developing Mobile Computing Applications, Security in Mobile Computing, Architecture for Mobile Computing, Three-Tier Architecture, Design Considerations for Mobile Computing, Mobile Computing through Internet, Multiple Access Procedures, Mobile Computing Through Telephone, Developing an IVR Application, Bluetooth, Radio Frequency Identification (Rfid), Wireless Broadband (WiMAX), Mobile IP, Internet Protocol Version 6 (IPv6), Java Card.

Module-II

(18 hours)

Global System for Mobile Communications, GSM Architecture, GSM Entities, Call Routing in GSM, PLMN Interfaces, Gsm Addresses and Identifiers, Network Aspects in GSM, GSM Frequency Allocation, Authentication and Security, GPRS and Packet Data Network, GPRS Network Architecture, GPRS Network Operations, Data Services in GPRS, Applications for GPRS, Limitations of GPRS, Billing and Charging in GPRS, WAP, MMS, GPRS Applications, Spread-Spectrum Technology, Is-95, Cdma Versus, Wireless Data, Third Generation Networks, Applications on 3G.

Wire LAN Advantages, IEEE 802.11 Standards, Wireless LAN Architecture, Mobility in Wireless LAN, Deploying Wireless LAN, Mobile Ad Hoc Networks and Sensor Networks, Wireless LAN Security, WiFi Versus, Moving Beyond the Desktop, A Peak under the Hood, Hardware Overview, Mobile Phones, PDA, Design Constraints in Applications for Handheld Devices, History of Palm OS, Palm OS Architecture, Application Development, Communication in Palm, Multimedia, Enhancements in the Current Release.

Module-III

(12 hours)

JAVA in Handset, The Three-Prong Approach to Java Everywhere, Java 2 Micro Edition (J2ME) Technology, Programming for CLDC, GUI in MIDP, UI Design Issues, Multimedia, Record Management System, Communication in MIDP, Optional Packages, Conclusion, Voice over IP, H.323 Framework for Voice over IP, Information Security, Security Techniques and Algorithms, Security Protocols, Public Key Infrastructure, Trust, Security Models, Security Frameworks for Mobile Environment.

Text Books Recommended:

1. Asoke K Talukder, Roopa R Yavagal, "Mobile Computing", TMH
2. J. Schiller, "Mobile Communication", Pearson

Reference Books:

1. Burkhardt , "Pervasive Computing", Pearson
2. Sandeep Singhal, "The Wireless Application Protocol", Pearson
3. Raj Pandya, "Mobile and Personal Communication Systems And Services". Prentice Hall of India,2001
4. Mark Ciampa, "Guide to Designing and Implementing Wireless LANs". Thomson Learning, Vikas Publishing House, 2001
5. Ray Rischpater, "Wireless Web Development", Springer Publishing
6. Sandeep Singhal, "The Wireless Application Protocols", Pearson
7. "P. Stavrontakis, Third Generation Mobile Telecommunication Systems", Springer Publisher

(CA 930) IMAGE PROCESSING

(3-0-0)

Module-I

(14hours)

Digital Image Fundamentals: Digital Image Representation , Digital Image Progressing System, Visual Perception, Sampling and Quantization, relationship between pixels, Fourier Transforms, Walsh, Hadamard and Discrete Cosine Transforms.

Spatial and Frequency domain methods, Enhancement by point processing, Spatial Filtering, Enhancement in the frequency Domain, Generation of Spatial Masks from Frequency domain Specification, Colour Image Processing.

Module-III

(10 hours)

Image Restoration

Degradation Model, Diagonalization of Circulant and Block Circulant of Matrices, Algebraic Approach to Restoration, Inverse Filtering, Least Mean Square Filter, Constrained Least squares restoration, Iterative Restoration, Restoration in the Spatial Domain .

Module –IV

(16 hours)

Image Compression

Fundamentals, Image compression models, Elements of information theory ,Error free compression, image compression standards.

Image Segmentation

Detection of Discontinuity, Edge linking and Boundary Detection, Thresholding, Region-Oriented Segmentation, The use of Motion in Segmentation.

Text Books Recommended:

1. Digital image processing , R.C. Gonzalez & R. E Wood, PHI 2nd edition.

Reference Books:

1. Digital Image Processing and Analysis, B.Channda & D. Dutta, Prentice Hall

2. Fundamentals of Digital Image Processing , Anil Ku Jain, PHI

3. Digital Image Processing and Computer Vision, Sonka, Hlavac, Boyle,
Cengage Learning.

4. Fundamental of Electronic Image Processing, Arther R. Weeks Jr.PHI

(CA 931) MICROPROCESSOR & ASSEMBLY LANGUAGE PROGRAMMING

(3-0-0)

Module-I

(12 hours)

Microprocessors: Their emergence from 8-bit, Introduction to the basic features of RISC and CISC processors, Microcontrollers. Their areas of use Introduction tom 8085 Microprocessor: Architecture, Bus organization, registers, ALU, Control section, Basic fetch, and Execute cycle of a program, Timing diagrams, Instruction set of 8085, Instruction format, Type of instructions, Addressing modes.

Memory Interfacing: Logic devices for interfacing in brief: Tri-state devices, Buffers, Bi-directional buffers, Decoders, Encoders and latches. Memory map addresses, Memory address range of a 1k memory chip, Memory address lines, memory word size, Memory and instruction

fetch, memory classification. Memory structure and its requirements, Basic concepts in memory interfacing, Address decoding and memory addresses, Interrupts of 8085, Absolute vs. partial decoding and multiple address ranges.

Module-II

(16 hours)

Assembly language programming: Instruction and data format, How to write, Assemble and execute a single program, writing assembly language programs, Debugging a program, programming techniques such as loop counting and indexing, Additional data transfer and 16-bit arithmetic instructions, Arithmetic operations related memory, Logic operations such as rotate and compare, Counters and delays, Stack subroutines, Advanced subroutine concepts.

Various Interfacing Protocols: Polling Interrupts of various types (software, hardware, vectored), Interrupt serial routines, CALL vs. hardware & software interrupts, Preliminary concepts of Exceptions/Traps, DMA.

Module-III

(12 hours)

Data transfer techniques: Programmed data transfer, Parallel data transfer using 8155, Programmable peripheral Interface (8255) and handshake input/output, Programmable interrupt controller 8259A, DMA transfer, Cycle stealing and burst mode of DMA, 8257-DMA controller, A/D/ & D/A converters.

Advance Microprocessors and Microcontrollers: 8086-Architecture, pins, signals & basic system concepts, Memory interfacing, 8051 Microcontroller architecture & pin description.

Text Books Recommended:

1. Ramesh S. Gaonkar, "Microprocessor Architecture, Programming and Applications with the 8085" For Edition, Penram International Publishing (India).
2. Doylas Hall, "Intel 8086 Microprocessor Architecture Programming Application", TMH.

Reference Books:

3. F. Cady "Microcontrollers and Microcomputers: Principles of Hardware and Software", OXFORD Press.
4. Mazidi & Mazidi, "8051 Microcontroller & Embedded System", Pearson Educations.
5. A.k.Ray and K.M.Bhurchandi, "Advance Microprocessor and Peripherals", TMH publication.

(CA 933)

SOFTWARE TESTING

(3-0-0)

Module-I

(12 hours)

Software Testing Strategy and Environment

Establishing testing policy, structured approach to testing, test factors, Economics of System Development Life Cycle (SDLC) Testing.

Software Testing Methodology

Defects hard to find, verification and validation, functional and structural testing, workbench concept, eight considerations in developing testing methodologies, testing tactics checklist

Module-II

(14 hours)

Software Testing Techniques

Black-Box, Boundary value, Bottom-up, Branch coverage, Cause-Effect graphing, CRUD, Database , Exception, Gray-Box, Histograms, Inspections, JADs, Pareto Analysis, Prototyping, Random Testing, Risk-based Testing, Regression Testing, Structured Walkthroughs, Thread Testing, Performance Testing, White-Box Testing

Software Testing Tools

Taxonomy of Testing tools, Methodology to evaluate automated testing tools, Load Runner, Win runner and Rational Testing Tools, Java Testing Tools, JMetra, JUNIT and Cactus.

Module-III

(14 hours)

Testing Process

Eleven Step Testing Process: Assess Project Management Development Estimate and Status, Develop Test Plan, Requirements Phase Testing, Design Phase Testing, Program Phase Testing, Execute Test and Record Results, Acceptance Test, Report test results, testing software installation, Test software changes, Evaluate Test Effectiveness.

Testing Specialized Systems and Applications

Testing Client/Server – Web applications, Testing off the Shelf Components, Testing Security, Testing a Data Warehouse

Text Books

1. Effective Methods for Software Testing, 2nd Edition

by *William E. Perry* , Second Edition, published by Wiley

2. Software Quality, by *Mordechai Ben-Menachem/Garry S. Marliss*, by Thomson Learning publication

Reference Books

1. Software Testing Techniques, by Bories Beizer, Second Edition, Dreamtech Press

2. Managing the Testing Process, by Rex Black, Wiley

3. Software Testing and continuous Quality Improvement, by William E.Lewis, Gunasekaran Veerapillai, Second Edition, Auerbach Publications

4. Dorothy Graham, Erik Van Veenendaal, Isabel Evans, Rex Black”Foundations of Software Testing”CENGAGE Learning,INDIA EDITION.

(CA 971) ADVANCE PROGRAMMING LAB USING JAVA (0-0-6)

ENTERPRISE COMPUTING WITH JAVA

- Web page designing using HTML (Using simple tags, Table, Frameset, Image, Clickable map, Forms)
- Web page designing using XHTML
- Web page designing using DHTML
- Client side scripting through Java script (Simple script)
- Java script object model
- Java Script (Working with properties and methods)
- Java Script (Event Handling)
- Java Script (Form Validation)
- Server side Programming(Usage of Servlet)

- Server side Programming (Usage of JSP)
- Database Programming (Servlet-JDBC)
- Database Programming(JSP-JDBC)
- XML Programming
- Distributed computing using RMI
- Simple EJB Programs (Session Bean and Entity Bean)

(CA 973) COMPUTER GRAPHICS LAB

(0-0-3)

1. Introduction to program writing in graphics with fundamentals.
2. Drawing of line, circle, and ellipses using graphics functions & filling with color.
3. Drawing of different logo of different organizations.
4. Implementation of line drawing Algorithms
 - Polynomial
 - DDA
 - Bresenham's
5. Implementation of circle drawing Algorithms
 - Polynomial
 - Trigonometric
 - Mid-point
5. Demonstration different 2-D geometric transformations
6. Implementation of Sutherland - Hodgeman polygon clipping Algorithms
7. Implementation of Cohen-Sutherland line clipping Algorithms
8. Drawing of different Splines – Hermites, Bezier, Spline.
9. Introduction to Multimedia software

6th Semester MCA

(CA 990) INDUSTRIAL PROJECT WORK (20-24 WEEKS)

Project work to be carried out in an industry. There will be one assessment of the project conducted jointly by the supervisor from the industry and the supervisor from the college for 4 credits. Final evaluation of 16 credits will be done as per the academic regulation.
