MCA

Course Curriculum for

Master in Computer Application

[Through Distance Education]

(w.e.f. July 2004)

Directorate of Distance Education
Guru Jambheshwar University
HISAR-125001

DIRECTORATE OF DISTANCE EDUCATION

GURU JAMBHESHWAR UNIVERSITY, HISAR

COURSE CURRICULUM
FOR
MASTER IN COMPUTER APPLICATION
[THROUGH DISTANCE EDUCATION]
Five-Year Programme (Integrated)

We all know that all Bachelor courses in Computer Science and Applications are not ultimate degrees and students will have to do MCA course. The current structure of existing B.Sc. (Computer Science), BCA and MCA courses h a ve no co-ordination. As a result of which overlapping exists in the scheme and syllabi of these courses. This needs revision in curriculum of these courses in order to remove redundancy among all these courses on the similar pattern which already exists in many courses in many universities viz. integrated MBA and integrated Law courses. In view of the above, Department of Computer Science and Engineering feels concerned and is introducing and recommending an integrated five year MCA course through distance education mode after 10+2 in annual examination mode following modular approach w.e.f. July 2003 session which would cater the need of the industry, attract bright students and would save one prestigious year of the students.

This course is designed on modular basis. i.e. if some one wants to leave this course after successful completion of third year, he/she will be awarded BCA degree, otherwise, he/she be awarded MCA degree after successful completion of fifth year.

Five year Integrated MCA Course

for Distance Education for the

session **2003-2004**

Scheme

MCA 1st Year

MCA-101	Computer Fundamentals	100
MCA-102	Computer Programming & Problem Solving Using C	100
MCA-103	Mathematics-I	100
MCA-104	Business Flow Systems	100
MCA-105	Operating System - I	100
MCA-106	Communication & Presentation Skills	50
MCA-107	Lab - 1 based on 101	100
MCA-108	Lab - 2 based on 102	100

		750

MCA 2nd Year

MCA-201	Data Structure & Algorithms	100
MCA-202	Database System	100
MCA-203	Digital Electronics	100
MCA-204	Computer Organization and Architecture	100
MCA-205	Mathematics - II	100
MCA-206	Communication Skills - Scientific & Technical Writing	50
MCA-207	Lab - 1 based on 201	100
MCA-208	Lab - 2 based on 202	100

		750

MCA 3rd Year

MCA-301	Computer Networks	100
MCA-302	Object Oriented Programming using C++	100
MCA-303	Software Engineering	100
MCA-304	Internet Fundamentals	100
MCA-305	Mathematics-III	100
MCA-306	Social Implications of IT	50
MCA-307	Lab - 1 based on 302	100
MCA-307	Minor Project	100

		750

MCA 4th Year

MCA-401	Computer Graphics & Multimedia	100
MCA-402	Artificial Intelligence	100
MCA-403	Analysis & Design of Computer Algorithms	100
MCA-404	Operating System-II	100
MCA-405	Computer Networks - II	100
MCA-406	Management Information System	100
MCA-407	Lab - 1 based on 401	100
MCA-408	Lab - 2 based on 402	100

		750

MCA 5th Year

MCA-501	Principles of Programming Languages	100
MCA-502	Advanced Architecture and Parallel Processing	100
MCA-503	Object Oriented Design and Modeling	100
MCA-504	System Simulation and Modeling	100
MCA-505	Data Mining and Data Warehousing	100
MCA-506	Project	250

		750

Total Marks = 3750

MCA-101 : Computer Fundamentals

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Computer basics, Representation of characters in computers, Representation of intergers, Representation of Fractions, Hexadecimal representation of numbers, Decimal to binary Conversion.

Description of computer input units, other input methods, Computer output units.

Memory cell, memory organization, Read Only memory, Serial Access memory, Physical devices used to construct memories, Magnetic Hard Disk, Floppy Disk Drives, CDROM, Magnetic tape drives.

Binary addition, substraction, signed numbers, Two's Complement representation of numbers, Addition/Substraction of numbers in 2's Complement rotation, Binary multiplication, Binary division, Floating Point representation of numbers.

Why Programming Language ?.. Assembly language, Higher level programming languages, Some high level languages.

Why do we need an OS?., Batch operating system, Multiprogramming Operating system, Time sharing operating system, Personal Computer Operating System, Unix Operating System, On line and Real time system.

First Generation of Computers, Second generation, Third generation, Fourth generation, Fifth generation, Classification of Computers, Distributed Computer System, Parallel Computer.

Types of Communication with analog computers, need for computer communication networks, Internet and World Wide Web, Characteristics of Communication Channels, Allocation of Channel, Physical communication media, Computer Network Topologies, Communication Protocols, Local Area Networks, ATM Networks, Interconnecting Networks.

Arrays of pointers.

Structures: Defining and processing, Passing to a function, Union.

Data Files: Open, close, create, process, Unformatted data files.

References:

1. Hutchison R, "Programming in C", Tata McGraw Hill, New York, 1990.
2. Johnsonbaugh R, and Kalin M, "Applications Programming in C" MacMillian. N.Y. 1990.
3. Kernighan B.W. and Ritchies D.M. "The C Programming Language" Prentice Hall of India, 1989.
4. E. Balaguruswamy, "Introduction to C", Tata McGraw Hill.
5. Yashwant Kanetkar, "Let us C", Tata McGraw Hill.

MCA-103 : MATHEMATICS-I

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Algebra : Revision on equation reducible to quadratics and simultaneous equations (linear and quadratic) up to two variables only. Determinants and their six important properties, solutions of simultaneous equations by Cramar's rule. Matrices, Definition of special matrices (like unit, singular, diagonal matrices etc.) arithmetic operation on martrices, transpose, adjoint reciprocal and inverse of a matrix, solution of simultaneous equations using matrices.

Trigonometry: Revision on angle measurement and T-ratios addition, subtaction and transformation formulae. T-ratio of multiple and allied angles.

Analytical plane geometry: Cartesian co-ordinates, distance between two points, area of triangle, locus of a point, straight line, slope and intercept form, general equation of first degree.

Calculus: Differential : Limits and functions, differential coefficient, differentiation of standard functions, including function of a function (chain rule), differentiation of implicit functions, logarithmic differentiation, parametric differentation, elements of successive differentiation.

Integral : integration as inverse of differentiation, indefinite integrals of standard forms, integration by parts, by partial fractions and by substitution, formal evaluation of definite integrals.

Differential equations : definition and formation of ordinary differential equations, equations of first order and first degree, variable separable, homogeneous equations, linear equations and differential equations reducible to there types.

Statistics: Measures of central tendency, ideal characteristics, mean, median, mode, GM, HM and weighted arithmetic mean form discrete and continous frequency distribution, quartiles, deciles and percentiles, measures of dispersion, range, quartile deciles and percentiles, measures of dispersion, range, quartile deviation, mean deviation, standard deviation, calculation of standard deviation from discrete and continuous frequency distributions, standard error of means, coefficient of variation.

Probability and events Bayes theorem probability theorems, probability distributions, elements of binomial and Poisson distributions, normal distribution.

Linear correlation and regression analysis, scatler plots, method of least squares Pearsoxian coefficients of correlation.

References :

1. R.S Agarwal, "Modern Approach of Mathematics".
2. Grewal, "Engineering Mathematics"
3. Gupta S.P. and Kapoor, V.K., "Fundamentals of Mathematical Statistics", Sultan Chand & Sons, 1995.

MCA-104 : Business Flow Systems

Total Marks: 100

Time: 3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Introduction: The nature of business and components of business.

Environment of business system: Economic and non-economic environment, environment and management, business system, business and economic system.

Forms of legal ownership: Sole proprietorship, partnership company and cooperative society-features, formation, merits and demerits.

Scale of Operation and size of firm: Measures of size and factors determining size, optimum firm, tendency towards large size.

Company Management: Shareholders, board of directors, chief executive and managing director, Meeting and resolutions, winding up process.

Horizons of business: Business combination, rationalization and combination. Public utilities-characteristics rights, duties, ownership and management.

Business Management: Nature and importance, Principles of Management, Functions of management-planning organization, staff, directing and controlling scientific management.

References : Study Material already developed.

MCA-105 : Operating System-I

Total Marks: 100

Time: 3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Definition of Operating System, Functions of Operating System, Introduction to Batch Systems, Multi programmed batch systems, Time sharing system, Personal Computer system, Parallel system, Distributed system, Real time systems.

Operating system structures: System components, Operating system services, system calls, system programs, System structures, Virtual machines.

Process Concepts, Process scheduling, Operations on processes, CPU scheduling basic criteria, scheduling algorithms, Deadlock's system model, Deadlock characterization, Methods for handling deadlocks, Memory management, Logical and Physical addresses, Swapping Concept.

References:

1. "Operating System Concepts", Silberchatz Galvin, Wiley Publications.

MCA-106 : Communication and Presentation Skills

Total Marks: 50

Time: 3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

1. Communication Skills: Essentials of Communication skills, Small group communication techniques, Group Discussions etc., Public speaking

techniques, Body Language, Interview, Workshop, Dress codes.

2. Presentation Skills: a) Presentation aids: Audio aids, Visual aids, Audio-Visual aids, Printed aids.

   b) Use of Power points.

   c) Meetings: Convening, Prepatation, Managing, Post-meeting Follow up.

3. Written Presentation

   a) Preparation of C.V./Resume.

   b) Report writing

References :

1. K. K. Sinha, "Business Communication", Galgotia Publishing Company.
2. Rajender Pal, J.S. Korlahalli "Essentials of Business Communication", Himalya Publishing House

MCA-201 : Data Structure & Algorithms

Total Marks: 100

Time: 3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Introduction: Definitions and Importance of Data Structures, Abstract data types, Storage Structures.

Linear Lists: Arrays, address calculation in single and multidimensional arrays, operations on array, sequential search, Binary Search and their complexity analysis, String Handling, variable and fix length strings.

Linked lists and operations on them, circularly linked lists, Doubly linked list, Application of linked list on polynomial expressions and sets., Doubly linked list.

Trees: Definition of tree, Binary tree and related terms, Application of binary tree, Tree Traversals, Threaded tree, Binary Search Tree, Head, Balanced Tree Definitions.

Graph: Representation of graph in memory and various operations on them, Finding path matrix, Warshall's algorithm, Application of graphs: route problems, Minimum spanning tree.

Sorting techniques: Selection, Insertion, Bubble, Merge, Quick, Heap with their complexity analysis.

Hashing techniques

References:

1. Schaum Series, "Introduction to Data Structures", MGH.
2. Tenenbaum, "Data Structure using C++", PHI.

MCA-202 : Database Management System

Total Marks: 100

Time: 3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Basic Concepts: Data, Information, Knowledge, Use of Data as Resource, Data Processing Vs Data Management System, File Oriented Approach, Database oriented approach to Data Management, Characteristics of a Database, Database Management system, Database Administrator, Types of Database system, Data Dictonary, Advantage and Disadvantages of databases systems, Data Models, Schemas & Instances, DBMS Architecture & Data Independence, Data Languages & Interfaces, Data modeling using the Entity-Relationship Approach.

Conventional Data Models & Systems: Network data Modeling concepts, Constraints in the Network model, Data Manipulation in a Network Database, Hierarchical Database Structures, Integrity Constraints Data definition in the

Hierarchical Model.

Relational Model, Languages & Systems: Relational Model concepts, Relational model constraints, Relational Algebra, SQL: Data Definition in SQL, view and queries in SQL, Specifying constraints & Indexes in SQL, A Relational Database Management Systems (ORACLE)

Relational Database Design : Function Dependencies & Normalizations for Relational Database, Functional Dependencies, Normal Forms based on primary keys (INF, 2NF, 3NF & BCNF), Lossless join & Dependency preserving decomposition.

Query Processing : Basic Alogrithms for Executing Query Operations, Using Heuristics in Query Optimization.

Concurrency Control & Recovery Techniques : Concurrency Control Techniques, Locking Techniques, Time Stamp Ordering, Granularity of Data items, Recovery Techniques, Recovery Concepts, Database Backup and Recovery from catastrophic failures.

Distributed Databases and Client Server Architecture : Distributed Database Concepts, Data Fragmentation, Replication and Allocation, Types of Distributed Database Systems, Query Processing in Distributed database, An overview of Client-Server Architecture.

References :

1. Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley, New York.
2. J.D. Ullman, J. Widom, "A First Course in Database System", Pearson Education.
3. Naveen Parkash, "Introduction to Database Management System", TMH.

MCA-203 : Digital Electronics

Total Marks: 100

Time: 3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Fundamental Concepts: Introduction, Digital Signals, Basic Digital Circuits, Boolean Algebra & Theorems.

Number System & Codes : Introduction, Number System - Binary, Octal, Hexadecimal Signed & Unsigned binary Numbers, Binary Arithmetic - addition, subtraction, Codes-BCD, EXCESS-3, Gray, Hexadecimal, Octal, ASCII, EBCDIC, Error codes.

Combinational Logic Design : Introduction, Standard forms - SOP & POS, Karnaugh Map-2, 3 & 4 variables, simplification using K maps, Minterms & Maxterms, Don't Care conditions. Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexer/ Encoder, Demultiplexer/Decoder, Comparator, Parity Generator/Checkers, Code Converters.

Flip Flops : Introduction, Clocked S-R FF, J-K FF, D-type FF, T type FF, Master Slave JKFF, Edge triggered flip flops, Excitation Tables of Flip Flops.

Registers : Introduction, Sequential Circuits, Shift Registers, Serial Input Serial Output, Serial Input Parallel Output, Parallel Input, Parallel Output, Parallel Input Serial Ouput, Bidirectional Shift Registers, Universal Shift Register.

Counters : Introduction, Types-Asynchronous Counter or Ripple Counters, Synchronous Counters, Counter Design.

Introduction to Digital Logic Families : Introduction, Characteristics of Digital IC's, Introduction about TTL & CMOS Logic, Tri-State Logic.

MCA-203 : Digital Electronics

Total Marks: 100

Time: 3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Fundamental Concepts: Introduction, Digital Signals, Basic Digital Circuits, Boolean Algebra & Theorems.

Number System & Codes : Introduction, Number System - Binary, Octal, Hexadecimal Signed & Unsigned binary Numbers, Binary Arithmetic - addition, subtraction, Codes-BCD, EXCESS-3, Gray, Hexadecimal, Octal, ASCII, EBCDIC, Error codes.

Combinational Logic Design : Introduction, Standard forms - SOP & POS, Karnaugh Map-2, 3 & 4 variables, simplification using K maps, Minterms & Maxterms, Don't Care conditions. Half Adder, Full Adder, Half Subtractor, Full Subtractor, Multiplexer/ Encoder, Demultiplexer/Decoder, Comparator, Parity Generator/Checkers, Code Converters.

Flip Flops : Introduction, Clocked S-R FF, J-K FF, D-type FF, T type FF, Master Slave JKFF, Edge triggered flip flops, Excitation Tables of Flip Flops.

Registers : Introduction, Sequential Circuits, Shift Registers, Serial Input Serial Output, Serial Input Parallel Output, Parallel Input, Parallel Output, Parallel Input Serial Ouput, Bidirectional Shift Registers, Universal Shift Register.

Counters : Introduction, Types-Asynchronous Counter or Ripple Counters, Synchronous Counters, Counter Design.

Introduction to Digital Logic Families : Introduction, Characteristics of Digital IC's, Introduction about TTL & CMOS Logic, Tri-State Logic.

References :

1. R.P. Jain, "Modern Digital Electronics", TMH.
2. Ghoshal, D.Mohan, Dharminder Kumar, "Digital Electronics", Galgotia Book Source.
3. Malvino Leech, "Digital Computer Electronics", TMH.

MCA-204 : Computer Organization & Architecture

Total Marks: 100

Time: 3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Basic Computer Organization, Register Transfer and Micro-operations, Arithmetic and Logic micro-operations, Shift-Micro-operations, computer Instructions, Timing and Control, Instruction cycle, Memory Reference Instructions, Input-Output and Interrupts Micro-programmed control-unit, Microprogram Sequencer, Central Processing Unit-general register organization, Stack organization, Instruction formats, Addressing modes.

Arithmetic Unit, Input-Output Organization, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupts, Direct Memory Access, Memory organization, auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Reference :

1. Mano M., "Computer System and Architecture", 3rd Edition, PHI.
2. Stallings W. "Computer Organizations and Architecture", 2nd Edition, PHI.

MCA-205 : Mathematics-II-Discrete Mathematical Structures

Total Marks: 100

Time: 3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Group and Subgroups : Group axioms, Permutation Groups, Subgroups, Cosets, Normal subgroups, semi-groups, FREE Semi-groups, Applications, (modular arithmetic, error correcting codes, grammars, language, Finite State Machine).

Graphs : Directed and undirected graphs, chains, circuits, paths, cycles, connectivity, Adjacency and incedence matrices, Minima's path Application (Flow charts and state transition graphs, algorithms for determining cycle and minimal paths, polish notation and trees, flows ion networks.).

Lattices and Boolean Algebra : Relations to p artial ordering, Lattices, Hasse diagram, Axiomatic definition of Boolean algebra as algebraic structures with two operations basic results truth values and truth tables. The algebra of prepositional function. The Boolean algebra of truth values, Applications (Switching circuits, Gate circuits).

Finite Fields : Definition Representation, Structure, Integral domain Irreducible polynomial, polynomial roots, Splitting field.

References :

1. Alan Doerr, "Applied Discrete Structures for Computer Science", Galgotia Publications Pvt. Ltd.
2. Scymour Lipschutz, "Discrete Mathematics", McGraw-Hill International Editions Marc Lars Lipson, Schaum's Series.
3. Bernard Kolm and Robert C.Busby, "Discrete Mathematical Structures For

Object Oriented Concepts : Paradigms of Object Oriented Programming : Object and Classes, Abstraction, Encapsulation, Information Hiding, Inheritance and Polymorphism Object Modeling.

C++ Language : Function in C++, Classes and Objects, Constructors and Destructors, Operator Overloading and Type Conversions, Inheritance : Extending Classes, Pointers, Virtual Functions and Polymorphism, Managing Console I/O Operations, Working with C++ files, Object Oriented System Development, Templates and Exception Handling.

References :

1. Rambagh J., et.al., "Object Oriented Modeling and Design", Prentice Hall of India, New Delhi.
2. E.Balagurusamy, "Object Oriented Programming with C++|, Tata McGraw Hill.
3. Timothy Budd, "An Introduction to Object Oriented Programming" Pearson Education Asia, 2001.

MCA-303 : Software Engineering

Total Marks: 100

Time: 3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Introduction: Software Crisis, Software Processes, Software Life Cycle models: Waterfall, Prototype, Evolutionary and Spiral models.

Software Metrics: Size Metrics like LOC, Token Count, Function Count, Design Metrics, Data Structure Metrics, Information flow metrics, Overview of Quality Standards like ISO 9001, SEI-CMM.

Software Project Planning : Cost estimation - Static, Single and multivariate models, COCOMO model, Putnam Resource Allocation Model, Risk Management.

Software Requirement Analysis and Specification: Problem Analysis, Data Flow Diagrams, Data Dictionaries, Entity Relationship Diagrams, Software Requirement and Specifications, Behavioral and non-behavioral requirements, Software Prototyping.

Software Design: Cohesion & Coupling Classification of Cohesiveness & Coupling, Function Oriented Design, Object Oriented design, User Interface Design, Structured Programming.

Software Reliability: Failure and Faults, Reliability Models: Basic Model, Logarithmic Poisson Model, Calender time Component Reliability Allocation.

Software Testing: Software process, Funtional Testing: Boundary value analysis, Equivalence class testing, Decision table testing, Cause effect graphing, Structural testing: Path testing, Data flow and mutation testing, unit testing, integration and system testing, Debugging, Testing Tools & Standards.

Software Maintenance: Management of Maintenance, Fault Reports, Authorizing changes to the product, Ensuring maintainability, Reverse Engineering, Testing During Maintenance.

Reference:

1. R.S. Pressman, "Software Engineering- A practitioner's approach", 3rd ed., McGraw Hill Int. Ed. 1992.
2. I.Sommerville, "Software Engineering", Addision Wesley, 1999.
3. P.Jalote, "An Integrated approach to Software Engineering", Narosa, 1991.
4. R.Fairley, "Software Engineering Concepts", Tata McGraw Hill, 1997K.K.

5. Aggarwal, Yogesh Singh, "Software Engineering", New Age Publication, 2002.

6. Nasib S.Gill, "Software Engineering", Khanna Publications, 2002.

MCA-304 : Internet Fundamentals

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Introduction : Growth of computer networking, complexity in Network systems, Growth of the Internet, Probing the Internet, Interpreting a ping response, Tracing a route.

Packets, Frames and Error detection, WAN technologies and Routing.

Network ownership, service paradigm and performance

Internet working concepts, Architecture and protocols, IP: Internet protocol addresses, IP Datagrams and Datagram forwarding, IP Encapsulation, Fragmentation, The future IP(IPV6), TCP Reliable Transport service.

Naming with the Domain name system, Electronic mail Representation and tranfer, file transfer and remote file access.

World wide web pages & Browsing, CGI Technology for Dynamic web documents, Network Management & Security.

Reference :

1. Douglas E. Comer, "Computer Networks and Internets", Pearson Education Asia, 2001.

MCA-305 : Mathematics-III-Computer Oriented Numerical and Statistical Methods Using C

Total Marks: 100

Time:3 Hour

Note: Total 8 questions are to be set by the examiner covering the entire syllabus uniformly. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Computer Arithmatic : Floating point representation of numbers, arithmetic operations with normalized floating point numbers and their consequences. Error in number representation-pitfalls in computing.

Iterative Methods : Bisection, False position, Newton-Raphson methods, Discussion of convergences, Polynomial evaluation, Solving polynomial equations (Bairstow's Methods).

Solving of Simultaneous Linear Equations and ordinary Differential Equations: Guass elimination method, Ill- conditioned equations, Gauss-Seidal Iterative method, taylors series and Euler methods, Runga-kutta methods, Predictor corrector methods.

Numerical Differentiation and Integration : Differentiation formulae based on polynomial fit, Pitfalls in differentiation, Trapezodial, Simpson's rules and Gaussian Quadrature.

Interpolation and Approximation : Polynomial interpolation, Difference tables, Inverse interpolation, Polynomial fitting and other curve fitting. Approximation of functions by Taylor series and chebyshev polynomials.

Statistical methods : Sample distributions, Test of Significance, n2, t and F test.

Analysis of Variance : Definition, Assumptions, Cochran's Theoram, One -way

classification , ANOVA Table, Two-way classification (with one observation per cell).

Time Series Analysis : Components and Analysis of Time Series, Measurement of Trend, Seasonal fluctuations and Cyclic movement.

References :

1. Gupta S.P. and Kapoor, V.K., "Fundamentals of Applied station statistics", Sultan Chand & Sons, 1996.
2. Gupta S.P. and Kapoor, V.K., "Fundamentals of Applied station statistics", Sultan Chand & Sons, 1995.
3. Rajaraman, V., "Computer Oriented Numerical Methods", Prentice Hall, India.
4. Graybill, "Introduction to Statistics", McGraw.
5. Anderson, "Statistical Modelling", McGraw.

MCA-306 : Social Implications of Information Technology

Total Marks: 50

Time:3 Hour

The objective of this course is to enable the students to debate on Social dimensions of Information Technology. The debates includes social, economic, political and cultural implications of Information and Communication Technologies.

Note : Examination will have two sections. In the first section, the examiner is requested to set five questions each of marks 10. A candidate is required to attempt any three questions from this section. In the second section, which is compulsory, the examiner is requested to set three topics on the current debates on social implications of Information Technology for essay writing. The candidates are required to write an essay of approximately 1000 words on any one of the topics. The essay will be of 20 marks.

Introduction : Importance of social dimensions of science and technology, perspectives on technology and society, debate over the social implications of information and communication technologies.

Information politics in digital age : How do social and technical choices reshape acccess to people, services and technologies. Influencing factors such as geography of access, the architecture of networks, the power of receivers and senders and control over the content.

Perspectives on role of IT : Focus on alternative ways in which IT professionals, Social scientists and others have thought about their social and economic role.

Information Technology and the reach of boundaries of business and management, Redesigning of work place, The intelligence household, IT in learing and education.

Debates on digital divide, Privacy and surveillance in everyday life and impact of IT on culture.

References :

1. Dutton, W.H. "Society on the line: Information politics in digital age", Oxford University Press, 1999.
2. Castells M., "The Internet Galaxy" Oxford University Press,
3. Teich, A.H., "Technology and the future", 8th edition, Newyork st. Martin press.

Useful Internet sites:

http://www.alteich.com

http://www.students.ou.edu.C/Kara.C.chiodo-1/orwell.html

MCA-401 : Computer Graphics and Multimedia

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Graphics Input Devices (Mouse, Light Pen), Graphic display devices-Storage CRT display, Calligraphic display, Raster Scan Display, Line and Circle plotting using Bresenham's algorithm. Circle & Ellipse plotting using Midpoint algorithm.

Windowing and Clipping, Sutherland-Cohen approach, Mid-point Sub division algorithm, curve drawing using Hermite polynomial, Bezier curves, B-splines. Picture transformation-translation, rotation, scaling, mirror images. 3-D graphics, 3-D transformations-rotation about an arbitrary axis, orthogonal projections, multiple views. Isometric projections, perspective projection (1,2,3 vanishing points). Curved surface generation, hidden surface removal-Z-buffer, Scan Line, Painters, Mid-division.

Multimedia : Hardware and Software for Multimedia, Application Area for multimedia, Components of Multimedia, Multimedia authoring tools.

References :

1. Donald Hearon & M.Pauline Baker, "Computer Graphics", PHI
2. Roy A.Plastock, Gordan Kalley, "Computer Graphics", Schaum's Outline Series, McGraw Hill
3. N.Krishnamurthy, "Introduction to Computer Graphics", Tata McGrawHill
4. Newman & Sproull, "Principles of Interactive Computer Graphics", Tata McGrawHill

5. David F Rogers "Procedural Elements for Computer Graphics", Tata McGraw Hill

6. Steven Harrington, "Computer Graphics- A Programming Approach", Tata McGrawHill

MCA-402 : Artificial Intelligence

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Scope of AI

Games, theorem proving, natural language processing, vision and speech processing, Robotics, expert systems, AI techniques, search knowledge, abstraction

Problem solving :

State space search; Production systems, Search space control, Depth first, breadth first search, heuristic search-Hill climbing, best first search, branch and bound, Best first search, Problem Reduction, Constraints, Satisfaction, Means End Analysis.

Knowledge Representation :

Predicate logic : Skolemizing queries, Unifiction, Modus pones, Resolution, dependency directed backtracking

Rule Based Systems : Forward reasoning, Conflict resolution, Backward reasoning: Use of no backtrack.

Structured Knowledge Representations : Semantic Net: slots, exceptions and defaults, frames.

Handling uncertainty : Prababilistic reasoning, Use of certainty factors, Fuzzy logic

Learning : Concept of learning, learning automation, genetic algorithm, Learning by induction, neural nets back propagation.

Expert Systems

Need and justification for expert systems, Knowledge acquision, Case studies MYCIN, RI

References :

1. Nilsson, N.J., "Principles of AI", Norosa Publishing House,1990.
2. Patterson, D.W. "Introduction to AI and Expert System", Prentice Hall of India, 1992.
3. Peter Jackson, "Introduction to Expert system", Addison Wesley Publishing Company, M.A. 1992.
4. Rich, E. and Knight K., "Artificial Intelligence", Tata McGraw Hill (IInd Edition)1992.
5. Schalkoff, R.J., "Artificial Intelligence-An Enfineering Approach", McGraw Hill International Edition, Singapore, 1992.
6. Sasikumar, M, Ramani, S., "Rule Based Expert System", Narosa Publishing House,1994.

MCA-403 : Analysis and Design of Computer Algorithms

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Basic definitions & types of Algorithms; Analysis of Algorithms; Solving recurrence relations , Elementary Data Structures, stacks and queues, Trees, Heaps & Heapsort. Graphs its sequential & linked representation.

Basic Techniques for Algorithms:

1. **Divide and Conquer**

   Problems: Binary search, Finding maximum, minimum, merge sort, quick sort & Strassen's Matrix Multiplication etc.

2. **Greedy Method :**

   Problems : Optimal storage on tape, Knapsack problem, Making change(Money), Minimum Spanning Trees, Single source/shortest path etc Digkastra's Algorithm.

3. **Dynamic programming :**

   All pair shortest path, Optimal Binary search trees, I/O Knapsack, the travelling salesperson problem, flow shop scheduling etc.

4. **Backtracking :** The 8 queues problem, Sum of subsets, Knapsock problem & Graph colouring etc.

5. **Branch and Bound :** O/I Knapsock problem, Travelling Sales person etc. Lower bound Theory & NP Hard & NP Complete problems.

References:

1. Horowitz E and Sahni S., "Fundamental of Data Structures" Galgotia Publications.

2. Aho A.V. Hoperoft, J.E. and Ullman, J.D., "Design and Analysis of Algorithm" Addison Wesley.

3. Brassard G. and Brattey P, "Intorduction to algorithms", PHI

4. Manber. U., "Introduction to Algorithms" Addison Wesley.

MCA-404 : Operating System-II

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Review of Basic concepts of operating system, Threads, Inter process communication, CPU scheduling criteria, CPU scheduling algorithms, Process syncronisation concepts, Critical section problems, Synchronization hardware, Semaphores, Classical problems of synchronization, monitors.

Basic concepts of Deadlock, Deadlock Prevention, Avoidance and detection, recovery from deadlock, Paging Segmentation, Demand Paging, Thrashing.

File concept, File access methods, Directory structures, Allocation methods, free space management, Directory implementation, Disk structure, Disk Scheduling.

Network Operating Systems, Distributed Operating systems, Introduction to UNIX Operating system, Basic Architecture, Memory management and File handling system.

References :

1. Silberchatz Galvin, "Operating System Concepts", Willey Publications.
2. Deitel, H.M., "An Inroduction to Operating Systems Concepts", Addison Wesley.

MCA-405 :Computer Networks-II

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Intorduction to Internetworking concepts, Internet architecture, IP address concept, Mapping of internet address to physical address(ARP), UDP, Internet Protocol(IP): connection less data delivery, TCP, Routing Protocols: RIP, OSPF, Hello, Mobile IP, Socket Interface.

WAN: Introduction, Circuit switching networks, Packet switching networks, LAN switches, Routers, Bridges.

Internet Security and Firewall Design(IP sec), future of TCP/IP(IPv6), Internet Tools, Introduction to high speed Networks, Need for High Speed Networks, Performance Attributes, Network Backbone.

Multimedia Applications: user activities and intra-activites, Stand alone multimedia applications, Single user networked applications, Video Conferencing.

Multimedia Networking , Multimedia networking applications, Streameny stored audio and video, RTP.

References:

1. Douglas E, Comer, "Internet working with TCP/IP, Principles, Protocols, and Architecture", Fourth Edition, Vol. 1, Pearson Asia Education.
2. Petra Borowka, "Internetworking : The way to a structure of Network", Thomson computer press.

3. James F. Kurosa, Kath W. Ross, "Computer Networking: A top down approach, featuring the internet", Pearson Education Asia.

4. Nalin K. Sharda, "Multimedia Information Netrworking", PHI

5. Neelu Shrivastva, "High Speed Networks"

MCA-406 : Management Information System

Total Marks: 50

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks

Background, Meaning, Nature, Need, Role, Impotance, Evolution of Management through information system; Relatedness of MIS with management activities. Management fuctions and decision making.

Concept of balance, MIS Effectiveness and efficiency criteria.

Developement of MIS: Methodology and Tools, techniques for systematic identification, evaluation, modification of MIS.

References:

1. Robert G. Murdick, Joel E. Ross, James R. Claggett, "Information systems for Modern Management"

2. James A.O'Brien, "Management Information System"

MCA-501 : Principles of Programming Languages

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks

Preliminaries : Language paradigms, language criteria, language design trade-offs, Influences on language design, bindings, type checking, and scopes, variable and data types: primitive data types, variables, structures data types. Abstraction: data abstraction, control abstraction, procedural abstraction.

Formal languages and automata: The chomsky hierarchy of formal languages, regular grammars: regular expressions, finite automata, Context free grammars: pushdown automata, ambiguous grammars.

Imperative Programming: Structured programming, procedure activations: parameter passing methods, scope rules, and activation records.

Object oriented programming: massages, methods and encapsulation, classes and polymorphism, inheritance and object orientation, design issues for object oriented languages.

Functional programming : Features of functional languages, implementing functional languages, application of functional languages.

Logic programming : Formal logical systems, implementations and applications.

Languages for databases : manipulating relational databases using SQL.

Languages constructs for parllel processing: the paradigm multiple processes, synchronization of cooperating processes.

References:

1. Sabesta W. Robert, "Concepts of programming languages", 4th ed.(Addison Wesley-2000).
2. Apple by Doris & Vandekopple J.Julius, "Programming languages-Paradigm and practices", 2nd ed. (TMH-1999)
3. Sethi Ravi, "Programming languages", 2nd ed.(Addison Wesley-2000)

MCA-502 : Advanced Architecture and Parallel Processing

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Parallel Computer Models : The state of computing, Multiprocessors and Multicomputers, Multi vector and SIMD Computer, PRAM and VLSI models.

Program & N/W Properties : Conditions of parallelism, Program Partitioning & Scheduling, Program flow mechanism, System Interconnect Architecture.

Processor and Memory Hierarchy : Advanced processor technology, Superscaler and Vector Processor, Memory hierarchy technology, Virtual memory technology.

Bus Cache and Shared Memory : Backplane bus system, cache memory organisation, Shared memory organization, Requested and weak consistency model.

Pipelining and Superscaler Techniques : Linear pipeline, Nonlinear pipeline, Instruction Pipeline design, Arithmetic Pipeline, Superscalar and superpipeline design.

Multiprocessor and Multicomputers : Multiprocessor system Interconnect, Cache Coherence and synchronization mechanism, Message passing mechanism.

References :

1. Kai Hwang "Advanced Computer Architecture" MGH Publications.

MCA-503 : Object Oriented Design and Modeling

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Object Modelling : Objects and Classes, Links and Associations, Generalisation and Inheritance, Grouping constructs, Aggregation, Generalization as extension and restriction, Multiple Inheritance, Meta data, Candidate keys, Dynamic Modelling, Events and states, Nesting Concurrency Functional Modeling, Data Flow Diagrams specifying operations.

Analysis : Object Modeling, Dynamic Modeling, Functional Modeling, Adding Operations, Iteration.

System Design : Subsystems Concurrency, Allocation to processors and tasks Management of data stores, Control implementation, Boundary condition, Architectural frameworks, Object design, Optimization, implementation of control, Adjustment of inheritance, Design of associations, Documentation, Comparison of methodologies

Implementation: Using a programming language, a database system, Programming styles, reusability, robustness, programming-in-the-large, case study.

References :

1. Booch.G.,"Object Oriented Analysis and Design", 2nd edition, Benjamin Cummins Publishing Co.redwood City, CA. USA, 1994.

2. Rebecca Wirfs-Brock, et.al, "Designing Object Oriented Software", Prentice Hall of India, 1996.

3. Rambaugh.J., et.al. "Object Oriented Modelling and Design", Prentice Hall of India, New Delhi,1991.

MCA-504 : System Simulation and Modeling

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

Defination of System :- Types of system, continuous and discrete; Modelling process and defination of the model, Computer workload and preparation of its models; verfication and validation modelling procedures, Comparing model data with real system data; Differential and partial differential equartion models; Combining discrete event and continues models;(Examples of a computer system should be used for illustration and discussion purposes)

Simulation Process :- Uses of simulation; Discrete and continuous simulation procedures; Simulation of a time sharing computer system.

Simulation languages :- A brief introduction to important discrete and continues simulation languages; study and use of one language (depending on the availability) in detail.

Use of database and A.I. Techniques in the area of modelling and simulation.

References :

1. G.Gorden., "System Simulation"

2. N Deo, "System simulation and modelling"

MCA-505 : Data Mining and Data Warehousing

Total Marks: 100

Time:3 Hour

Note: Examiner is requested to set eight questions covering the whole syllabi. A candidate is required to attempt any five questions. All questions shall carry equal marks.

What is Data Mining? Data Mining Functionalities, Pattern Interestingnees, Classification of data mining system, major issues in data mining.

Why preprocess the data? Data cleaning, Data integration and Transformation, Data reduction

Data Mining Primitives, Data Mining Query Language, Designing GUI based on DMQL, Architecutre of Data Mining System

Association rule Mining, Mining single-dimensional Boolean Association rules from transactional databases, Mining multidimensional rules from relational databases & data warehouses, Constraint-based association Mining.

What is classification? What is prediction issues regarding classification & prediction classification by decision tree induction, Bayslan classification, classification by back propagation

What is cluster analysis, categorization of major clustering methods, partitioning methods, Hierarchical methods, outlier analysis

Applications and trends in data mining, data mining applications, social impacts of data mining, trends in data mining.

What is data warehouse, a multidimensional data model, Data Warehouse architecture, Dataware house implementation.

References :

1. J.Han & Michelize Kamber, "Data Mining-Concepts & Techniques", Morgan Kaufman Publisher
2. Sam Anahory & Dennis Murray, "Data Warehousing", Pearson Eductioan
3. Micheal J.A. Berry, Gordan S.Linoff, "Mastering Data Mining", John Willey & Sons.
4. Clande Seidman, "Data Mining with Microsoft SQL server 2000", Prentice-Hall India

Printed at : Pragati Art Press, Near Rly. Double Phatak, Hisar. Ph. (01662) 232262, 233262

Price : Rs.

Printed at: ***Pragati Art Press,*** *Rly. Double Phatak, Hisar Ph. 233262*