DEPARTMENT OF COMPUTER SCIENCE & IT, UNIVERSITY OF JAMMU, JAMMU

REVISED SCHEME OF MCA COURSE STRUCTURE YEAR-2008

SEMESTERWISE COURSE DISTRIBUTION AND PAPERWISE OUTLINE OF MASTERS DEGREE IN COMPUTER APPLICATION PROGRAMME [MCA]

Semester - I

Course No	Title	Credits	Max. Marks Sem. Exam.	Max. Marks Int. Assessment	Total
MCA-101 :	Mathematical Foundation Of Computer Science	4	80	20	100
MCA-102 :	Problem Solving & Programming in C-Language	4	80	20	100
MCA-103 :	Computer Organization & Assembly Language	4	80	20	100
MCA-106 :	Fundamentals of Information Technology	4	80	20	100
MCA-190 :	Practicals (Windows & Unix/Linux Operating Systems, MS-EXCEL, Power Point and Assembly & C languages)	8	75	75	150
	Semester - I Total:-		395	155	550

Note: More emphasis shall be given to C-language.

MCA - Ist SEMESTER

Duration of the Examination: 3 Hrs **Theory Exam. = 80**
Total Marks = 100 **Int. Assessment = 20**

COURSE NO. : MCA-101
TITLE : MATHEMATICAL FOUNDATION OF COMPUTER SCIENCE

Unit-I Sets, Relations and Functions:
Definition of Sets and Subsets; Intersection Union and Complements:
Demorgan's Law; Cardinality; Relations - Equivalence relation etc. Mapping One-one Onto etc.
10 HOURS

Unit-II Calculus:
Functions; Limits and Continuity; Differentiation and Integration; Differential Equations of first Order and first degree.
10 HOURS

Unit-III Linear equations and Matrices:
Various types of Matrices Row/Column operations Solution of linear equations Gaussin Eliminations etc. Properties of determinants; Cramer's Rule; transpose and inverse of a Matrix.
10 HOURS

Unit-IV Vector Spaces:
Definition of Vector, Scalar Product, Vector Product Linear Independence; Bases, Subspace and dimensionality Inner products and Norms.
10 HOURS

Unit-V Vector Algebra:
Definition of Vector, types of Vectors, Addition of two vectors, multiplication by a scalar, laws of vector, addition collinear vectors, coplanar vectors, product of two vectors, laws of product of two vectors, scalar triple product, vector triple product.
10 HOURS

Suggested Readings:

1. Modern Algebra by Prof. M.R. Puri and Dr. Raí Krishan Publisher: Malhotra Brothers
2. Matrices by A.R. Vasishtha Publisher: Krishna Prakashan Mandir

3. Trembley, J.P. and Manohar, R.P.: Discrete Mathematical Structures with Applications to Computer Science. McGraw-Hill, 1975.
4. Lew: Computer Science: A Mathematical Introduction, Prentice - Hall International (Paperback Edition).
5. Hans Scheinder and George P Barker: Matrices and Linear Algebra Holt Rinehart, 1968.
6. Kenneth.H.Rosen: Discrete mathematics and its applications 3rd Edition, McGraw Hill international edition.
7. Elements of Vector Algebra by B.L. Raina Publisher: Malhotra Brothers
8. Vector Algebra by R. Gupta Publisher: Laxami Publishers (P) Ltd.

COURSE NO.: MCA-102
TITLE: PROBLEM SOLVING AND PROGRAMMING IN C - LANGUAGE

Unit-I
Steps for problem solving, computer as a tool for problem solving. Algorithm and its features. Computational complexity of an Algorithm. Order of Notation, rules for using Big – O notation, worst, best and average case behaviour of an Algorithm. Flowcharts and their design.

10 HOURS

Unit-II
History of C – language, structure of C – program, compiling, linking and running a C – program, syntax, semantic, linker, logical and runtime errors.
Character set of C – language, identifiers, keywords, data types, variables, constants, expressions and operators in C - language.

10 HOURS

Unit-III
Control statements, Arrays, strings and functions Storage classes in C – language
C – preprocessors, Macros, Macros Vs functions, Reading from other files

10 HOURS

Unit-IV Structures & Unions:
Declaration, assessing & initializing structures, structures as function arguments, structures and Arrays.
Unions initializing and accessing the members of a union.

10 HOURS

Unit-V
Pointers and their characteristics, pointer arithmetic, passing pointers to functions, Arrays and pointers, pointers and strings.
Files: Files handling in C. Open and close a file in C, Input and output using file pointers, Segmental Vs random access files

10 HOURS

COURSE NO.: MCA-103
TITLE: COMPUTER ORGANISATION AND ASSEMBLY LANGUAGE

Unit-I Introduction & Data Representation
Overview of computers, Integer & floating point representation using IEEE FORMAT, Rules of Floating point Arithmetic, parity, Error detection and correction methods using Hamming technique, ASCII code representation, Number systems & their inter - conversion rules, Rules of addition/subtraction for r's, (r - 1)'s complements, BCD, excess - 3 respectively and their circuits.

10 HOURS

Unit-II Logic Gates & Boolean Algebra
Logic gates, And, OR, NOT, NAND, XOR, NOR, XNOR Gates & their design.
Boolean Algebra:
Binary arithmetic, Boolean Expressions, Laws of Boolean Algebra, De – Morgan laws, K - map, simplification of Boolean Expressions using SOP, POS, K - map techniques.

10 HOURS

Unit-III Combinational and sequential circuits
Combinational circuits:
Half & Full adders & subtractors, parallel adders and subtractors. Encoder, decoder, Multiplexer, De - Multiplexer, code converters.
Sequential circuits:
Flip-flop, its types, registers, its types, & bi – directional register.

10 HOURS

Unit-IV Memory organization and Input/Output devices
Memory organisation:

Memory Hierarchy, Memory, its types (RAM/ROM), characteristics of memory, memory address map to CPU, cache memory.
I/O devices FD/HD disks, VDU; I/O organisation:
Modes of I/O transfer like DMA, programmed control, interrupts technique.
Interrupt & instruction:
Interrupt, its types & its life cycle, instruction life cycle.

10 HOURS

Unit-V Central Processing Unit & Microprocessor
Stack organisation, types of addressing modes, Instruction formats (one, two, three address etc.)
Microprocessor 8086:
Microcomputer structure, Architecture of 8086, Instruction set, problem like Table search, subroutines, largest value search, counting 1's or 0's in a string of bits & numeric manipulations using 8086 instructions set.

10-HOURS

Suggested Readings:

1. Gear, C.W.: Computer Organization and Programming McGraw – Hill, 1975.
2. Tannenbaum, A.S.: Structured Computer Organization Prentice - Hall of India.
3. Mano, M.M.: Computer System Architecture, Prentice – Hall, of India, 1983.
4. Langholz, G., Grancioni, J. and Kandel, A.: Elements of Computer Organization, Prentice - Hall International, 1988.
5. Assembler Manual for the chosen machine.
6. Hayes: Computer Architecture and Organization, McGraw – Hill International Edition.
7. Sloan, M.E.: Computer Hardware and Organization, 2nd Edn, Galgotia publ., Pvt. Ltd.
8. Floyd: Digital Fundamentals, 3rd edn, Universal bookstall, and pvt.ltd
9. R. K Gaur: Digital Electronics and microprocessor - dhantpat Rai pub.

COURSE NO.: MCA-106
TITLE: FUNDAMENTALS OF INFORMATION TECHNOLOGY

Unit-I
Information Technology and its Impacts: Information Technology, Role of computer-based information systems, the information society, information Technology hardware, information technology software, Social and Economic Impact of Information Technology, IT in Government, The Digital Divide, The evolution of the Internet and its impact, IT in developing countries, IT and Gender, IT implementation in organizations, Social/Legal/Ethical issues of Information Technology.

10 HOURS

Unit-II
Organizing Information: Data and Information, Need for information and Computerization, Qualities of Information, Value of Information, Decision making, Data Concepts, Data processing stages and types, Files and databases.

10 HOURS

Unit-III
Internet, Security and E-commerce: Network, communication Links, internet, Addressing Schemes, Protocols, WWW, Network Services, Resource Sharing, Client-Server, FTP, Telnet, Email, Newsgroups, Search Engines, Introduction to Cryptography, Security, E-commerce & its applications, Data Privacy, Introduction to IT Act, Digital Signatures, Electronic Governance.

10 HOURS

Unit-IV Artificial Intelligence:
Introduction to artificial intelligence, Issues in artificial Intelligence, Visual Perception, Pattern Recognition, Reasoning, Knowledge, Representation, Learning and Expert System-description and Features.

10 HOURS

Unit-V Future Trends:
Future of Information Technology Systems, ICT Overview, Relevance and Applications, Emerging Trends and Technologies General concepts of Data Mining, Data Warehousing, Mobile Computing, e-Technologies, Bio-Informatics.

10 HOURS

Suggested Readings:

1. "Computer Science, an Overview", J. Brookshear, Addison Wesley, 2000.
2. "Fundamentals of Information Technology", Alex Leon, Mathews Leon, LeonTechWorld.
3. "Computers in Your Future", Meyer, Baber & Pfaffenberger, Que (Macmillan/Prentice-Hall), 1999.
4. "Information Society in Global Age", Feroz Khan, APH Publishing Corporation.
5. "Information System Management", S K. Bansal, APH Publishing Corporation

6. "Comdex Information Technology, Course Kit", Vikas Gupta
7. "Great Ideas in Computer Science", Alan W Biermann, MIT Press.
8. "Introduction to Artificial Intelligence and Expert Systems" Dan W Patterson, PHI
9. "Computers Today", Suresh K Basandra, Galgotia Publications
10. "Ethics and Information Technology", Goran Collste Ed.Oscar Publications (Delhi, Del, India)
11. "Computer, Ethics and Society" M David Ermann & Michele S Shauf, Oxford University Press US.

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6. Introduction to Data Structures using Pascal by Bhagat Singh and Naps Thompson Publisher: Galgotia
7. Desh Pande, C & Data Structure, Wiley India (Text)

COURSE NO.: MCA-204
TITLE: COMPUTER ORIENTED NUMERICAL METHODS (Scientific Computation)

Unit-I Numeric Computation:
Computer Arithmetic: Floating point numbers, arithmetic Operations. Normalization and their consequences. Errors in number representation.

10 HOURS

Unit-II Interactive Methods:
Zeros of a single transcendental equation and zeros of polynomials using bisection, false position, Newton-Raphson Methods, Convergence of solution; Polynomial Evaluation Birge vieta Methods and Bairstow's Methods.

10 HOURS

Unit-III
Simultaneous Linear Equations; Solutions of Simultaneous Linear equations–Gauss elimination method and pivoting, Ill conditioned equations and refinement of solutions; Jacobi and Gauss–Seidal interactive methods.

10 HOURS

Unit-IV
Numerical differentiation and Integration, Solutions of Differential Equations; Runga-Kuta methods; Predictor-corrector methods; Automatic error monitoring, stability of solutions, Newton's cotes of Integration and Gaussing Quadratic.

10 HOURS

Unit-V Interpolations and Approximations:
Polynomial interpolation Newton, Lagranges etc. Spline Interpolation; Difference tables; Curve fitting, Approximation of function by Taylor series.

10 HOURS

Suggested Readings:
1. Stoer, Bullrich: Computer Oriented Numerical Methods, Springer Verlag, 1980.
2. Krishnamurthy, E.V., Sen, S.K.: Computer Based Numerical Algorithm, East West Press, 1984.
3. Rajaraman, V.: Computer Oriented Numerical Methods, Prentice Hall India, 1980.
4. S.S. Sastry: Introductory Methods of Numerical Analysis.

COURSE NO : MCA-207
TITLE: FUNDAMENTALS OF DISCRETE MATHEMATICS

Unit-I Counting techniques:
Basics of counting pigion hole principles, permutation and combination, Recurrence Relations & their solution (Homogeneous & non-homogenous), Decision trees, Divide & Conquer Relations function, Decision trees

10 HOURS

Unit-II Logic & Fuzzy sets:
Logic operators like AND, OR etc., Truth tables; theory of inference and deductions, Mathematical Induction, predicate calculus, predicate and quantifiers.
Introduction to fuzzy systems, fuzzy sets, equality of fuzzy sets, normal fuzzy sets, containment, support of a fuzzy set. Alpha-level sets. Basic operation of Fuzzy sets.

10 HOURS

Unit-III Graph:
Introduction to Graphs; Incidence and degree; Handshaking Lemma; Isomorphism; Subgraphs and Union of graphs; connectedness; Walks, Paths and Circuits; Components; Connectedness Algorithm, shortest path Algorithms, Eulerian graph; Fleury's algorithms, Hamiltonian graph-Necessary conditions and sufficient conditions; Travelling saleman problem; Bipartite graphs; Directed Graphs, Binary relations, connectedness in directed Graph.
Matrix representations of graph: Incidence; Adjacency matrices and their properties.

10 HOURS

Unit-IV Trees:
Properties of trees; Pendant vertices in a tree: Center of a tree; Rooted an binary trees; Spanning Trees–spanning tree algorithms; Fundamental circuits; Spanning trees of a weighted graph, cutsets and cut–Vertices; Fundamental cutsets; connectivity and separativity;

10 HOURS

Unit-V Planar graphs & colouring:

Combinatorial and geometric dual; Kuratowski's graphs; Detection of planarity; Thickness and crossings.
Colorings: Vertex coloring, Chromatic number; Chromatic polynomial, The four colour problem, edge coloring.

10 HOURS

Suggested Readings:

1. Harry, F.: Graph Theory: Addison - Wesley Publ. Camp. 1972.
2. Trembly, J.P. and Manohar, R.P.: Discrete Mathematical Structures with Applications to Computer Science, McGraw - Hill, 1975.
3. Deo, N.: Graph Theory with Applications to Engineering and Computer Science, Prentice-Hall Inc. 1974.
4. Krishnamurthy, V.: Combinatorics: Theory and Applications, Affiliated East-West Press Pvt. Ltd. 1985.
5. Doerr, A. and Levasseur, K.: Applied Discrete Structures of Computer Science, Galgotia Publications Ptv. Ltd. 1986.

COURSE NO.: MCA-208
TITLE: DATA BASE MANAGEMENT SYSTEM & ORACLE

Unit-I Database Management System Concepts:
File based system, Need of database Management System (dbms) Components of dbms, data independence, three level architectural of database entity relationship model, conversion of ER diagrams to relational Database, conventional file organizations, inverted files, hashing and B tree.

10 HOURS

Unit-II Data Models:
Hierarchical, network and relational data models, relational database Design, relation concepts of joins, relational algebra and calculus, QBE.

10 HOURS

Unit-III Normalisation:
Functional Dependencies, multivalued dependencies, theory of normalization, normal forms.
Concurrency Control:
Data security, recovery management, recovery techniques, concurrency management.

10 HOURS

Unit-IV SQL using Oracle:
SQL query processing table creation and management, using inbuilt A function, data integrity constraints, views, joins, ET operators, privileged roles and security policies.

10 HOURS

Unit-V Oracle PL/SQL
Architecture, Fundamentals, PL/SQL control structure, Exception, Cursors, procedures and functions, packages database triggers.

10 HOURS

Suggested Readings:

1. Bipin C.Desai: An Introduction to Database Systems, West-publishing company.
2. Elmasri, Navathe: Fundamentals of Database Systems, Addison Wesley, Pearson Education.
3. Date, C.J.: An Introduction to Database Systems Addison Wesley Pearson Education.
4. R.A. Parida: The power of Oracle 9i, Firewall Media Vinod Sharma publications.
5. V.K. Jain: Database Mgt. System, Wiley India
6. Desh Pande: SQL/PL for Oracle 8 & 8i

COURSE NO.: MCA-209
TITLE: COMPUTER ARCHITECTURE & MICRO PROCESSOR

Unit-I Digital Electronics:
Semi-conductor, p-type, n-type formation, pn junction & its characteristics, Bipolar and MOSFET transistors as current controlled and voltage controlled Switch, Basic design for AND, OR, NOT, NAND, NOR using RTL, DTL, TTL, MOS Technology, Tristate logic

10 HOURS

Unit-II Sequential Circuits & Computer Arithmetic:
Sequential circuits: Sequence generator, counters, A/D & D/A converters,
Computer Arithmetic: Flowchart, Hardware design & algorithm for signed magnitude & 2's complement form for addition, subtraction, multiplication & division methods, floating point arithmetic

10 HOURS

Unit-III Memory & Register Organisation:
Memory: Basic memory cell, 2D/3D Static RAM, Static and Dynamic Memory, Types of ROM, associative memory and interleaved memory, Random access, Sequential access, Direct access, virtual memory.
Register transfer Language and Architecture: Register transfer language, micro-operation, I/O processor, CPU bus architecture.

10 HOURS

Unit-IV Microprocessor & Control Design:
Internal structure of 8086 MPU, Instruction format of 8086, Bit Slices, I/O interface adapter (Serial and Parallel), Memory read, Memory write, Memory map and I/O map, Interrupts like Serial, Polling and vector methods. Software debugging aids. Features and comparison of higher microprocessors, bus bandwidth Processor & control design ALU & Micro-programmed control unit.

10 HOURS

Unit-V Parallel processing:
Classification of parallel machines, pipeline processing, Vector processing, multiprocessor system architecture-multiport memory, crossbar switch, timeshared common-bus, dual-bus, Bus arbitration.

10 HOURS

Suggested Readings:

1. MALVINO, A.P., LEACH, D.P.: Digital Principles and Applications, Tata McGraw-Hill, 3rd Edn. 1985
2. MILLMAN and HALKIAS: Integrated Electronics, McGraw-Hill.
3. STRANGIO, C.E.: Digital Electronics – Fundamental Concepts and sons, 1985
4. KHAMBATA, J.: Microprocessor and Microcomputer, John Wiley and Applications, PHI, 1984.
5. LIU, Y.GIBSON, G.A.: Microcomputer Systems: The 8086/808¸ Family, Prentice-Hall 2nd Edn, 1986.
6. ALEXANDRIDIS NIKITAS, A.: Microprocessor System Design Concepts, Galgotia Publications, 1984.
7. STONE, S.: Introduction to Computer Architecture, Galgotia Publications, 2nd Edn, 1986.
8. MANO, M.M.: Computer System Architecture, Prentice-Hall, 1976.
9. BAER, J.L.: Computer System Architecture, Computer Science Press, 1980.

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Unit-I Introduction:
Evolution of operating systems, operating systems concepts, types of operating systems, different views of the operating system, operating system structure.

10 HOURS

Unit-II Processes:
Concept, Operating system's view of processes, Interprocess communication, mutual exclusion, Interprocess synchronization, semaphores, Monitors, Message passing, process scheduling and performance criteria, scheduling algorithms, deadlocks, deadlock handling strategies.

10 HOURS

Unit-III Memory Management:
Basic memory management, swapping, relocation & protection, virtual memory, paging, page replacement algorithms, Design issues for paging systems, segmentation.

10 HOURS

Unit-IV
File & I/O Management: Files, directories, disk organization, disk space management, disk scheduling, Protection Mechanisms, I/O devices, I/O buffering, device controllers.

10 HOURS

Unit-V Multiprocessors, Distributed OS:
Multiprocessors: Advantages, classification, Interconnection, types of multiprocessor OS
Distributed system: Introduction, benefits, algorithms for distributed processing.

10 HOURS

Suggested Readings:

1. Andrew. S. Tanenbaum : Modern operating systems, pearson prentice hall.
2. A. S. Tanenbaum , A. S. Woodhull : Operating systems-design and implementation, Prentice hall of India pvt. ltd.
3. Milenkovic M : Operating system-concepts and design, McGraw hillinternatinal editions.
4. Silberschartz, Galvin, Gagne : Operating system Principles , WSE wiley.
5. A S Godbole : Operating systems, tata McGraw hill.
6. Bach M. : Design of the UNIX Operating Systems.
7. Deitel H. M. : An Introduction to operating system, addison- wesley publications.
8. Madnick & Donovan: Operating systems, mcgraw-hill book co.
9. Understanding Operating Systems – Flynn – Thomson Learning

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COURSE NO.: MCA-307
TITLE: OBJECT ORIENTED CONCEPTS & PROGRAMMING IN C++

Unit-I The Object Oriented Methodology:
Paradigms of Programming Languages, Evolution of OO Methodology, Basic Concepts of OO Approach, Comparison of Object Oriented and Procedure Oriented Approaches, Benefits of OOPs, Introduction to Common OO Language, Applications of OOPs, Objects, classes, inheritance, reusability, creating new data types, polymorphism and overloading.

10 HOURS

Unit-II Language Basics:
Basic program construction, data types: integer, character, float, double, long double and Boolean. Input output statements: cin, cout, comments, escape sequence, manipulators, type conversion, arithmetic logical and relational operators, and library function. For loop, while loop & do loop and if, if…else, switch & other control statements. Structures, Enumeration, Functions: passing arguments to functions, returning values from functions, reference arguments, overloaded functions, inline functions, default arguments, variables and storage class and returning by reference.

10 HOURS

Unit-III Objects and Classes:
A simple class, c++ objects as physical objects, c++ objects and data types, object as function argument, constructors, as function argument, overloaded constructors, copy constructors, returning objects from functions, structures and classes, static class data, const and classes, Arrays and Strings.

10 HOURS

Unit-IV Operator Overloading:
Overloading unary and binary operator, data conversion, and pitfalls. Inheritance: derived class and base class, derived class constructors, overloading member functions, class hierarchies, public and private inheritance, level of inheritance, multiple inheritance. new and delete operator.

10 HOURS

Unit-V

Virtual functions:

Virtual functions, friend functions, static functions, this pointer. Streams and files: stream classes, stream errors, disk file I/O with streams, file pointers, error handling in file I/O. Templates and exception: function templates, class templates, exceptions

10 HOURS

Suggested Readings:

1. Herbert Schildt, C++ The Complete Reference, McGraw Hill.
2. Robert Lafore, Object Oriented Programming In C++, Galgotia publ.
3. H.M. Deitel and P.J. Deitel, C++: How to Program, Prentice Hall.
4. Bjarne Stroustrup, The C++ Programming Language, (3rd edition), Addision Wesley.
5. D. Ravichandran,"Programming with C++", Tata Mcgraw Hill.
6. E.Balagursamy , Object Oriented Programming using C ++ ,Tata Mcgraw Hill
7. Scott Meyers, Effective C++: 50 Specific Ways to Improve Your Programs and Designs, Addison Wesley.
8. S.Halladay and M. Wiebel," Object Oriented Software Engg", BPB Publ.

COURSE NO : MCA-308
TITLE: COMPUTER NETWORKS

Unit-I

Fundamentals of Communication, Analog Transmission, Carrier Frequency, Modulation, Serial and Parallel Transmission, Digital Transmission, Data Encoding, Baud Rate, Bit Rate, Simplex and Duplex Communication, Synchronous and Asynchronous transmission.

Fundamentals of Networking, Definition, Types, Topology, OSI reference model, TCP/IP model, network standardization, Inter-networking.

10 HOURS

Unit-II

Physical layer, Switching Technique, terminals, modems, Guided transmission media, Co-axial, Twisted Pair and Fiber Optic Cables, Transmission Impairments, On-guided transmission media, Electromagnetic Spectrum, Communication Satellites, GSM, CDMA.

Data Link layer, Design issues, Frame, Error detection and correction, Flow Control, Elementary Data link protocols, Character-riented and Bit-oriented Protocols, Sliding window protocols.

Channel allocation methods, TDM, FDM, ALOHA, Carrier sense Multiple access protocols, Collision free protocols, IEEE standard 802 for LANS, Ethernet, Token Bus, Token ring.

10 HOURS

Unit-III

Network Layer, Store and Forward Packet Switching, Connectionless and Connection-oriented services, Virtual Circuit, Routing Algorithms, Shortest path, Flooding, Link State, Distant vector, Hierarchical, Broadcast and Multicast Routing. Congestion, Congestion control algorithms.

10 HOURS

Unit-IV

TCP/TP Protocol, IP Addresses, Classes of IP Addresses, Subnets, IPv6, Network layer in the Internet and ATM, Internet Control Protocols, ARP, RARP, BOOTP, DHCP, OSPF, BGP.

Transport Layer, Protocol Stack, Transport Services Primitives, Sockets, Socket Programming with TCP and UDP.

10 HOURS

Unit-V

Application layer, Name service (DNS) Domain Hierarchy, Name servers, Name resolutions, Traditional applications, SMTP, MIME World wide web-HTTP,

Network security-Cryptographic Algorithms, DES, RSA, Authentication protocols, Firewalls

10 HOURS

Suggested Readings:

1. Andrew S.Tanenbaum, "Computer Networks", 4e, 2003, Pearson Education Asia.
2. William Stallings. "Data and Computer Communication", 7e, 2003, Pearson Education Asia.
3. Behrouz A. Forouzan, "Data & Communication Networks", 3e, 2004, TataMcGraw Hills.
4. Michael A. Miller, "Data and Network Communications", 2e, Delmar Thomson Learning.
5. James F. Kurose and Keith W. Ross, "Compter Networking", 3e, Pearson Education.
6. Peter Norton and Dave Kearns, "Complete Guide to Networking", ie,Techmedia India Ltd.

COURSE NO.: MCA-309
TITLE: SOFTWARE PROJECT MANAGEMENT:

Unit-I INTRODUCTION TO SOFTWARE PROJECT MANAGEMENT AND PROJECT PLANNING:
Concept of Software Project Management and its importance, Activities of Software Project Management, ways of categorizing software projects, project as a system, Problems encountered with software projects. Requirement Specification. Information and control in an organization. Stepwise Project Planning.

10 HOURS

Unit-II PROJECT EVALUATION AND SELECTION:
Evaluation of individual projects: Technical assessment, cost-benefit analysis (Evaluation Techniques), and Risk evaluation.
Choosing technologies for the project, Technical plan, Software Process Models (waterfall, V-process, etc.), Selection of most appropriate process plan.

10 HOURS

Unit-III SOFTWARE PROJECT ESTIMATION AND SCHEDULING:
Introduction to Project estimation, software estimation techniques, different types of project metrics, Models for cost estimation (COCOMO, Putnam's, statistical, function point)
Introduction to project scheduling, project schedules, project and activities, scheduling activities, formulating a network model.

10 HOURS

Unit-IV OVERVIEW OF PROJECT MANAGEMENT:
Introduction to management, Characteristics of management, Process of management, Levels of management, Impact of management.
Managing people, understanding behaviour, selecting the right person for the job, motivation, working in groups, decision-making and leadership.

10 HOURS

Unit-V SOFTWARE QUALITY:
Introduction, place of software quality in project planning, Importance of software quality, software quality standards (ISO 9126, 9000, 9003), software quality measures, enhancing software quality, CMM model, concept of six sigma.

10 HOURS

Suggested Readings:

1. Software Project Management Tata McGraw Hill by Bob Hughes & Mike Cotterell
2. Software Project Management PHI S.A.Kelkar
3. Software Engineering: Roger S. Pressmen
4. Software Engineering: David Gustafson
5. Software Engineering: Ian Sommerville
6. Software Project Management: Step by Step by Milton D. Rosenau, Marsha D. Lewin
7. Introduction to Software Project Management and Quality Assurance by D. (Darrel) Ince, Helen Sharp, Mark Woodman
8. Information Technology Project Mgt. Thomson Learning by Kathy & Schwalbe

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COURSE NO.: MCA-310
TITLE: ANALYSIS AND DESIGN OF ALGORITHMS

Unit-I Review of Algorithms and Data Structures:
Algorithms, Problems and Instances, Characteristics, Basic Instructions, Control Mechanisms and Control Structures, Stacks and Queues, Trees, Graphs.
Understanding and Analyzing the Problem, Choice of Appropriate Data Structures and Design Technology, Analyzing an Algorithm

10 HOURS

Unit-II Basics of Analysis:
Asymptotic Bounds, Concept of Efficiency of an Algorithm, Well Known Asymptotic Functions & Notations.
Well Known Sorting Algorithms, Comparison of Sorting Algorithms, Best-Case and Worst-Case Analyses, Average-Case Analysis, Amortized Analysis

10 HOURS

Unit–III Design Techniques-I:
Divide-and-Conquer, General Method, Binary Search, Merge Sort, Quick Sort, Strassen's Matrix multiplication, Exponentiation
Dynamic Programming, General Method, The Problem of Making Change, The Principle of Optimality, Chained Matrix Multiplication

10 HOURS

Unit-IV Design Techniques–II:
Backtracking, General method, 8 queen's problem.
Greedy Algorithms, General Method, Knapsack problem, Job sequencing with dead lines, Minimum Spanning Trees, Kruskal's Algorithm, Prim's Algorithm, Single Source Shortest Paths
10 HOURS

Unit-V Classification of Problems & Graphs Algorithms:
Introduction to NP-Completeness, Establishing NP-Completeness of Problems, NP-Completeness Proofs & Head Problems,NP-Hard Problems, Non-Deterministic Algorithms
Graphs Algorithms, Traversing Trees, Depth-First Search, Breadth-First Search, Best-First Search & Minimax Principle, Topological Sort
10 HOURS

Suggested Readings:

1. Ellis Horowitz and Sartaj Sahni – Fundamentals of Computer Algortihms, Galgotia Publ.
2. Aho A V , Hopcroft J E, Ullman J D–The Design and Analysis of Computer Algorithms, Addison Wesley.
3. G. Brassared and P. Brately-Fundamental of Algorithmics, Prentice-Hall-of India.
4. D. Harel - Algorithmics : The spirit of computing , Addison Wesley.
5. R. Neapolitian and K. Naimipour–Foundation of Algorithms , D.C. Health-and Company
6. D. E. Knuth - Foundation Algorithms , Narosa Publishing House.

COURSE NO.: MCA-390
TITLE: PRACTICALS (The Practicals in this course shall be based on all above courses with special emphasis to C++.)

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Semester - IV

Course No	Title	Credits	Max. Marks Sem. Exam.	Max. Marks Int. Assessment	Total
MCA-410 :	Computer Oriented Statistical Methods	4	80	20	100
MCA-411 :	Web Technologies	4	80	20	100
MCA-412 :	Programming in JAVA	2	40	10	50
MCA-413 :	Communication Skills	2	40	10	50
MCA-414 :	Advance Database Systems	4	80	20	100
Elective-I (Any one of the following)	MCA-415: Theory of Computation MCA-416: e-Commerce MCA-417: Neural Networks	4	80	20	100
MCA-490 :	Practicals (based on above courses)	8	75	75	150
	Semester - IV Total:-		475	175	650

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and median, moments of random variable, moment generating functions. Discrete probability; Union, intersection and compliment of events; conditional probability;

10 HOURS

Unit-II Probability distributions:

Discrete Probability Distributions: Binomial (Derivation, mean and variance and fitting of Binomial distribution), Poisson (Poisson as a limiting case of Binomial distribution, mean and variance and fitting of Poisson distribution.

Standard variables and normal distribution, mean and variance of normal distribution, computing normal probabilities. fitting of normal distribution in a given set of data. Student's T test and F-Static test.

10 HOURS

Unit-III Basic Statistics:

Basic Statistics: Measures of central tendencies:-Mean, Median, Mode; Measures of dispersion: Range variance and standard deviation; Frequency distribution and cumulative frequency distributions; Linear correlation coefficient; Linear regression; Non-linear regression; Multiple correlation and multiple-regression;

10 HOURS

Unit-IV Sampling Theory:

Concept of Population, Sample. Importance of Sampling and its advantages, Sampling distributions, mean and standard deviation of the sampling distribution of means. Sampling distribution as a probability distribution, Sampling distribution of percentages, mean and standard deviation of Sampling distribution of percentages.

Estimating mean and percentages: Estimator, Estimate, Estimation, interval estimation of population mean, interval, level of confidence, estimating population mean.

10 HOURS

Unit-V Hypothesis Testing and Decision-making:

Statistical decisions, hypothesis testing, type-1 and type-2 errors, level of significance, one tailed and tailed tests.

One sample hypothesis tests: Hypothesis tests of means-two tailed and one tailed.

Two sample hypothesis tests: Sampling distribution of the differences between sample means, two tailed and one tailed tests, two sample hypothesis test of percentages.

Comparison of three or more sample means (analysis of variance, A NOVA), Reason behind analysis of variance, estimators of Sigma square ____, F-ratio and F distribution tables.

Chi-square analysis: Chi-square distribution, Chi-square testing, Computation of expected frequencies, testing of goodness of fit.

10 HOURS

Suggested Readings:

1. AFFI, A.A.: Statistcal Analysis: A Computer Oriented Approach, Academic Press, Inc. 1979.
2. MORRIS, C., ROLPH, J.: Introduction to Data Analysis and Statistical Inference,Prentice-Hall, 1981.
3. SCALZO, F.: Elementary Computer Assited Statistics, Van Nostrand Reinherd Co. Ltd., 1978.
4. JOHNSTON, J.: Economatric Methods, McGraw-Hill.
5. HOGG, R.V., CRAIG, A.L.: Introduction to Mathematical Statistics, American PublishingCo. Pvt. Ltd.
6. YULE, U.G., KENDALL, M.G.: An Introduction to the Theory of Statistics, CharlesGriffin and Co. Ltd.
7. DRAPER, N.A., SMITH, H.: Applied Regresion Analysis John-Wiley and Sons, Inc.
8. ANDERSON, T.W.: An Introduction to Multivariate Statistical Analysis, John-WileyandSons, Inc.
9. MORRISON, D.F.: Multivariate Statistical Methods, McGraw-Hill.

COURSE NO.: MCA-411
TITLE: WEB TECHNOLOGIES

Unit-I

Web Server, Web site, Web page, URL, Setting up of a web server, Web Browser and its Working.

Introduction to HTML, Text Formatting Tags, BODY Tag, HEAD Tag, META Tag, Adding Lists, Table, Frame and Form, Embedding objects,

10 HOURS

Unit-II

Introduction to DHTML, Cascading Style Sheet, Defining Styles, Elements of Style, Linking a Style Sheet to an HTML Document, In-line Styles, External Style Sheets, Internal Style Sheets, Multiple Styles.

JavaScript, Variables, String manipulation, Mathematical Functions, Statements, Operators, Arrays, and Functions, Data and Objects, Regular Expressions, Built-in Objects, Events, Data validation, Opening a New Window, Messages and Confirmations, The Status Bar, Writing to a Different Frame, Rollover Buttons, Moving Images.

10 HOURS

Unit-III

Java Applets : Life Cycle of Applet, Creating Applets, Adding Applet to HTML File; Running the Applet, Passing Parameters to an Applet, Drawing Images on the applet, Introduction to SWING. XML, structure of XML document, using DTD with XML, XML Entities, XML schema

10 HOURS

Unit-IV

CGI, Servlets, HTTP servlet, Servlet Life Cycle, Servlet Request and Response Interface session tracking, Database connectivity, JDBC vs ODBC Inter-servlet communication.

10 HOURS

Unit-V

JSP, scripting Elements, JSP Expression, JSP Declaration, Predefined variables/objects. Working with Databases Using JSP, Inserting, Updating, and Deleting Database Records,

10 HOURS

Suggested Readings:

1. Web Programming – Chris bates – Wiley Dreamtech India – Second Edition–2002
2. Internet and Web Technologies – Raj kamal – Tata McGrawHill – 2002
3. Multimedia and Web Technology, Ramesh Bangia, 2e, Firewall Media
4. The Complete Reference Java 2, Herbert Schildt and Pattrick Manghton, 3e, Tata McGraw Hill
5. Internet and Worldwide Web, H.M. Deitel, P.J. Dietel and A.B. Goldberg, 3e, Pearson Education
6. Java Servlets, Karl Moss, 2e, Tata McGraw Hills
7. Mastering Javascript and Jscript, James Jaworski, 2e, BPB
8. HTML 4.0, E. Stephen Mack and Janan Platt, 1e, BPB
9. JSP The complete Reference, Phil Hana
10. Java Servlets and JSP, Bonce W. Perry,
11. ASP Developer's Guide, Greg Bnczek, 1e, McGraw Hill
12. "XML: Related Technologies and Programming with Java" PHI
13. Dynamic HTML, Jeff Rule, 1e, Dreamtech Press
14. The Complete Reference Java Script, Thomas Powell and Fritz Schneider, 2e, Tata McGraw Hill
15. Java Server pages in 24 Hours, Jose Annunziato and Stephanie Fesler Kaminaris 1e, Techmedia
16. Web Warrier Guide to Web Design Technologies. Sklar – Thomson Learning
17. Principals of Web Design – Sklar Thomson Learning

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I/O in Java, Byte Stream Classes, Character Stream Classes, Reading and Writing to Console, Reading and Writing Files, the Transient and Volatile Modifiers, the String and String Buffer Class.
The Applet Class, An Applet Skeleton, Graphics and User Interfaces, Building User Interface with AWT, Handling Events, Layouts and Layout Manager.

10 HOURS

Suggested Readings:

1. Herbert Schildt – "Java2 The Complete Reference", Tata Mcgraw Hill.
2. E. Balagurusamy - " Programming with JAVA", Tata McGraw Hill.
3. Dietel & Dietel – "Java How to Program", Pearson Education.
4. Steven Holzner – "Java2 Black Book", Dreamtech Press.
5. Grant Palmer – "Java Programmer's Reference", Wrox.
6. Jamie Jaworski – "Java2 Platform Unleashed", TechMedia.
7. Bruce Eckel – "Thinking in Java", Prentice Hall.

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10 HOURS

Unit-III Object Oriented Databases:
Need for Object Oriented Databases, Object Definition Language, Object Query Language, Object Relational databases, Introduction to Spatial, Multimedia, Deductive Databases and Mobile Databases

10 HOURS

Unit-IV Distributed Databases:
Concepts, Parallel versus Distributed, Advantages, Data Fragmentation, Data Replication, Data allocation, Types of Distributed Databases systems, Query Processing in Distributed Databases, Concurrency Control and Recovery in Distributed Databases, 3- Tier Client/Server Architecture.

10 HOURS

Unit-V Data Mining and Data Warehousing:
Data Mining Data Warehousing Technology, Association Rules, Approaches to Data Mining Problems, Applications of Data Mining, Data Modeling for Data Warehouses, Building a Data Warehouse, Difficulties and Issues in Data Warehousing.

10 HOURS

Suggested readings:

1. Database Management system, 4th edition, R Elmasri, Shamkant Navathe, Pearson.
2. Database Management System by Korth and Silberschaz,3rd/4th edition Tata McGraw Hill.
3. Database Management System, 7th edition 2003, C.J. Date, Addison Wesley.
4. Introduction to Data mining with case studies, by G.K. Gupta, PHI Pvt. Ltd.
5. Data Modelling and Database Design by Narayen S. Umanath, Richard W. Scawell, THOMSON course Technology (2007).

ELECTIVE COURSE-I

COURSE NO.: MCA-415
TITLE: THEORY OF COMPUTATION

Unit-I Regular Expressions and Languages:
Sets, Relations and Functions, Strings, alphabets and languages, Regular expressions, Algebra of Regular expressions, Regular grammar, Regular languages, Closure properties of Regular languages, Finite automata, Mealy and Moore Machines.

10 HOURS

Unit-II Finite Automata
Non-Deterministic and Deterministic Finite Automata, Equivalence of Regular Expression and Finite automata, Equivalence of ^-NFA and NFA, Equivalence of NFA and DFA, Pumping Lemma for Regular Languages.

10 HOURS

Unit-III Context Free Grammar
Grammar and its classification, Production rules and derivation, Context free Languages, Closure properties for context free languages, Pushdown Automata, Backus-Naur Form, Chomsky Normal Form, Pumping Lemma for Context free languages.

10 HOURS

Unit-IV Turing Machines
Description, Transition diagram, Roles of Turing machine, Turing Thesis, Modular Construction of complex Turing machines, Extensions of Turing machines, Non-Deterministic Turing Machines. Universal Turing Machine, Turing acceptable and Turing decidable languages.

10 HOURS

Unit-V Recursive Function Theory and Applications:
Partial, total and constant functions, Primitive recursive functions, Unbounded minimalisation and m-recursion, Decidable and Undecidable Problems.
Applications of regular expressions, Applications of finite automata, Applications of Context Free Grammar

10 HOURS

Suggested Readings:

1. H. R. Lewis and C. H. Papadimitriou - Elements of the Theory of Computation, Prentice Hall.
2. J. E. Hopcroft, R. Motwani and J. D Ullman - Introduction to Automata Theory, Languages and Computation, Pearson Education Asia.
3. J. E. Hopcroft, and J. D Ullman - Introduction to Automata Theory, Languages and Computation, Addison Wesley.
4. F. Hennie: Introduction to Computability, Addison Wesley .

5. E. V. Krishna moorthy, "Introductory theory of Computer Science". East West Press Pvt. Ltd., New Delhi.
6. K. L. P. Mishra and N. Chandrasekaran - "Theory of Computations (Automata, languages and Computation)", Prentice Hall .
7. Rogers H., Theory of Recursive Functions and effective computing, Mcgraw-Hill.
8. Darrell Long J.C., Theory of Finite Automata with an Introduction to Formal Languages, Prentice Hall.
9. J.C. Martin – Introduction to Languages and Theory of Computation, Tata Mcgraw Hill.

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Unit-II Activation and Synaptic Dynamics:
Introduction, Activation dynamics models, Synaptic dynamics models, Learning methods, Stability and Convergence, Recall in Neural Networks.
Functional Units of ANN for Pattern Recognition Tasks:
Pattern recognition problem, Basic functional units, Pattern recognition tasks by the functional units.

10 HOURS

Unit-III Feedforward Neural Networks:
Introduction, Analysis of pattern association networks, Analysis of pattern classification networks, Analysis of pattern mapping networks.
Feedback Neural Networks:
Introduction, Analysis of linear autoassociative FF networks, Analysis of pattern storage networks, Stochastic networks and simulated annealing, Boltzman machine.

10 HOURS

Unit-IV Competitive Learning Neural Networks:
Introduction, Components of a competitive learning networks, Analysis of feedback layer for different output functions, Analysis of pattern clustering networks, Analysis of feature mapping networks.

10 HOURS

Unit-V Architectures for Complex Pattern Recognition Tasks:
Introduction, Associative memory, pattern mapping, Stability-Plasticity dilemma, ART, Temporal patterns, Pattern variability, Neocognitron, Hardware Realization of ANNs, Adaptive Resonance Theory
Application of ANN: Introduction, Direct applications, Application areas.

10 HOURS

Suggested Readings:

1. Haykins, "Neural Networks", 1e, 2003, Pearson Education Asia.
2. B. Yegnanarayana, "Artificial Neural Networks", PHI.
3. Jacek M. Zurada "Introduction to Artificial Menral Systmen" 4e, JAICO Publishing house.
4. Alexander, Heien Marton, "An Introduction to Neural Computing". Thomson
5. Anderson, "Introduction to Neural Networks", PHI.
6. Rajasekhara, "Neural Networks, Fuzzy Logic and General Algorithms", PHI.
7. Ananda Rao, Srinivas, "Neural Networks", 2003, Narosa.
8. Mohamad H. Hassoun, "Fundamental of Artificial Meural Network", 2e, PHI.

COURSE NO.: MCA-490
TITLE: PRACTICALS (The Practicals in this course shall be based on all above courses with special emphasis to JAVA and C++.)

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MCA – Vth SEMESTER

Duration of the Examination: 3 Hrs **Theory Exam. = 80**
Total Marks = 100 **Int. Assessment = 20**

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Unit-IV Expert System:
Existing System (DENDRAL, MYCIN); domain exploration Meta-knowledge, expertise transfer, self-explaining system.

10 HOURS

Unit-V Pattern Recognition Structured Description:
Symbolic description, machine preception, line finding, interpretation, semantics and models, object identification, speech recognition.
The language LISP and/or prolog is to be covered in the course.

10 HOURS

Suggested Readings:

1. Charniak, E.: Introduction of Artificial Intelligence, Narosa Publishing House.
2. Winston, P.H.: LISP, Narosa Publishing House.
3. Milner, Common LISP: A Tutorial, Prentice-Hall Inc. 1988.
4. Marcellus: Expert System Programming in TURBO PROLOG, Prentice-Hall-Inc. 1989.
5. Elaime, R.: Artificial Intelligence, 1983.
6. Hunt, E.B.: Artificial Intelligence, Academic Press, 1975.
7. Lloyd, J.: Foundation of Logic Programming Springer-Verlog, 1982.
8. Clark, K.L. & McCabe, F.G.: Micro-prolog, Prentice-Hall, India, 1987.
9. Clockskin, W.F. and Mellish, C.S.: Programming in Prolog, Narosa Publishing House.

COURSE NO.: MCA-510
TITLE: COMPUTER BASED OPTAMIZATION TECHNIQUES

Unit-I Linear Programming:
Mathematical model, assumptions of linear programming, graphical solution, simplex method, Dual simplex method, Applications, Sensitivity analysis.

10 HOURS

Unit-II Introduction to integer programming, Branch and Bound techniques.
Special types of linear programming problems-transpolation and assignment models. Traveling saleman problem, Applications.

10 HOURS

Unit-III Introduction to Dynamic programming:
Deterministic and probabilistic Dynamic programming. Network Analysis, Shortest Route problem, Applications.

10 HOURS

Unit-IV
Project Scheduling in PERT-CPM. Diagram representation, critical path calculation, time chart, resource leveling, cost consideration in project scheduling, project control, Applications.

10 HOURS

Unit-V
Sequencing models and its applications. Replacement models and its applications.

10 HOURS

Suggested Readings:

1. TAHA, H.A.: Operations Research Macmillan, New York (1987).
2. Gillet, B.E.: Introduction to Operations Research-a Computer Oriented Algorithmic-Approach. McGraw-Hill (1976).
3. Churchman, C.W.& Arnchoff E.L.: Introduction to Operations Research John Wiley and sons.
4. Srinath, L.S.: Linear Programming, East-West, New Delhi.

COURSE NO : MCA-511
TITLE: PRINCIPELS OF COMPILER DESIGN

Unit-I Compiler Structure & Lexical Analysis:
Compiler Structure: Compilers and Translators, Analysis- Synthesis Model of Compilation, Various Phases of Compiler, Pass Structure, Bootstrapping & Compiler Construction Tools.

Lexical Analysis: Interface with input, parser and symbol table, token, lexeme and patterns, difficulties in lexical analysis, Error Reporting, Regular definition, Transition diagrams, LEX. Capabilities of Lexical Analyzer

10 HOURS

Unit-II Finite Automata:
Finite Automata: Nondeterministic Finite Automata, Deterministic Finite Automata, Subset Construction, Thompson's construction, DFA State Minimization.

The Syntactic Specification of Programming Languages: CFG, Derivation and Parse tree, Ambiguity, Capabilities of CFG.

10 HOURS

Unit-III Parsing:

Basic Parsing Techniques: Top-Down parsers with backtracking, Recursive Descent Parsers, Predictive Parsers, Nonrecursive Predictive Parsers, Bottom–up Parsers, Shift-Reduce Parsing, Operator Precedence Parsers, LR parsers. YACC, Syntax Directed Definitions, Type checking

10 HOURS

Unit-IV Memory Management & Intermediate Code Generation:

Run Time Memory Management: Static and Dynamic storage allocation, stack based memory allocation schemes, Symbol Table management

Error Detection and Recovery: Lexical phase errors, Syntactic phase errors, Semantic errors.

Intermediate Code Generation: Different Intermediate forms: three address code, Quadruples & Triples.

10 HOURS

Unit-V Code Optimization & Generation:

Sources of optimization, Local optimization, Loop optimization, Peephole optimization.

Issues in the design of Code Generator, Basic Blocks and Flow Graphs, Transformations on Basic Blocks, DAG, Code Generation Algorithm, Register Allocation and Assignment.

10 HOURS

Suggested Readings:

1. Alfred V Aho , Jeffrey D. Ullman: "Principles of Compiler Design", Narosa Publ. House.
2. A.V. Aho, R. Sethi and J.D Ullman: "Compiler: principle, Techniques and Tools", Addison Wesley.
3. Tremblay and Sorenson: "The theory and Practice of Compiler Writing" – McGraw Hill.
4. Tremblay and Sorenson: "An Implementation Guide to Complier Writing" – McGraw Hill.
5. Londan: "Compiler Construction" - Thomson Learning.
6. H.C. Holub: "Compiler Design in C", Prentice Hall.
7. Apple: "Modern Computer Implementation in C: Basic Design", Cambridge press.
8. Compiler Construction: Principles & Practice: Londa – Thomson Learning.

ELECTIVE-II

COURSE NO.: MCA - 512
TITLE: SIMULATION AND MODELLING

Unit-I

System and system environment, components of system, discrete and continuous System, static and dynamic systems, model of a system, steps required in deriving a model of a system. Verification and validation of simulation model, stochastic nature of the output data. Introduction to the simulation, why and when simulation is an appropriate tool, advantages and disadvantages of Simulation, Areas of application, general steps followed in simulation experiment.

10 HOURS

Unit-II

Simulation of continuous system, description of continuous model using differential equations, chemical reactor system, integration vs. simulation, selection of integration formula, other examples of continuous system simulation, water reservoir system.

Discrete system simulation, fixed time step vs. next event models, use of random numbers. test of randomness, generation of non uniform random numbers, Monte-Carlo vs. stochastic simulation.

10 HOURS

Unit-III

Simulation of queuing system, elements of queueing theory, Poisson arrival pattern, negative exponential service time, simulation of single server queue, two severs queue and more general queues.

10 HOURS

Unit-IV

Simulation of PERT, network model of project, critical path computation, uncertainties in the activity durations, normal PERT calculations, simulation of activity network, comparison of normal PERT calculation and calculation through simulations.

10 HOURS

Unit-V

Simulation of inventory system, elements of inventory theory, more complex inventory models, examples of simulation of inventory system: with respect to service level considerations and minimum cost considerations, generation of Erlang distributed variates. Simulation languages,

continuous and discrete simulation languages, features of some popular simulation languages: SIMSCRIPT, GPSS, SIMULA etc. Factors in selection of simulation language.

10 HOURS

Suggested Readings:

1. Gorden, G. : System Simulation, Parentice Hall, 1978
2. Payer T. A. : Introduction to Simulation, McGraw-Hill, 1982
3. Reitman, J. : Computer Simulation Application, Wiley, 1971
4. Spriet, W.A. : Computer-aided Modeling and Simulation, Academic Press, 1982
5. Barnes, B. : Modelling and Performance measure,ment of Computer Systems, 1982
6. Deo, N. : Systems Simulation with Digital Computer, Prentice Hall, New Delhi, 1979
7. Banks J., Carson II J.S., Nelson B.L.: Discrete-Event system Simulation, Prentice Hall, New Delhi, 1996

ELECTIVE-II

COURSE NO.: MCA - 513
TITLE: MOBILE COMPUTING

Unit-I Introduction:
Enabling concepts for mobile and personal communications, Terminal mobility,personal mobility and service mobility. The Intelligent Networks(IN) concept.
Mobile and personal communication: Past, Present & Future, Some related network aspects.

10 HOURS

Unit-II
Mobile computing Architecture: History of computers, History of internet, Internet – The ubiquitous Network Architecture for mobile computing, Three tier Architecture, Design considerations for mobile computing, Mobile computing through Internet, Making existing applications mobile enabled.

10 HOURS

Unit-III
The cellular concept and its initial implementations: The cellular concept, Multiple access technologies for cellular systems, Cellular system operation and planning (General principles, System Architecture, Location updating and call setup), Handoff and power control.
Initial implementations of the cellular concept: The AMPS system, TACS system, NMT system, NTT system, Concluding remarks.

10 HOURS

Unit-IV Digital cellular mobile systems:
Introduction, GSM: The European TDMA digital cellular standard, GSM standardization and service aspects, GSM reference architecture and function partitioning, GSM radio aspects, Security aspects, GSM protocol model, Typical call flow sequences in GSM, Evolutionary directions for GSM
IS-136: The North American TDMA digital cellular standard(D-AMPS), Background on North American digital cellular, Service aspects of D-AMPS(IS-136), Network reference, Radio aspects, Security aspects, Protocol model and typical flow sequences, Evolutionary directions

10 HOURS

UNIT-V
Mobile data communications: Introduction, Specialized packet and mobile radio networks, Circuit switched data services on cellular networks, circuit switched data on analog cellular networks, Circuit switched data on digital cellular networks, high speed Circuit switched data in GSM, Packet switched data services on cellular networks, Packet data in analog cellular networks, CDPD(cellular digital packet data), Packet data in digital cellular, Evolution of cellular mobile data capabilities: The EDGE concept, Data over lower power wireless or cordless telecommunication networks, Data services over DECT(Digital enhanced cordless telecommunications), Data services in PACS(Personal Access communications System), Data services in PHS(Personal Handy phone system), Data services in CT2(Cordless Telephony 2)

10 HOURS

Suggested Readings:

1. Mobile and personal communication systems and services,By Raj Pandya
2. Mobile communications,By Jochen Schiller
3. Mobile Computing ,By Talukder Yavagal

ELECTIVE-II

COURSE NO.: MCA-514
TITLE: PARALLEL AND DISTRIBUTED PROCESSING

Unit-I
Introduction to Parallel Processing. Parallelism in sequential Mechanics, Abstract model, Multiprocessor architecture, Architecture classifications and Techniques. Pipelining, Arithmetic and Instruction Pipelines, Pipelining Hazard.

10 HOURS

Unit-II
Interconnection Networks, Hyper cubes, Shuffle Exchanges, Trees, Meshes and Butterfly networks, parallel Algorithm for, linear Algebra, Matrix Multiplication, solving linear systems, probabilistic algorithm, possibility of super linear speedup, Sorting, Vector and Array Processors.

10 HOURS

Unit-III
Shared Memory Programming, general model of shared Memory Programming, Thread management, attributed, Thread implementation Java Threads.
Parallel Processing – Operating Systems for parallel Processors, types, tools and languages
Parallel Programming Languages – FORTRAN 90 (Introduction)

10 HOURS

Unit-IV
Characterization of Distributed Systems – Introduction, Examples of Distributed Systems, Resource sharing and the Web, Challenges. Message passing Model, programming model, PVM, Remote procedure Call – parameter passing, Java Remote Method Invocation
Other parallelism paradigms – Data Flow Computing, Systolic Architecture

10 HOURS

Unit-V
Distributed Data Base – objectives, issues, systems, database integrity, concurrency model, DDBMS structure
Distributed Operating System – need, types, goals, design issues, Inter process Communciation

10 HOURS

Suggested Readings:
1. Scientific Computing, An introduction with parallel computing: Gene Golub/James M.Ortega
2. Introduction to parallel processing: M Sasikumar, Dinesh S., P. Ravi Prakesh: PHI, 2002

COURSE NO.: MCA-590
TITLE: PRACTICALS (The Practicals in this course shall be based on all above courses with special emphasis to JAVA.)

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