

**SCHEME OF TEACHING AND EXAMINATIONS 2006-2007**  
**MASTER OF COMPUTER APPLICATIONS**

**FIRST SEMESTER**

Subject Code	SUBJECTS	Teaching Load Per Week			Examination Marks								
						Max. Marks				Min. Marks			
		L	T	P	Th	Ses	Pr	Total	Th	Ses	Pr	Total	
MCA101	Object Oriented Programming With 'C++'	3	2	-	100	50	-	150	40	30	-	70	
MCA102	Mathematical Foundations Of Computer Science	3	2	-	100	50	-	150	40	30	-	70	
MCA103	Essentials of Information Technology	3	2	-	100	50	-	150	40	30	-	70	
MCA104	Data Structure through algorithms With 'C'	3	2	-	100	50	-	150	40	30	-	70	
MCA105	Communication Skill	3	2	-	100	50	-	150	40	30	-	70	
MCA106	Programming Lab 'C++'	-	-	5x2	-	25	100	125	-	15	50	65	
MCA107	Data Structure through Algorithms "Lab"	-	-	5x2	-	25	100	125	-	15	50	65	
	<b>TOTAL</b>	15	10	20	500	300	200	<b>1000</b>	200	180	100	<b>480</b>	

**FIRST SEMESTER : MCA-101**  
**Object Oriented Programming with 'C++'**

**Max Marks : 100**

**Min Marks : 40**

**1. Introduction to OOP**

Advantages of OOP, The Object Oriented Approach, and Characteristics of object oriented languages- Object, Classes, Inheritance, Reusability, and Polymorphism. OMT.

**2. Language Fundamental**

Overview of C++: History of C++, Data Types - int, float, char, double, void. Constant and Variables. Operators and Expression: Arithmetic Operators, Relational Operators, Logical Operators, Conditional Operators, Bitwise Operators. Control constructor: if , if-else, nested if-else, while(), do-while() , for(;), break, continue, switch, goto. Storage class.

**3. Structure and Function**

Structures : A Simple structures ,specify the structures, Defining a structure variable, Accessing structures member, Enumeration data type.

Function: Function Declaration, Calling Function, Function Defines, Passing Argument to function, Passing Constant, Passing Value, Reference Argument, Passing struct variable, Overloaded Function, Inline Function, Default Argument, return statement, returning by reference.

Array: Defining array, array element, initiation array, multi dimensional array, passing array to function.

**4. Object Classes and Inheritance**

Object and Class, Using the class, class construct, class destructors, object as function argument, struct and classes , array as class member, operator overloading. Type of inheritance, Derive class, Base class. Access specifier: protected. Overriding, member function, String, Templates.

**5. Pointers and Virtual Function**

pointers: & and \* operator pointer variables, pointer to void ,pointer and array, pointer and function, pointer and string, memory management, new and delete, pointer to object, pointer to pointer, link list. Virtual Function: Virtual Function, Virtual member function, accesses with pointer, Late binding, pure virtual function, Friend function, Friend class, static function, this pointer.

**6. File and Stream**

C++ streams, Stream class, string I/O, char I/O, Object I/O, I/O with multiple object, File pointer, Disk I/O,

**RECOMMENDED BOOKS :**

- Object Oriented Programming : McGregor and Sykes S A, 1992 Van Nostrand.
- The C++ Programming Language : Strustrp B,Addision Wasley.
- Object Oriented Programming in C++ : Lafore R, Galgotia Publications.
- Introduction to Object Oriented Programming : Witt KV, Galgotia Publications.
- Object Oriented Programming : Blaschek G, Springer Verlag
- Object Data Management : Cattel R, Addison Wasley.

**FIRST SEMESTER : MCA-102**

# ***Mathematical Foundation Of Computer Science***

**Max Marks : 100**

**Min Marks : 40**

## **1 Mathematical Logic, Sets Relations and functions**

**Mathematical Logic** : Notations, Algebra of Propositions & Propositional functions, logical connectives, Truth values & Truth table Tautologies & Contradictions, Normal Forms, Predicate Calculus, Quantifiers.

**Set Theory**: Sets, Subsets, Power sets, Complement, Union and Intersection, De-Morgan's law Cardinality, relations: Cartesian Products, relational Matrices, properties of relations equivalence relation functions: Injection, Surjection, Bijection, Composition, of Functions, Permutations, Cardinality, the characteristic functions recursive definitions, finite induction.

## **2 Lattices & Boolean Algebra**

**Lattices** : Lattices as Algebraic System, Sub lattices, some special Lattices( Complement, Distributive, Modular).

**Boolean Algebra** : Axiomatic definitions of Boolean algebra as algebraic structures with two operations, Switching Circuits.

## **3 Groups Fields & Ring**

**Groups** : Groups, axioms, permutation groups, subgroups, co-sets, normal subgroups, free subgroups, grammars, language).

**Fields & Rings** : Definition , Structure, Minimal Polynomials, Irreducible Polynomials, Polynomial roots & its Applications.

## **4 Graphs**

**Graphs** : Simple Graph, Multigraph & Psuedograph, Degree of a Vertex, Types of Graphs, Sub Graphs and Isomorphic Graphs, Operations of Graphs, Path, Cycles and Connectivity, Euler and Hamilton Graph, Shortest Path Problems BFS(Breadth First Search , Dijkstra's Algorithm, Representation of Graphs, Planar Graphs, Applications of Graph Theory.

## **5 Trees**

**Trees** : Trees, Properties of trees, pendant vertices in a tree, center of tree, Spanning tree, Binary tree, Tree Traversal, Applications of trees in computer science.

### **BOOKS RECOMMENDED :**

1. A text book of Discrete Mathematics – By Swapan Kumar Sarkar.(S.Chand & company Ltd.).
2. Discrete Mathematical structure with - By J.P Trembly & R.P. Manohar.  
applications to computer science
3. Discrete Mathematics -By K.A Ross and C.R.B writht.
4. Discrete Mathematics Structures -By Bernard Kohman & Robert C. Bushy.  
for computer science
5. Discrete Mathematics -By Seymour Lipschutz Mare Lipson. Tata McGraw-Hill Edition.

## **FIRST SEMESTER : MCA-103**

### ***Essentials Of Information Technology***

**Max Marks : 100**

**Min Marks : 40**

#### **1. Introduction –**

Basics concept of IT, concept of data and information,. Data processing, History of computer, Data processing, organization of computers and input and output device, storage device, and file organization.

#### **2. Software concept -**

System software, application software, utility package, compilers, and interpreters, operating system, elementary command of DOS, UNIX and WINDOWS (file handling directory, management and general purpose user interfacing command).

#### **3. Computer languages –**

Machine languages, assembly languages, high level languages, 4<sup>th</sup> generation languages, general purpose, concept of oops and SQL

#### **4. Communication and network technology -**

Communication and system elements, communication mode (Analog and Digital, Synchronous and Asynchronous, Simplex, Half duplex, Full duplex, circuit switching), communication media (Speed and capacity, twisted pair, coaxial cable, optics, wireless), common network, protocols (ISO/OS, reference model, TCP/IP)

#### **5. Internet**

Technical foundation of Internet- Client server computing, Distributed Computing, Domain naming system, DNS Server, Internet Security – Fire walls, Encryptions etc.

Internet Applications - E-mail, WWW, E-commerce, Teleconferencing,

Application of Information Technology - State of Art Application of IT, Application of IT in business, Industry, home, education and training entertainment, science and engineering and medicine.

### **RECOMMENDED BOOKS :**

1. Fundamental of Computer - V.Rajaraman
2. Computer today - Sanders D.H
3. Information technology today - S.Jaiswal

## **FIRST SEMESTER : MCA-104**

### ***Data Structure Through Algorithms***

**Max Marks : 100**

**Min Marks : 40**

**1. Introduction and Preliminaries -**

Introduction ,Basic terminology, Elementary data organization, Data structure ,Data structure operation, Algorithms : complexity , time-space Tradeoff.. Mathematical Notation and functions, Algorithmic Notation, Control Structures, Complexity of Algorithms, Sub algorithms, Variables, Data Type.

**2. String Processing, Arrays, Records And Pointers –**

Basic Terminology, Storing String, Character Data Type, String Operations, Word Processing, Pattern Matching Algorithms. Linear Array, Representation of linear Array in Memory, Traversing Linear Arrays, Inserting And Deleting, Sorting; Bubble Sort, Searching; Linear Search, Binary Search, Multidimensional Array, Pointers; Pointer Array, Records; Record Structures, Representation of Records in Memory; Parallel Arrays, Matrices, Sparse Matrices.

**3. Linked Lists, Stacks, Queues, Recursion -**

Linked list, Representation of linked lists in memory, Traversing a linked list, Searching a linked list, Memory Allocation; Garbage Collection, Insertion into a linked List, Deletion from a Linked List, Header Linked List, Two- Way Linked Lists. Stacks, Array Representation of Stack, Arithmetic Expressions; Polish Notation, Quick sort, an application of Stacks, Recursion, Tower of Hanoi, Implementation of Recursive Procedures by Stacks, Queues, Deques, Priority Queues.

**4. Trees & Graphs -**

Binary Trees, Representing Binary Trees in Memory, Traversing binary tree, Traversal Algorithms using stacks, header nodes; threads, Binary Search Tree, Searching and Inserting in Binary Search Tree, Deleting in Binary Search tree, Heap; Heap sort, Path Lengths; Huffmans Algorithms, General Tree. Graph Theory Terminology, Sequential Representation of Graph; Adjacency Matrix, Path Matrix, Linked Representation of Graph.

**5. Sorting And Searching –**

Sorting, Insertion Sort, Selection Sort, Merging, Merge Sort, Radix Sort, Searching and data modification, hashing.

**BOOKS RECOMMENDED :**

1. *Data Structure*

- Seymour Lipschutz (Schaum's Series).

2. *Data Structure & Program Design*

- Robert L. Kruse, 3<sup>rd</sup> Ed., Prentice Hall.

**FIRST SEMESTER : MCA-105**

***Communication Skills***

**Max Marks : 100**

**Min Marks : 40**

Meaning and Process of communication, importance of effective communication, communication situation and communication skills, barriers to communicate, objective of communication, types of communication, principles of communication, essentials of effective communication, media of communication - written, oral, face to face, visual, audio visual, merits and demerits of written and oral communication prepared for oral presentation, conditional presentation, developing communication skill.

Interview - how to face and how to conduct, preparation of bio-data, seminars, pair, bibliography, graph discussion, official correspondence.

Mechanics of writing, paragraphing precise, report writing, technical reports, length of written report, organizing report, writing technical report.

**BOOKS RECOMMENDED :**

1. Essentials of business Communication - by Rajendra Pal, & J.S.Karlahalli & S.Chand publication
2. Business Communication - by U.S.Rai & S.H.Rai , Himalaya publishing house,
3. Writing technical paper - by Menzal nad, D.H.Jones,McGraw Hill 1961
4. Business communication, Strategy and skill, -Pentice Hall, New Jersey.

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**SECOND SEMESTER**

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					Max. Marks				Min. Marks			
		L	T	P	Th	Ses	Pr	Total	Th	Ses	Pr	Total
MCA201	Program Based Numerical Analysis in C++	3	2	-	100	25	-	125	40	15	-	55
MCA202	Computer System Architecture	3	2	-	100	25	-	125	40	15	-	55
MCA203	RDBMS & ORACLE	3	2	-	100	25	-	125	40	15	-	55
MCA204	Operating System	3	2	-	100	25	-	125	40	15	-	55
MCA205	Financial Management & Accountancy	3	2	-	100	25	-	125	40	15	-	55
MCA206	Programming Lab on MCA203	-	-	3x2	-	50	100	150	-	30	50	80
MCA207	Programming Practice / Mini-Project	-	-	2	-	50	50	100	-	30	25	55
MCA208	Common Software/Mini-Project	-	-	2	-	50	50	100	-	30	25	55
MCA209	Seminar	-	-	2	-	25	-	25	-	15	-	15
	<b>TOTAL</b>	15	10	20	500	300	200	<b>1000</b>	200	180	100	<b>480</b>

## SECOND SEMESTER : MCA - 201

### *Program Based Numerical Analysis*

**Max. Marks: 100**  
**Min Marks:40**

- Solution of Polynomial and Transcendental Algebraic Equations**  
Bisection method, Regulafalsi method & Newton's method, Solution of Cubic & Biquadrate Equation, Complex roots of polynomial equations.
- Simultaneous Equations and Matrix**  
Gauss-Jordan method, Cholesky's method, Reduction to lower or upper Triangular forms, Inversion of matrix, method of partitioning, Characteristics equation of matrix, Power methods, Eigen values of matrix, Transformation to diagonal forms.
- Curve-Fitting from Observed Data**  
Divided difference table for evenly or unevenly spaced data, polynomial curve-fitting - Newton's and Langranges form of interpolation, method of least square for polynomials, Chebyshev Polynomials, Harmonic analysis .
- Numerical Differentiation and Integration**  
Forward and Backword differential operators, Recurring formula, The Lonse Diagram, Taylor's Series, Newton - cotes integration formula, Legendre's rule, method of weighted coefficients, Gaussian quadrature .
- Solution of Differential Equations**  
Numerical Solution of ordinary differential equations, one step method, Predictor-Corrector Method, One step method, Euler's Method, Runge-Kutta Method. Milne's method.

#### BOOKS RECOMMENDED

- Garewal* : Numerical methods
- Gupta & Mallic* : Numerical Methods
- Hamming R.W.* : Numerical methods for scientist & Engineers. (McGraw Hill)
- Conle S.D.* : Elementary numerical analysis  
*Carl De Boor* (International Book Company London)
- Jain M.K.* : Numerical methods for Science and Engineering  
*Iyengar S.R.K* Calculations (John Willey & Sons)

## SECOND SEMESTER: MCA - 202

### *Computer System Architecture*

**Max Marks: 100**  
**Min Marks: 40**

- Representation of Information**

Number system, Integer & Floating point representation Character code (ASCII, EBCDIC), Error Detect and Correct code, Basic Building Blocks, Boolean Algebra, MAP Simplification, Combination Blocks, Gates, Multiplexers, Decoders, etc Sequential building block, flip-flop, registers, counters, ALU, RAM etc.

**2. Register transfer language and micro operations**

Concepts of bus, data movement along registers, a language to represent conditional data transfer, data movement from its memory, arithmetic and logical operations along with register transfer timing in register transfer

**3. Basic Computer Organization and Design**

Instruction code, Computer Instructions, Timing and Control, Execution of Instruction, Input and Output Interrupt, Design of Computer.

**4. Computer Software**

Programming Language, Assembly Language, Assembler, Program Loops, Input /Output Programming, System Software. Central Processor Organization: - Processor Bus Organization, Arithmetic Logic Unit, Stack Organization, Instruction Formats, Addressing modes, Data transfer and Manipulation, Program Control, Microprocessor Organization, Parallel Processing,.

**5. Input –Output Organization**

Peripheral Devices, Input/Output Interface, Asynchronous Data Transfer, Direct Memory Access (DMA), Priority Interrupt, Input-Output Processor, Multiprocessor System Organization, and Data Communication Processor.

**6. Memory Organization**

Auxiliary Memory, Micro Computer Memory, Memory Hierarchy, Associative Memory, Virtual Memory, Cache Memory, Memory Management Hardware.

**BOOKS RECOMMENDED:**

1. Computer System Architecture - M. Morris Mano (PHI).
2. Digital Computer Electronics - Malvino.
3. Digital Computers and Logic Design - M.Morris Mano (PHI).
4. Structured Computer Organization - Andrew M. Tanenbanm (PHI).

**SECOND SEMESTER : MCA - 203**  
***RDBMS & ORACLE***

**Max Marks : 100**

**Min Marks : 40**

**1. Overview of Database Management -**

Data, Information and knowledge, Increasing use of data as a corporate resource, data processing verses data management, file oriented approach verses database oriented approach to data management; data independence, database administration roles, DBMS architecture, different kinds of DBMS users, importance of data dictionary, contents of data dictionary, types of database languages. Data models: network, hierarchical, relational. Introduction to distributed databases, Client/Server databases, Object-oriented databases, Object-relational databases, Introduction to ODBC concept.

**2. Relational Model -**

Entity - Relationship model as a tool for conceptual design-entities attributes and relationships. ER diagrams; Concept of keys: candidate key, primary key, alternate key, foreign key; Strong and weak entities, Case studies of ER modeling Generalization; specialization and aggregation. Converting an ER model into relational Schema. Extended ER features, Introduction to UML, Representation in UML diagram (Class Diagram etc.).

**3. Structured Query Language**

Relational Algebra: select, project, cross product different types of joins (inner join, outer joins, self join); set operations, Tuple relational calculus, Domain relational calculus, Simple and complex queries using relational algebra, stand alone and embedded query languages, Introduction to SQL constructs (SELECT...FROM, WHERE... GROUP BY... HAVING... ORDERBY...), INSERT, DELETE, UPDATE, VIEW definition and use, Temporary tables, Nested queries, and correlated nested queries, Integrity constraints: Not null, unique, check, primary key, foreign key, references, Triggers. Embedded SQL and Application Programming Interfaces.

**4. Relational Database Design-**

Normalization concept in logical model; Pitfalls in database design, update anomalies: Functional dependencies, Join dependencies, Normal forms (1NF, 2NF, 3NF). Boyce Codd Normal form, Decomposition, Multi-Valued Dependencies, 4NF, 5NF. Issues in physical design; Concepts of indexes, File organization for relational tables, De-normalization, Clustering of tables, Clustering indexes.

**5. Introduction to Query Processing and Protecting the Database**

Parsing, translation, optimization, evaluation and overview of Query Processing. Protecting the Data Base - Integrity, Security and Recovery. Domain Constraints, Referential Integrity, Assertion, Triggers, Security & Authorization in SQL.

**6. Data Organization -**

File Organization: -Fixed length records, variable length records, Organization of records in files, Indexing: - indexed files -B-tree, B+-tree, and Hashing Techniques.

**BOOKS RECOMMENDED :**

1. Database system concept - H. Korth and A. Silberschatz, TMH
2. Data Base Management System - Alexies & Mathews [ Vikas publication]
3. Data Base Management System - C. J. Date [Narosha Pub.]
4. Data Base Management System - James Matin
5. Principles of Database System - Ullman
6. An Introduction to database systems - Bipin Desai, Galgotia Publication.
7. Database Management System - A. K. Majumdar & P.Bhattacharya, TMH

**SECOND SEMESTER : MCA - 204**  
***Operating System (with Linux as case Study)***

**Max Marks : 100**

**1. Introduction:**

What is operating system, basic concept, terminology, batch processing, spooling, multiprogramming, time sharing, real time systems, protection, multiprocessor system, operating system as resource manager, process view point, memory management, process management, device management and information management, other views of operating system, historical, functional job control language and supervisor service control.

**2. Memory Management:**

Preliminaries of memory management, memory handling in M/C, relocation, swapping and swap time calculation, multiple partitions, partitioned allocation MFT, fragmentation, MVT, compaction, paging, job scheduling implementation of page tables, shared page, virtual memory-overlays, concepts of virtual memory demand page, memory management and performance, page replacement and page replacement algorithms. Allocation algorithms. Storage hierarchy disk and drum scheduling - physical characteristics fcfs scheduling SCAN, short of seek time first disk scheduling algorithms sector queuing.

**3. Information Management (File System) :**

File concept, file type, typed based system, disk based system, general model of file system, file directory maintenance, symbolic file system, basic file system, physical file system, file support device directory, access methods free space management contiguous, linked allocation and indexed allocation performances.

**4. Processor Management (CPU Scheduling) :**

Reviewing of multiprogramming concept, scheduling concept, basic concept, CPU I/O burst cycle process state, PCB (Programme Control Block) scheduling queries, schedulers, scheduling algorithms - performance criteria, first-come - first served shortest job - first priority, preemptive algorithm, round robin, multilevel queues and multilevel feedback queues, algorithm evolution, multiprocessor scheduling, separate system, coordinated job scheduling, master / slave scheduling.

**5. Dead Locks :**

The dead lock problem - dead lock definition, dead lock detection, detection algorithm usage, dead lock characterization, resource allocation graph, dead lock prevention, mutual exclusion, hold and wait, no preemption and circular wait, dead lock avoidance-bankers algorithm. Recovery from deadlock process termination, resource preemption, combined approach to deadlock handling.

**6. Unix (Operating System) :**

History, design principle, programmer interface, user interface, file system, process management, I/O system, inter process communication.

**7. Device Management :**

Dedicated, shared and virtual devices, sequential access and direct access device, channel and control units, I/O schedulers. Introduction to assembly language programming, introduction to I/O programming. Introduction to interrupts and their programming.

**BOOKS RECOMMENDED :**

- 1. Principles of Operating System - Peterson.
- 2. Operating System - Mandinick & Donovan

**SECOND SEMESTER : MCA – 205**  
**Financial Management & Accountancy**

**Max Marks : 100**  
**Min Marks : 40**

**1. Financial Accounting**

Meaning and Nature, Accounting Principles underlying the preparation of financial statements.

**2. Preparation of Financial Statements**

A Synoptic view-Profit and Loss account, Balance Sheet

**3. Financial statement Analysis**

Ratio analysis (Liquidity, Solvency, Profitability, Efficiency), Statement of Changes in financial position-working capital basis.

**4. Conceptual Framework of Cost Accounting**

Meaning nature and need of cost accounting, Elements of cost, Preparation of cost – sheet, Cost concept –Fixed and variable costs, sunk costs, Out of pocket costs, Relevant and irrelevant costs, Opportunity and imputed costs.

**5. Cost – volume Profit (CVP) relationship**

Break-even analysis; (single and multiple products), Determination of sales volume to attain desired profits, Cash break-even point. Graphic presentation of CVP relationship. Assumptions and limitation of break-even analysis

**6. Budgeting**

Definition and objective. Preparation of various types of budgets including cash budget. Fixed and flexible budgets.

**7. Cost Accumulation System**

Job and Process (simple treatment)

**8. Variable and absorption costing systems**

Comparison for income determination (simple treatment), Variable costing as a tool of decision-making

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			Max. Marks      Min. Marks

		L	T	P	Th	Ses	Pr	Total	Th	Ses	Pr	Total
MCA301	Programming in VB & VC++	3	2	-	100	25	-	125	40	15	-	55
MCA302	Computer Network & Data Communication	3	2	-	100	25	-	125	40	15	-	55
MCA303	Operation Research	3	2	-	100	25	-	125	40	15	-	55
MCA304	A.I. & Expert System	3	2	-	100	25	-	125	40	15	-	55
MCA305	System Analysis Design & MIS	3	2	-	100	25	-	125	40	15	-	55
MCA306	Programming Lab VB/VC++	-	-	3x2	-	50	100	150	-	30	50	80
MCA307	Programming Practice / Mini-Project	-	-	2	-	50	50	100	-	30	25	55
MCA308	Common Software/Mini-Project	-	-	2	-	50	50	100	-	30	25	55
MCA309	Seminar	-	-	2	-	25	-	25	-	15	-	15
	<b>TOTAL</b>	15	10	20	500	300	200	<b>1000</b>	200	180	100	<b>480</b>

**THIRD SEMESTER : MCA - 301**  
**Programming Language III - VB & VC++**

**Max Marks : 100**

**Min Marks : 40**

**GUI - Programming Visual Basic**

**1. Introduction to Visual Basic :**

Windows and DOS; hardware; windows, icons and menus; Event Driven Programming; terminology; the working screen; controls and events; the menu systems; the programming language.

**2. Designing and Creating Programs :**

Program Design; the launch program; the form and the controls; writing the code; save your work; running and testing; making an EXE file; printouts.

**3. Program Flow :**

Logical testing; branching with if; Select Case; Go To; For...Next; Do Loops; While... Wend.

**4. Interacting with user :**

Msg boxes, the input box function, scroll bars, frames, options, check boxes, menus and various components. (Like timer, dgrid, dcombo, msflex Grid, etc)

**5. Testing and Debugging :**

Errors and error spotting, debugging tools, break points and watches, keeping watch, stepping through, error trapping.

**6. Graphics :**

Objects and properties for drawing, the drawing methods, working with imported graphics, animation.

**7. Procedures, Functions and Forms :**

Procedures and Functions, creating a procedures, creating a function, recursive functions, multiple forms (MDI), startup forms, starting from sub main, transferring between forms, procedures and modules.

**8. Arrays :**

Dimensions, elements and subscripts, arrays and loops, control arrays, creating a control arrays.

**9. Sequential Files :**

Saving data to files, basic filing, data analysis and file, the extended text editor.

**10. Records and Random Access Files :**

Record structures, random access files, the staff database, design and coding, MDI Forms - parent and child.

**11. Accessing Data - Data Manager and Data Control :**

Creating database, what is database, planning your database, using the data manager, adding an index, using the data manager to enter data, creating a form with data aware controls, what is data control, what are data aware controls, creating a menu bar.

**12. ADO & RDO controls and introduction to ActiveX control**

**Visual C++**

1. **Introduction to VC++- C** under windows, Overview of VC++, VC++ workspace & projects, creating source code file, adding C++ code to a program.

2. **Introduction to MFC** - The part of VC++ programs, the application object, the main window object, the view object, the document object, Windows event oriented programming, What is device context., Windows Application using MFC.

3. OLE (object linking and embedding technique), Features of OLE, introduction to ActiveX controls, introduction to COM and DLL.

**BOOKS RECOMMENDED :**

1. Programming in Visual Basic - SAHU By BPB Publications.
2. Unreleased Visual Basic Guide

## VC++

1. The complete Reference VC++ : Chris H.Pappas & William H.Murray, Tata McGraw
2. Visual C++ in Record time : Steven Holzner
3. Visual C++ Programming : Yashwant P. Kanetkar

## **THIRD SEMESTER : MCA - 302** ***Computer Networks And Data communication***

**Max Marks : 100**

**Min Marks : 40**

### **1. Introduction to Computer Networking**

The Concept of Networking, Data Communication, Required network elements, The role of Standards Organization. Line Configuration, Various Topologies, Transmission Mode, Categories of Networks- LAN, MAN, WAN. The benefits of a Computer Networks.

### **2. The OSI and TCP/IP Reference Model**

The Concept of Layered Architecture, Design Issues for the Layers. Interfaces and services, Detailed Functions of the Layers. Comparison between OSI and TCP/IP Reference model.

### **3. Transmission of Digital Data**

Shannon's and Nyquist theorems for maximum data rate of a channel. Transmission media- Co-axial, UTP, Fiber optic and wireless. Analog and digital data Transmission- parallel and serial transmission. DTE-DCE interface using RS-232C. Study of modems- 56k and Cable Modem. Modem standards.

### **4. Multiplexing and Switching**

The Concept of Multiplexing- FDM, TDM, WDM. The Concept of Switching- Circuiting, Message switching, Packet switching.

### **5. Data Link Layer and Routing Algorithms**

Line Discipline, Flow Control- stop and wait, sliding window, Go back N, Error Control- ARQ stop and wait, sliding window ARQ. HDLC, SLIP, PPP. Multiple access protocols- ALOHA, Slotted ALOHA, CSMA/CD. IEEE standards for LAN's and MAN's. The IP protocol, and its header. IP address classes and subnet mask. The concept of ICMP, ARP, RARP, RSVP, CIDR and Ipv6.

Routing algorithms- shortest path first, Distance Vector, Link State. Congestion Control-The leaky bucket and Token bucket Algorithms.

### **6. Transport Layer**

The Concept of client and Server in terms of Socket addressing in Transport layer. Two way and three-way handshaking. TCP header.

Network Performance Issues. The Concept of Domain Name System, Various Resource Records. Architecture and services of E-mail (RFC-822 and MIME). The Concept of World Wide Web- server side and client side.

### **7. ATM**

The concept of ATM, ATM Adoption layers- AAL1, AAL2, AAL3/4, AAL5, Comparison of AAL protocols. Cell formats for UNI and NNI. Service Categories, Quality of service, Congestion Control in ATM.

### **8. Comparative study of Networking Technologies**

X.25, Frame Relay, ATM, SONET, SMDS, ISDN.

### **9. Network Security**

The Importance of Security in Networking. Traditional Cryptography, Data Encryption Standards, RSA algorithm.

### **BOOKS RECOMMENDED :**

1. Computer Networks- A S Tanenbaum
2. Data Communication and Networking- Forouzan

## **THIRD SEMESTER : MCA - 302** ***Operation Research***

**Max Marks : 100**

**Min Marks : 40**

### **1. Linear Programming -**

L P formulations, Graphical method for solving LP's with 2 variables, Simplex method, Duality theory in linear programming and applications, Special Linear Programming Problems, Transportation Problem (Stepping Stone Method), Assignment problem (Hungarian Method)

### **2. Network Analysis -**

Examples of network flow problems, Shortest -route problems, Dijkstras Algorithm, Applications of shortest - route problems, Max flow problem, Flow network, Labeling routine, Labeling algorithm for the max flow problems, Min-cut and max -cut theorem.

### **3 Project Scheduling by PERT/CPM -**

Project management origin and the use of PERT origin and use of CPM, Application of Pert and cpm; Project network - Diagram representation, Critical path calculations by linear programs, Critical path calculations by network analysis and critical path method (cpm), Determinations of floats, Constructions of time chart and resource labeling, Project cost curve and crashing in project management, Program evaluation and Review technique (pert).

### **4 Dynamic Programming -**

Basic concepts - Bellman's optimality principles, Examples of D.P. models and computations. Examples to be taken from Different areas of allocations, replacement, sequencing, and scheduling, networks and other related

O>R areas.

**5 Queuing Models -**

Notations and assumptions, Queuing models with Poisson input and exponential service

**6 Sequencing Models -**

Sequencing Problem, Johnson's algorithm for processing n jobs through 2 machines, Johnson's Algorithm for processing n jobs through 3 machines, Processing 2 jobs through n machines, graphical solution.

**7 Inventory Models -**

Introduction to the inventory problem, Deterministic models - The classical EOQ (Economic Order Quantity) model, Non- zero lead time, The EOQ with shortages allowed.

**BOOKS RECOMMENDED :**

1. Operation Research : By Gillette.
2. Operation Research : Gupta and Kumar.
3. Operation Research : Gupta and Manmohan.

**THIRD SEMESTER : MCA - 304**  
*Artificial Intelligence And Expert Systems*

**Max Marks : 100**

**Min Marks : 40**

**1. General Issues and overview of AI :**

The AI problems; what is an AI technique; Characteristics of AI applications

**2. Problem solving, search and control strategies :**

General problem solving; production systems; control strategies: forward and backward and backward chaining  
Exhaustive searches: Depth first Breadth first search

**3. Heuristic Search techniques :**

Hill climbing; Branch and Bound technique; Best first search and A\* algorithm; AND/Or Graphs; problem reduction and AO\* algorithm; constraint satisfaction problems

**4. Game playing :**

Minimax search procedure; Alpha-Beta cutoffs; Additional Refinements

**5. Knowledge Representation :**

First order predicate calculus; Skolemization Resolution principle and unification; Inference Mechanisms; Horn's clauses; semantic Networks; frame systems and value inheritance. Scripts; conceptual dependency;

**6. AI Programming Languages :**

Introduction to Lisp, Syntax and Numeric functions; List manipulation functions; Iteration and Recursion; Property list and Arrays, Introduction to PROLOG.

**7. Natural language processing :**

Parsing technique; context—context- free grammar; Recursive Transition Nets (RTN); Augmented Transition Nets ((ATN); case and logic grammars; semantic analysis.

**8. Planning :**

Overview- An example Domain: The Blocks World; Component of planning systems: Goal Stack Planning (linear planning); Non-linear planning using goal sets; probabilistic reasoning and Uncertainty; probability theory; Bayes Theorem and Bayesian networks; certainty factor.

**9. Expert Systems :**

Introduction to expert systems and Applications of expert systems; various expert system shells: vidwan; frame work; knowledge acquisition; case studies; MYCIN.

**10. Learning :**

Role learning; learning by induction; Explanation based learning.

**BOOKS RECOMMENDED :**

1. Elaine Rich and Kevin knight: Artificial Intelligence-Tata McGraw hill.
2. Dan W. Patterson: Introduction to Artificial Intelligence and Expert Systems. Prentice hall of India.
3. Nills j. Nilson: Principles of Artificial Intelligence; Narosa publishing house.
4. Clocksin & C.S. Melish ; Programming in PROLOG – Narosa publishing house.
5. M.sasikumar ,S.Ramani. etc : Rule based expert system (A practical Introduction)  
narosa publishing house.

**THIRD SEMESTER: MCA - 305**  
*System Analysis Design & MIS*

**Max Marks : 100**

**Min Marks : 40**

**1. Introduction -**

Systems Concepts and the information systems environment: Definition of system, Characteristics of system, elements of system, types of system,

The system Development life cycle : consideration of candidates system.

The Role of system Analyst : Introduction, the multiphase role of the analyst, the analyst / user interface, the place of the analyst in the MIS Organization.



MCA401	Programming in Java	3	2	-	100	25	-	125	40	15	-	55
MCA402	Software Engineering	3	2	-	100	25	-	125	40	15	-	55
MCA403	Interactive Computer Graphics	3	2	-	100	25	-	125	40	15	-	55
MCA404	Unix / Linux	3	2	-	100	25	-	125	40	15	-	55
MCA405	Compiler Designing	3	2	-	100	25	-	125	40	15	-	55
MCA406	Programming Lab JAVA	-	-	3x2	-	50	100	150	-	30	50	80
MCA407	Programming Practice / Mini-Project	-	-	2	-	50	50	100	-	30	25	55
MCA408	Common Software/Mini-Project	-	-	2	-	50	50	100	-	30	25	55
MCA409	Seminar	-	-	2	-	25	-	25	-	15	-	15
	<b>TOTAL</b>	15	10	20	500	300	200	<b>1000</b>	200	180	100	<b>480</b>

## FOURTH SEMESTER – MCA401

### *Programming in JAVA*

**Max Marks : 100**

**Min Marks : 40**

#### 1. Introduction to java programming

An overview of Java: Object Oriented Programming, Features of Java, Java Virtual Machine, Java Environment: Java Development Kit, Java Standard Library, Data Types, Variables: Declaring a variable, Dynamic Initialization, The scope and life time of variable, Type conversion and Casting: Narrowing and Widening Conversions, Numeric Promotions, Type Conversion Contexts; Operators: Arithmetic Operators, Relational Operators, Logical Operators, Bit wise Operators, Conditional Operators, new operator, [ ] and instance of operator. Control Statements: Java's Selection statement, Iteration Statement, Jump Statement, Array: Declaring Array variables, Constructing an Array, Initializing an Array, Multidimensional Arrays, Anonymous Arrays.

#### 2. Define the Class and interface

Introducing Classes: Class Fundamentals, Declaring Object, Assigning Object Reference Variables, Defining Methods, method overloading, Using objects as parameter, Constructors, Garbage collection, finalize () method. Inheritance: Inheritance basic, method overloading, object reference this and super, Chaining constructor using this () and super (), Member accessibility modifier: public, protected, default accessibility of member, private protected, private, Package: Define package, CLASSPATH, importing package, Interface: Define an interface, implementing interface, extending interface, variable in interface, Overview of nested class: Top level nested class and interface, Non static inner class, Local class, Anonymous class.

#### 3. Exception handling and Multithreading

Exception Handling: Exception types, Uncaught Exception, Using try and catch, multiple catch, nested try block, throw, and throws, finally.

Multithreading: creating thread, Thread priority, synchronization, thread Scheduler, Running & yielding, sleeping and waking up, waiting and notifying, suspend and resume, miscellaneous method in thread class.

#### 4. Input output, Networking and Fundamental class of java

Object class, String class, String Buffer class, Wrapper class, Math class, Collection: Collection interface, List interface, Set interface sorted interface, Array List class, Linked List class, Tree Set, Comparator, Vector, Stack. Input output classes and interface: File, Buffer Stream, Character Stream, and Random Access for files, Object Sterilization.

Networking: Socket overview, Client/Server, Proxy Server, Network class and interface, TCP/IP client socket, TCP/IP Server socket, URL Connection, Datagrams, Datagram Packets.

#### 5. Applet programming and AWT

Applet: Applet and Application program, Creating Applets, Applet Life Cycle, Applet and Thread, Supplying Applet parameter, Using Images and Sound in Applets, JAR files, Applet Security.

Introducing the AWT: Overview of the java.awt package, Component and Containers: Component, Container, Panel, Applet, Window, Frame, and Dialog classes. Working with Graphics, Working with Fonts, Working with Colors, GUI Control Components: Button, Canvas, Checkbox and Checkbox Group, Choice, List, Label, Scrollbar, Text Field and Text Area, Frame, Menu Bars and Menu

Layout Management: Layout Management Policies, Flow Layout, Grid Layout, Border Layout, Card Layout, Grid Bag Layout, Customized Layout.

Event Handling: Overview of Event Handling, Event Hierarchy, Event Delegation Model, Event Adapters, Low Level Event Processing.

#### 6. Advance features of java

JDBC: JDBC/ODBC Bridge, The Driver manage class, the java.sql package, data manipulation: Insert, Update, Delete Record, Data navigation: Result Set

BDK: What is java Beans, Advantages of java Beans, the Bean Developer Kit, Jar Files, Introspection, Developing a New Bean, Using Bound Properties, Using BeanInfo interface, The java Beans API.

Servlets : Movement to Server Side JAVA, Overview of Servlets, Common Gateway Interface (CGI), The JAVA Servlet Architecture, Generic Servlet and HTTP Servlet, The Servlet Interface, Requests and Responses, The Life Cycle of a Servlet, Retrieving Form Data in a Servlet, Session Tracking, Cookies.

#### **BOOKS RECOMMENDED :**

1. The Complete Reference Java 2 - Herbert Schildt, Publisher- TMH
2. A Programmer Guide to Java - Khlid A. Mughal, R.W. Rasmussen. Publisher- Addison Wesley
3. Introduction to HTML by - Kamlesh N. Agarwala, O.P.Vyas, P A. Agarwala.  
(Kitab Mahal Publications).
4. Web Enabled Commercial Application Java 2 - Ivan Bayross Publisher- B.P.B.

### **FOURTH SEMESTER : MCA - 402**

#### ***Software Engineering***

**Max Marks : 100**

**Min Marks : 40**

#### **1. Software Engineering Fundamentals :**

Definition of software product; software development paradigms; software engineering; knowledge engineering and end user development approaches.

#### **2. Software Analysis :**

Abstraction; partitioning and projection; system specification; software requirements specification (SRS) standards; formal specification method; specification tools; flow based, data based and object orientated analysis.

#### **3. Systems Design ;**

Idealised and constrained design; process oriented design (Gane and Sarson and Yourdon notations); data oriented design (Warnier – (Orr, E-r modeling); Object oriented design (Booch approach); Cohesion and coupling; Design metrics; design documentation standards.

#### **4. Role of Case Tools :**

Relevance of case tools; High-end and low-end case tools; Automated support for data dictionaries, data flow diagrams, entity relationship diagrams.

#### **5. Coding And Programming :**

Choice of programming languages; mixed language programming and call semantics; Re-engineering legacy systems; coding standard.

#### **6. Software Quality And Testing :**

Software quality assurance; types of software testing (white box, black box, unit, integration, validation, system etc); debugging and reliability analysis; program complexity analysis; software quality and metrics; software maturity model and extensions. Software cost and Time estimation. Functions points; issues in software cost estimation; introduction to the Rayleigh curve<sup>3</sup>; algorithmic cost model (COCOMO, Putnam-slim, Watson and felix); Other approaches to software cost and size estimation (software complexity, Delphi, costing by analogy)

#### **7. Software Project Management :**

Planning software projects; work background structures; integrating software, software design and project planning; software project teams; project monitoring and controls.

#### **RECOMENDED BOOKS:**

1. Software Engineering: A Practitioner's Approach – by essman Roger, Tata McGraw Hill
- 2 . An Integrated approach to Software Engineering - by Jalote Pankaj, Narosa: New delhi. 1991.

### **FOURTH SEMESTER : MCA - 403**

#### ***Interactive Computer Graphics***

**Max Marks : 100**

**Min Marks : 40**

#### **1. Display Devices**

Refresh Cathode ray tubes, Random Scan and raster Scan Monitors, Direct view storage tubes, continual refresh and storage display, plasma panel displays, LED & LCD devices, color display techniques, shadow marking and penetration, hard copy devices-printer and plotters.

#### **2. Output Primitives**

Points and Lines, Line drawing algorithms - vecgen and Bresenham Antialiasing. Circle generating Algorithms, Bresenham Circle Algorithms Ellipse, Character generating and text display. Matrix and Stork fonts, output command for various geometrical shapes, fill areas horizontal scan for Polygons. Attribute of outputs primitives, line style, text style, bundled attributes, fill colors and patterns.

#### **3. Display Description**

Word/user coordinates, device coordinate, normalized device coordinates, two dimensional viewing. Transformation - Translation, scaling rotation, reflection, shearing. Matrix representation of transformation and homogenous coordinates, Concatenation of transformation. Viewing algorithms- windows and viewpoints, windowing and clipping, line, area text clipping, blanking windows to view point transformation zooming and planning. Segment, concepts and file, segment attributes.

#### **4. Interactive Graphics**

Physical Input devices, logical classification, interactive picture construction techniques, input function.

#### **5. 3-D Transformation**

Translation, Scaling, Rotation about standard and arbitrary axis, transformation commands.

## 6. 3-D Projection

Viewing Pipeline, Viewing transformation and clipping, Normalized view volume, viewing Pipeline, hidden line and surface elimination algorithms backface removal, depth buffer method, scan line method, depth sorting method, area subdivision and octree method.

## 7. Design for User Interface

Components and user model, command language, memorization user help, backup and error handling, response time, command language style, menu design, feed back, output formats.

### RECOMMENDED BOOKS :

- |   |                         |
|---|-------------------------|
| 1. Computer Graphics                          | - Hearn D. & Baker P.M. |
| 2. Computer Graphics : A Programming Approach | - Harrington S.         |
| 3. Procedural Elements for Computer Graphics  | - Rogers D.F.           |

## FOURTH SEMESTER : MCA – 404 Unix / Linux

Max Marks : 100

Min Marks : 40

### 1. Introduction

Introduction to Multi-user System, Emergency and history of Unix, Feature and benefits, Versions of Unix.  
**System Structure:-**Hardware requirements, Kernel and its function, introduction to System calls and Shell.

### 2. File System

Feature of Unix File System, Concept of i-node table, links, commonly used commands like who, pwd, cd, mkdir, rm, ls, mv, lp, chmod, cp, grep, sed, awk, pr, lex, yacc, make, etc. Getting started (login / logout), File system management, file operation, system calls, buffer cache.  
**.Vi Editor:-**Intro to text processing, command and edit mode, invoking vi, command structure, deleting and inserting line, deleting and replacing character, searching strings, yanking, running shell command, command macros, set windows, set auto indent, set number, intro to exrc file.

### 3. Shell Programming

Introduction to shell feature, wild card characters, i/out redirections, standard error redirection, system and user created shell variables, profile files, pipes/tee, background processing, command line arguments, command substitution, read statement, conditional execution of commands, special shell variables \$ #, #?, \$\* etc. Shift commands, loops and decision making- for, while and until, choice making using case...esac, decision making if ...fi, using test, string comparison, numerical comparison, logical operation, using expr.

### 4. Introduction to Shell

Features, changing the login shell, cshrc, login, logout files, setting environment, variables, history and alias mechanism, command line arguments, redirection/ appending safely, noclobber, noglob, ignore eof, directory stacks (pushd, popd), feature of other shell (rsh, vsh).

### 5. Process Control

Process management, process states and transition, regions and control of process, sleep and waking, process creation, process killing, signals, system boot and init process, traps, setting process priorities.

### 6. Inter-process Communication

I/O Sub system, terminal drives, disk drives, messages, shared memory, semaphores, memory management, swapping, demand paging.

### 7. System Calls and Unix -C Interface

File handling calls like - access (), open(), create(), read(), write(), close(), fseek(), process control system calls like kill(), exec(), fork(), wait(), signal(), exit(), comparing stdio library and calls.

### 8. System Administration:-

Process and Scheduling, Security, Basic System Administration:- Adding a User, User Passwords, Delete of a User, Adding a Group, Deleting a Group, Super User, Startup and Shutdown. Advanced System Administration:- Managing Disk Space, Backup and Restore, Managing System Services.  
**Xwindows:-** Introduction to Xwindows concept

### 9. Introduction to Linux:-

Evolution of Linux, Red Hat Linux, Linux Installation and LILO, System Configuration. Gnome Desktop and the K Desktop. Xconfigurator, The X window system and window managers, Shell Operations, Linux File Structure.

### BOOKS RECOMMENDED :

- |                                     |                      |
|-------------------------------------|----------------------|
| 1. Design of Unix Operating System  | - Maurice Bach       |
| 2. Advanced Unix                    | - Stephan Prata      |
| 3. The Unix Programming Environment | - Kennighan and Pike |
| 4. Unix Programmers Guide           | - P. P. Selvester    |
| 5. Introduction to Unix System      | - Rachell Morgan     |
| 6. Complete Reference Red Hat Linux | - Richard Peterson   |
| 7. Complete Reference Unix          |                      |

**FOURTH SEMESTER : MCA – 405**  
**Compiler Design**

**Max Marks : 100**

**Min Marks : 40**

**1. Introduction to Compiling and one pass compiler :**

Compilers & translators, Phases of compilers, Compiler writing tools, Bootstrapping; overview of one pass compiler.

**2. Finite Automata and Lexical Analysis –**

Role of Lexical Analyzer; specification of tokens, Recognition of tokens, Regular expression, Finite automata, from regular expression to finite automata, DFA and NFA, Implementation of lexical analyzer; tools for lexical analyzer -LEX.

**3. Syntax analysis & Parsing Technique -**

Context free grammars; Bottom up parsing, Shift reduce parsing, Operator Precedence parsing, Top down parsing, elimination of left recursion; recursive descent parsing, Predictive parsing.

**4. Automatic Construction of Efficient parsers –**

LR parser, construction of SLR and canonical LR parser table, Using ambiguous grammar, An automatic parser the generator, YACC, Using YACC with ambiguous grammar, creating YACC lexical analyzer with LEX, Error recovery in YACC.

**5. Syntax Directed Translation –**

Syntax directed schema, Construction of syntax tree, Translation with top down parser.

**6. Run Time Environment –**

Source Language issues, Storage organization and allocation strategies, Parameter passing, Implementation of block-structured language.

**7. Intermediate Code Generation –**

Intermediate languages; Postfix notation, Three-address code, Quadruples and triples, Translation of assignment statements, Boolean expression, and Procedure call.

**8. Error Detection & recovery –**

Lexical & syntactic phase error, semantics error.

**9. Code Optimization –**

Optimization of basic block, Loop optimization global data flow analysis, Loop in variant computation.

**10. Code Generation –**

Issue and design of code generator, the target machine, a simple code generator.

**BOOKS RECOMMENDED :**

1 Principles of Compiler Designing

- by Alfred V. Aho and J.D. Ullman.

2.Principles of Compiler-Principles, Technique and Tools - Alfred V. Aho, Ravi Sethi

**SCHEME OF TEACHING AND EXAMINATIONS 2006-2007**  
**MASTER OF COMPUTER APPLICATIONS**

**FIFTH SEMESTER**

Subject Code	SUBJECTS	Teaching Load Per Week			Examination Marks							
		L	T	P	Max. Marks				Min. Marks			
					Th	Ses	Pr	Total	Th	Ses	Pr	Total
MCA501	Advanced Programming Tools - Java	3	2	-	100	25	-	125	40	15	-	55
MCA502	Introduction to .Net Technology & C#	3	2	-	100	25	-	125	40	15	-	55
MCA503	Data Mining and Data Warehouse	3	2	-	100	25	-	125	40	15	-	55
MCA504	Electives : 1. Soft Computing 2. Simulation & Modeling 3. OOAD 4. Introduction to ISO & CMM	3	2	-	100	25	-	125	40	15	-	55
MCA505	Electives : 1. Mobile Computing 2. Embedded Programming 3. Robotics 4. Artificial Neural Network & fuzzy logic	3	2	-	100	25	-	125	40	15	-	55
MCA506	Programming Lab	-	-	3x2	-	50	100	150	-	30	50	80
MCA507	Programming Practice / Mini-Project	-	-	2	-	50	50	100	-	30	25	55
MCA508	Common Software/Mini-Project	-	-	2	-	50	50	100	-	30	25	55
MCA509	Seminar	-	-	2	-	25	-	25	-	15	-	15
	<b>TOTAL</b>	15	10	20	500	300	200	<b>1000</b>	200	180	100	<b>480</b>

**FIFTH SEMESTER : MCA – 501**  
**Advanced Programming Tools - JAVA**

**Max Marks : 100**  
**Min Marks : 40**

**1. JDBC**

Introduction to JDBC, JDBC Drivers Type, Connection, JDBC URLs, Driver Manager, Statement – Creating, Executing, Closing, Result Set – Data Types and Conversions. Prepared Statement, Callable Statement, Mapping SQL and Java Types, JDBC-ODBC Bridge Driver

**2. RMI**

Distributed Applications, Introduction to RMI, Java RMI Architecture, Writing an RMI Server, Designing a Remote Interface, Implementing a Remote Interface, Creating a Client Program, Compiling the Programs, Running the Programs

**3. Servlets**

Movement to Server Side JAVA, Overview of Servlets, Common Gateway Interface (CGI), The JAVA Servlet Architecture, Generic Servlet and HTTP Servlet, The Servlet Interface, Requests and Responses, The Life Cycle of a Servlet, Retrieving Form Data in a Servlet, Session Tracking, Cookies.

**4. Java Beans**

Java Beans Concepts and the Beans Development Kit, Using the Bean Box, Writing a Simple Bean, Properties, Manipulating Events in the BeanBox, The BeanInfo Interface, Bean Customization, Bean Persistence.

**5. Java Server Pages (JSP)**

Overview of JSP, JSP Scripting elements, Compare and Contrast JSP with CGI and Servlet Technologies, List JSP directives, Integrate JSP with Java Beans Components, Handle JSP exceptions, Develop a basic Java Server Pages, Deploy Java Server Pages, Compare two-tier and multi-tier web application architectures, Database Connectivity.

## FIFTH SEMESTER : MCA – 502

### *Introduction to .NET Technology*

Max Marks : 100

Min Marks : 40

- 1. Inside the .NET framework :**  
Overview of .net framework, Managed Execution process, CLR,JIT Compilation , MSIL, Assemblies, Common Type System , cross language, interoperability.
- 2. Programming with .NET Framework**  
XML, Accessing data, ADO.Net, Accessing Internet, Component Programming essentials and Throwing exceptions, Processing Transactions, Garbage Collection, Base types, working with I/O, Basic files.
- 3. Building .NET framework applications :**  
ASP.net Web Application, Web forms, Server controls, Introduction to windows forms, Design –Time Support.
- 4. Debugging Optimizing and Profiling :**  
Performance and optimization concept, monitoring and managing Windows Process, Managing process, Retrieving Information about Process.
- 5. .NET Framework common classes & tools:**  
Microsoft.Csharp, Microsoft.Jscript, Microsoft.VisualBasic,Microsoft.  
Win 32 System, System Data, System security, System Web, System XML.qms,  
**tools-**AL.exe, Aximp.exe, Ilasm.exe, LC.exe, .NET Framework Configuration Tools, Wincv.exe

#### **BOOKS RECOMMENDED**

MSDN online – by Microsoft

## FIFTH SEMESTER : MCA – 503

### *Data Mining & Data Warehousing*

Max Marks : 100

Min Marks : 40

#### **Unit 1 – Introduction & Data Warehousing and OLAP Technology for Data Mining –**

What is data mining?, Data Mining: On what kind of data?, Data mining functionality, Are all the patterns interesting?, Classification of data mining systems, What is a data warehouse?, A multi-dimensional data model, Data warehouse architecture, Data warehouse implementation, Further development of data cube technology, From data warehousing to data mining. Concept of Transaction, Transactional database, Distributed Database, Commit Protocols.

#### **Unit 2 – Data Preprocessing, Data Mining Primitive, Languages and System Architecture –**

Why preprocess the data?, Data cleaning ,Data integration and transformation, Data reduction, Discrimination and concept hierarchy generation, Data Mining Primitive, Data Mining Query Language, Architecture of data mining system.

#### **Unit – 3- Mining Association Rules in Large Databases-**

Association rule mining, Mining single-dimensional Boolean association rules from transactional databases, Mining multilevel association rules from transactional databases, Mining multidimensional association rules from transactional databases and data warehouse, From association mining to correlation analysis, Constraint-based association mining.

#### **Unit 4 - Classification and Prediction & Cluster Analysis –**

What is classification? What is prediction? Issues regarding classification and prediction, Classification by decision tree induction, Bayesian Classification, Classification by back propagation, Classification based on concepts from association rule mining, Other Classification Methods ,Prediction, Classification accuracy, What is Cluster Analysis?, Types of Data in Cluster Analysis, A Categorization of Major Clustering Methods, Partitioning Methods, Hierarchical Methods, Density-Based Methods, Grid-Based Methods, Model-Based Clustering Methods, Outlier Analysis.

#### **Unit 5 - Mining Complex Types of Data & Applications and Trends in Data Mining-**

Multidimensional analysis and descriptive mining of complex data objects, Mining spatial databases, Mining multimedia databases, Mining time-series and sequence data, Mining text databases, Mining the World-Wide Web, Data mining applications, Data mining system products and research prototypes, Additional themes on datamining, Social impact of data mining, Trends in data mining

#### **BOOKS RECOMMENDED**

1. Data Mining: Concepts and Techniques - Jiawei Han and Micheline Kamber
2. Data Mining Concepts - H. Marget

## FIFTH SEMESTER : MCA – 504

### *Soft Computing*

Max Marks : 100

Min Marks : 40

- 1. Introduction to Fuzzy Logic System**  
Fuzzy Sets Operation Of Fuzzy Sets, Properties Of Fuzzy Sets, Fuzzy Relations, Fuzzy Arithmetic, Membership Functions, Fuzzy To Crisp Conversion. Fuzzy Logic, Fuzzy Rule Based Systems, Fuzzy Decision Making, Fuzzy Database, Fuzzy Intelligent System.
- 2. Introduction to Artificial Neural Networks**  
Introduction to Artificial Neural Network, Artificial Neuron, Classification of Artificial Neural Network, Architecture of a Artificial Neural Network, Activation Function, Training an Artificial Neural Network, Application of Artificial Neural Network.
- 3. Perceptron and Associative Memories**

Amari General Learning Rule, HEBB Learning Rule, ADLINE, Perceptron Layer Network, Associative memory: Auto associative Memory, Bi-directional memory, Back-propagation Network: Architecture, Training Algorithm Application of Back-propagation algorithm

#### **4. Machine Learning**

Regression And Classification, Decision Tree, SPRINT, Gini Index, Entropy, Pruning, C4.5, Active Learning - Feature Selection, Clustering, Models And Methods, Neural Networks, Markov Chain/Processes, Hidden Markov Models (HMM).

#### **5. Soft Computing Tools**

Introduction to MATLAB, Features, Matrix Operations, Curve Plotting, Toolbox Introduction, Introduction to Simulink.

#### **RECOMMENDED BOOKS:**

1. Fuzzy systems and Fuzzy Logic, Klir and Uuna, PHI Publications.
2. Introduction to Artificial Neural Networks, S. N. Sivanandam and M. Paulraj, Vikas publication.
3. Neural Network Design by Hagan & Demuth, Vikas Pub. Comp.
4. Fundamentals of Artificial Neural Networks, M.A.Hassaoun.
5. Fuzzy sets, uncertainty and information George J. Kir, & TA Folger.
6. Fuzzy sets, Decision making and Expert system, HJ Zimmerman, Kluwer, Boston.
7. Fuzzy set theory and its applications, H. J. Zimmerman, Kluwer, Boston.

## **FIFTH SEMESTER : MCA – 505** ***Satellite & Mobile Communication***

**Max Marks : 100**

**Min Marks : 40**

#### **1. Introduction.**

Introduction to Mobile Communication, Short history of wireless communication, Applications, Vehicles, Emergency, Business, Replacement of wired network, Location dependent services, infotainment, Mobile and Wireless devices, A Simplified reference model, some open research topics in mobile communication.

#### **2. Satellite Systems**

History of satellite system, Applications of satellite systems, Type of satellite systems, characteristics of satellite systems, satellite system infrastructure, satellite system architecture, Global Positioning system (GPS), Limitations of GPS. Beneficiaries of GPS, Applications of GPS

#### **3. Mobile Communication Systems**

Introduction, Cellular System Infrastructure,, Registration, Handoff Parameters and Underlying support, Roaming Support Using System Backbone, to Mobile IP, Functions of Mobile IP, Mobile Node, Corresponding Node, Home Network, Foreign Network, Home Agent , Foreign Agent, Care-of Address, IP Packet Delivery, Agent Discovery, Agent Solicitation , Registration, Tunneling , Dynamic host configuration protocol.

#### **4. Wireless LANs and PANs**

Introduction to IEEE 802.11, Ricochet, Ricochet Wireless Modem, Services Provided by Ricochet , Home RF, Home RF Technology, Hiper LAN, Blue tooth , Advantages and disadvantages of Wireless LAN, Infra red vs radio transmission , introduction to MAC. Technologies influence WLANs / WPANs in future.

#### **5. Mobile Adhoc Network**

Introduction to Mobile Adhoc Network(MANET), Characteristics of MANET, Applications of MANET, Routing, Need for Routing, Routing Classification, Table-Driven Routing Protocol – Destination Sequenced Distance Vector Routing Protocol, Cluster-Head Gateway Switch Routing, Wireless Routing Protocol. Source initiated On-demand Routing- Adhoc On Demand Distance Vector Routing, Dynamic Source Routing, Temporarily Ordered Routing Algorithms, Hybric Protocol – Zone Routing Protocol.

#### **RECOMMENDED BOOKS :**

1. Mobile Communication: Jochen H. Schiller, Pearson Education Publication
2. Introduction to Wireless and Mobile Systems: D.P. Agrawal , Qing-An Zing , Vikas Publishing House

**SCHEME OF TEACHING AND EXAMINATIONS 2006-2007**  
**MASTER OF COMPUTER APPLICATIONS**

**SIXTH SEMESTER**

Subject Code	SUBJECTS	Teaching Load Per Week			Examination Marks								
		L	T	P	Max. Marks			Min. Marks					
					Project Work	Viva	Pr	Total	Project Work	Ses	Pr	Total	
MCA601	System Development Project (System Design & Implementation)	-	2	-	200	200	-	400	80	120	-	200	
	<b>TOTAL</b>	-	2	-	200	200	-	400	80	120	-	200	