Rajasthan Technical University, Kota

FACULTY OF COMPUTER APPLICATIONS

Master of Computer Applications
SYLLABUS
Session 2007-08

Rajasthan Technical University, Kota

FACULTY OF COMPUTER APPLICATIONS

**Master of Computer Applications
SYLLABUS
Session 2007-08**

S.No.	COURSE CODE	SUBJECT	PERIODS			INTERNAL ASSESMENT	ESE	Subject TOTAL
			L	T	P			
1	MCA-101	Computer Architecture	3	1		20	80	100
2	MCA-102	Accounting and Financial Management	3	1		20	80	100
3	MCA-103	Database Management System	3	1		20	80	100
4	MCA-104	Programming in C	3	1		20	80	100
5	MCA-105	Discrete Mathematics	3	1		20	80	100
Practicals								
1	MCA-151	Office management Lab			4	20	80	100
2	MCA-152	DBMS Lab			4	20	80	100
3	MCA-153	Programming in C Lab			4	20	80	100
4	MCA-154	Microprocessor Lab			4	20	80	100
		Total				180	720	900

MCA Year 1 Semester I

1	MCA-101	Computer Architecture	3	1		20	80	100

Combinational Digital Circuits: Gates, Boolean Functions and Expressions, Designing Gate Networks, Useful Combinational Parts, Programmable Combinational Parts, Timing and Control, Latches, Flip-Flops and Registers, Sequential Circuits, Useful Sequential Parts, Programmable Sequential Parts, Clocks and Timing of Events.

Computer System Technology: Components to Applications, Computer Systems and their Parts, Generations, Processor and Memory Technologies, Peripherals I/O and Communications, Software Systems and Applications.

Instruction and addressing, instruction formats, types, addressing modes. Assembly Language Programs, Assembler Directives, Pseudo Instructions, Macroinstructions, Linking and Loading,.8085 Instruction Set.

Arithmetic/Logic Unit: Number Representation, Arithmetic Operations, Floating-Point Arithmetic.

Memory System Design: Main Memory Concepts, Cache Memory Organization, Mass Memory Concepts, Virtual Memory and Paging.

Input/Output and Interfacing, Input/Output Devices, Input/Output Programming, Interrupts.

Vector And Array Processing, Shared-Memory, Multiprocessing, Distributed Multi Computing.

Programming in 8085 Microprocessor.

Text/References:
1. Computer Organization and Architecture - William Stallings (Pearson Education Asia)
2. Computer Organization and Architecture -John P. Hayes (McGraw -Hill)

3. Computer Organization -V. Carl. Hamacher (McGraw-Hill)
4. Computer Organization & Design, Patterson & Hennessy, ELSEVIER

2	MCA-102	Accounting and Financial Management	3	1	20	80	100

Definition of Accounting and its advantages & limitations, Scope of accounting, Branches of Accounting – Financial Accounting – Cost Accounting – Management Accounting, users of Accounting information, Methods of Accounting, Double Entry Accounting System, Types of Accounts and Rules for Debit and Credit. Cash and Credit Transaction, Cash discount and Trade discount. Preparation of Journal, Ledger and Trial Balance. Final Accounts and Accounting Ratios, Preparation of Final Accounts (Sole Proprietorship only), Preparation of Trading A/c, Profit & Loss A/c and Balance Sheet covering simple adjustments.

Accounting Ratios: Meaning, Advantages and Limitations of Accounting ratios Computation of following ratios only:

Gross Profit Ratio, Net Profit Ratio, Stock Turnover Ratio, Operating Ratio, Current Ratio, Liquid Ratio, Debtors Ratio, Creditors Ratio, Return on Capital Employed, Earning Per Share, Return on shareholders fund.

Cost Accounting: Meaning and definition of Cost Accounting – its Advantages & Limitations

Budgetary Control, Definitions – Advantages – Limitations, Procedure for setting up Budgetary Control, Different types of budgets, Advantages and limitations of Cash Budget and preparation of Cash Budget.

Marginal Costing: Meaning-Advantages- Limitations, Break Even Point, Margin of Safety, Profit Volume Ratio, Application of Marginal Costing including simple problems on make or buy and product mix.

Text/References:

1. Accounting for Management – Vijay Kumar, Tata McGraw-Hill.
2. Accounting: Text and Cases(SIE) - Anthony, N. Robert, Hawkins and Merchant, McGraw-Hill.
3. Advanced Management Accounting, Vol. 1&2 – S. N. Maheshwari, and S. K. Maheshwari, Vikas Publishing House.
4. Advanced Management Accounting - Kaplan and Atkinson, 3rd ed. Prentice Hall.
5. Cost Accounting and Costing Methods - H. J. Weldon, Macdonald and Evans.
6. Manegerial Finance - Weston, John. Fred. Thomas, E. Copeland, Dryden press.
7. Basic Business Finance: A Text. R. D. Irwin - Pearson Hunt, Charles Marvin Williams, Gordan Donaldson.
8. Basic Financial Management - Khan & Jain, Tata McGraw-Hill.
9. Financial Decision Making: Concepts, Problems and Cases - Hampton, J. John, Prentice – Hall International.
10. Financial Management - Periasamy, Tata McGraw-Hill.

3	MCA-103	Database Management System	3	1	20	80	100

Overview of DBMS, Basic DBMS terminology, data base system v/s file system, data independence. Architecture of a DBMS

Introduction to data models: entity relationship model, hierarchical model: from network to hierarchical, relational model, comparison of network, hierarchical and relational models.

Data modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.

Relational model: storage organizations for relations, relational algebra, relational calculus. Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependencies, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.

Introduction to SQL: Characteristics of SQL, Advantages of SQL, SQL data types and literals, Types of SQL commands, SQL operators and their procedure, Tables, views and indexes, Queries and sub queries, Aggregate functions, insert, update and delete operations, Joins, Unions, Intersection, Minus in SQL.

Text/References:
1.   Date C J, "An Introduction To Database System", Addision Wesley
2.   Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
3.   Elmasri, Navathe, "Fundamentals of Database Systems", Addision Wesley
4.   Paul Beynon Davies, "Database Systems", Palgrave Macmillan
5.   Bipin C. Desai, "An introduction to Database Systems", Galgotia Publication
6.   Majumdar & Bhattacharya, "Database Management System", TMH
7.   Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
8.   Bharti P.K, "An introduction to Database Systems", JPNP

4	MCA-104	Programming in C	3	1		20	80	100

Problem Solving with Computers: Algorithms, and Flowcharts. Data types, constants, variables, operators, data input and output, assignment statements, conditional statements, string and character handling, data validation examples.

Iteration, arrays, strings processing, defining function, types of functions, function prototype, passing parameters, recursion.

Storage class specifiers, pre-processor, header files and standard functions. Pointers: Definition and uses of pointers, pointer arithmetic, pointers and array, pointers and functions, pointer to pointer. Structures, union, pointers to structures, user-defined data types, enumeration. Data files: Opening, closing, creating, processing and unformatted data files. Introduction to Dynamic Memory Allocation, command line arguments, systems calls.

Text/References:
1. C Programming Language, Kernighan & Ritchie, PHI.
2. C How to Program, Dietel & Dietel, PHI
3. The Complete Reference C, Schildt, TMH

5	MCA-105	Discrete Mathematics	3	1		20	80	100

Introduction to Discrete Mathematical Structures, Formal Methods: Introduction and Analogy, Abstraction.

Fundamentals: Sets & Relations- Sets, Types of Sets, Multi Sets, Operations on Sets, Relations and Properties of Relations, Representation of Relations, Equivalence Relation, Closures of Relations, Methods of Proof-Direct Proofs, Indirect Proofs, Mathematical Induction, Method of Contradiction.

Combinatorics: Permutations and Combinations, Pigeon Hole Principle, Principle of Inclusion and Exclusion, Sequence and Series, Generating Functions.

Mathematical Logic, Posets and Lattices: Partial Order Set, Bounding Elements, Well Ordered Set, Topological Sorting, Lattices, Principle of Duality, Bounded, Distributed, and Complemented Lattices, Proposition and Propositional Calculus.

Graphs and Group Theory: Basic Introduction of Graphs- Types of Graphs, Path and Circuits, Eulerian Path and Circuits, Hamiltonian Path and Circuits, Shortest Path Algorithms, Group, Definitions and Properties, Coset & Subgroup, Normal subgroup, Homomorphism of groups, Cyclic Group, Permutation Group.

Finite State Machines and Languages: Grammar and Languages- Phrase structure Grammar, Types of Grammars and Languages, Finite State Machines and Languages, Minimization of Finite State Machines.

Text/References:
1. Keneth H. Rosen, "Discrete Mathematics and Its Applications", TMH
2. C.L. Liu, "Elements of Discrete Mathematics", TMH.
3. Kolman, Busby & Ross, "Discrete Mathematical Structures", PHI.
4. Narsingh Deo, "Graph Theory With Application to Engineering and Computer Science", PHI
5. Trembly J.P. & Manohar P., "Discrete Mathematical Structures with Applications to Computer Science", McGraw Hill..

MCA Year 1 Semester II								
S.No.	COURSE CODE	SUBJECT	PERIODS			INTERNAL ASSESMENT	ESE	Subject TOTAL
			L	T	P			
1	MCA-201	C++ and Algorithm and Data Structure	3	1		20	80	100
2	MCA-202	Computer Oriented Numerical and Methods	3	1		20	80	100
3	MCA-203	Programming in Java	3	1		20	80	100
4	MCA-204	Operating System	3	1		20	80	100
5	MCA-205	Data Communications and Computer Networks	3	1		20	80	100
Practicals								
1	MCA-251	Data Structure Lab			4	20	80	100
2	MCA-252	CONM Lab			4	20	80	100
3	MCA-253	Java Lab			4	20	80	100
4	MCA-255	Communication & Soft Skill Lab			4	20	80	100
		Total				180	720	900
1	MCA-201	C++ and Algorithm and Data Structure	3	1		20	80	100

Evolution of OOP, OOP Paradigm, advantages of OOP, Comparison between functional programming and OOP Approach, characteristics of object oriented language – objects, classes, inheritance, reusability, user defined data types, polymorphism, overloading. Introduction to C++, Identifier and keywords, constants, C++ operators, type conversion, Variable declaration, statements, expressions, input and output, conditional expression loop statements, breaking control statements.

Defining function, types of functions, storage class specifiers, recursion, pre-processor, header files and standard functions, Arrays, pointer arithmetic's, structures, pointers and structures, unions, bit fields typed, enumerations.

Classes, member functions, objects, arrays of class objects, pointers and classes, nested classes, constructors, destructors, inline member functions, static class member, friend functions, dynamic memory allocation.

Inheritance, single inheritance, types of base classes, types of derivations, multiple inheritance, container classes, member access control

Function overloading, operator overloading, polymorphism, early binding, polymorphism with pointers, virtual functions, late binding, pure virtual functions, opening and closing of files, stream state member functions, binary file operations, structures and file operations, classes and file operations, random access file processing.

DATA STRUCTURE: Basic data structures such as arrays, stack and queues and their applications, linked and sequential representation. Linked list, representation of linked list, multi linked structures.

Trees: definitions and basic concepts, linked tree representation, representations in contiguous storage, binary trees, binary tree traversal, searching insertion and deletion in binary trees, heap tree and heap sort algorithm, AVL trees.

Graphs and their application, sequential and linked representation of graph – adjacency matrix, operations on graph, traversing a graph, Dijkstra's algorithm for shortest distance, DFS and BFS, Hashing.

Searching and sorting, use of various data structures for searching and sorting, Linear and Binary search, Insertion sort, Selection sort, Merge sort, Radix sort, Bubble sort, Quick sort, Heap Sort.

Text/References:
1. An introduction to data structures with applications By Jean-Paul Tremblay, P. G. Sorenson, TMH
2. Data Structures in C/C++, Tanenbaum, PHI
3. Data Structures in C/C++, Horowitz, Sawhney.
4. Practical C++ Programming, Steve Oualline, O'Reilly.
5. How to Program C++, Dietel, Pearson
6. Object Oriented Design & Modelling, Rambaugh, PHI.
7. A First Book of C++, Bronson, Thomson

2	MCA-202	Computer Oriented Numerical Methods	3	1		20	80	100

Floating point Arithmetic: Representation of floating point numbers, Operations, Normalization, Pitfalls of floating point representation, Errors in numerical computation

Iterative Methods: Zeros of a single transcendental equation and zeros of polynomial using Bisection Method, Iteration Method, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

Simultaneous Linear Equations: Solutions of system of Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Rate of Convergence.

Interpolation and approximation: Finite Differences, Difference tables, Polynomial Interpolation: Newton's forward and backward formula, Central Difference Formulae: Gauss forward and backward formula, Stirling's, Bessel's, Everett's formula.

Interpolation with unequal intervals: Langrange's Interpolation, Newton Divided difference formula, Hermite's Interpolation, Approximation of function by Taylor's series and Chebyshev polynomial

Numerical Differentiation and Integration: Introduction, Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Weddle's Rule Euler- Maclaurin Formula.

Solution of differential equations: Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector method, Automatic error monitoring, stability of solution.

Curve fitting and Approximation: Method of least squares, fitting of straight lines, polynomials, exponential curves etc.

(Emphasis must be given to algorithmic approach)

Text/References:
1. Numerical Methods and Computing, Cheney & Kincaid, 5th Ed., Thomson.
2. Applied Numerical Methods for Engineers, Schilling & Harries, Thomson.
3. Numerical Algorithms, Krishnamurthy & Sen, EWP.

3	MCA-203	Programming in Java	3	1		20	80	100

Overview of Object Oriented Concepts in Java.

Introduction Java & internet, Java applets and its applications, Java features like security, portability, byte code, java virtual machine, object oriented, robust, multithreading, architectural neutral, distributed and dynamic.

Data types and control structures, operators, array, Java methods and classes.

Inheritance of procedures and Data, packages and interface, exception handling, multithreaded programming thread priorities, synchronization, messaging, creating and controlling of threads. I/O and applets. String handling and various string functions.

Java utilities like java.lang, java.util and their uses, java.io, basics of networking using Java.

Java applets and their use – Event Handling – AWT and working with Windows – Event Handling – Event Handling Mechanisms, Delegation Event Model, Event Class, Event Listener Interfaces, Adapter Classes, Inner Class. AWT and working with windows – AWT Classes, Window fundamentals, frame windows, frame window in An Applet, Working with Graphics, color, fonts and text.

Java Beans – BDK, JAR files, Introspection, Developing simple bean using BDK, Bound Properties, BeanInfo, Interface, Constrained properties, Persistance, Customizers Servlets - Life cycle of servlet, use of tomcat for servlet, servlet API, Javax.Servlet package, servlet parameters, Javax.Servlet.http package, Handling HTTP requests and Responses, Cookies.

JDBC – JDBC API, JDBC Drivers, Products, JDBC Design considerations, Two Tier and Three Tier client server model, Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements, Resultset and Resultset MetaData Object.

Text/References:
1. Java How to Program, Dietel & Dietel, Pearson
2. Herbert Schildt: JAVA 2 - The Complete Reference, TMH, Delhi
3. U.K. Chakraborty and D.G. Dastidar: Software and Systems – An Introduction, Wheeler Publishing, Delhi.
4. Joseph O'Neil and Herb Schildt: Teach Yourself JAVA, TMH, Delhi.

4	MCA-204	Operating System	3	1		20	80	100

Introduction: Definition and types of operating systems, Batch Systems, multi programming, time–sharing parallel, distributed and real-time systems, Operating system structure, Operating system components and services, System calls, system programs, Virtual machines.

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

Process Synchronization and Deadlocks: The Critical-Section problem, synchronization hardware, Semaphores, Classical problems of synchronization, Critical regions, Monitors, Deadlocks-System model, Characterization, Deadlock prevention, Avoidance and Detection, Recovery from deadlock, Combined approach to deadlock handling.

Storage management: Memory Management-Logical and Physical Address Space, Swapping, Contiguous Allocation, Paging, Segmentation with paging, Virtual Memory, Demand paging and its performance, Page replacement algorithms, Allocation of frames, Thrashing, Page Size and other considerations, Demand segmentation, File systems, secondary Storage Structure, File concept, access methods, directory implementation, Efficiency and performance, recovery, Disk structure, Disk scheduling methods, Disk management, Recovery, Swap-Space management, Disk reliability.

Protection and Security-Goals of protection, Domain of protection, Access matrix, Implementation of access Matrix, Revocation of Access Rights, language based protection, The

Security problem, Authentication, One Time passwords, Program threats, System threats, Threat Monitoring, Encryption.

Case study : Windows NT-Design principles, System components, Environmental subsystems, File system, Networking and program interface.

Text/References:
1. Abraham Siberschatz and Peter Baer Galvin, "Operating System Concepts", Fifth Edition, Addision-Wesley
2. Milan Milankovic, "Operating Systems, Concepts and Design", McGraw-Hill.
3. Harvey M Deital, "Operating Systems", Addison Wesley.
4. Tanenbaum: Modern Operating System, Prentice Hall.

5	MCA-205	Data Communications and Computer Networks	3	1		20	80	100

Overview, evolution of computer networks, computer telephony.

Data communications – advantages of digital communication, transmission media, fundamentals of digital communications, transmission media, modulation techniques and modems.

The OSI seven layer network model, LAN technologies – protocols and standards, LAN hardware, TCP/IP and the Internet, Internet Architecture, Internet protocol and datagrams., Routing protocols, UDP, Internet standard services, DNS.

Networking Technologies, ISDN, Cable Modem System, DSL, SMDS, Frame relay, fast Ethernet, 100VG-anyLAN and Gigabit Ethernet, FDDI and CDDI, Asynchronous Transfer, SONET, DWDM

Switching and Virtual LAN, Non-ATM Virtual LANs, IEEE 802.1Q VLAN standard, Network Performance, Analytical approaches, simulation, traffic monitoring.

Network Management – SNMP, RMON and RMNv2, TMN, Directory services and network management.

Issues related to network reliability and security, SSL and VPN, Introduction only to firewalls and Kerberos, Cyber Laws.

Text/References:
1. Stalling, Data & Computer Communication, 8th Ed., Pearson.
2. Tanenbaum; Computer Network, 4th Ed., Pearson.
3. Kurose; Computer Networking, 3rd Ed., Pearson.
4. Peterson, Davie; Computer Networks, 3rd Ed., ELSEVIER
5. Youlu Zheng, Shakil Akhtar, Networks for Computer Scientists and Engineers, Oxford Press.

S.No.	COURSE CODE	SUBJECT	PERIODS			INTERNAL ASSESMENT	ESE	Subject TOTAL
			L	T	P			
		MCA Year 2 Semester III						
1	MCA-301	Java Technologies	3	1		20	80	100
2	MCA-302	Web Technologies and Development	3	1		20	80	100
3	MCA-303	Computer Graphics	3	1		20	80	100
4	MCA-304	Advanced Database System	3	1		20	80	100
5	MCA-305	System Analysis and Design	3	1		20	80	100
Practicals								
1	MCA-351	Advanced Java Lab			4	20	80	100
2	MCA-352	Web Design Lab			4	20	80	100
3	MCA-353	Computer Graphics Lab			4	20	80	100
4	MCA-354	Advanced DBMS Lab (Oracle/DB2/MySQL)			4	20	80	100
		Total				180	720	900

1	MCA-301	Java Technologies	3	1		20	80	100

Introduction to Java Enterprise, API JDBC, fundamentals, J2EE multi-tier architecture, Web Applications in J2EE.

Servlets fundamentals – architecture, life cycle of a servlet, initialization, threads, servlets and HTML, retrieving data in servlet, servicing he GET and POST requests, servlet sessions – session tracking, cookies.

Servlets, JDBC and Inter servlet communications – JDBC, Driver types, JDBC servlet, JDBC connection pool, inter servlet communication, servlet security and different packages of JSP and servlets.

JSP fundamentals – architecture, implicit objects, standard actions, JSP errors.

J2ME – introduction, building MIDlets, creating a user interface, event handling with commands, tickers, screens, textbox, lists and forms.

Text/References:
1. David flangan, Jim Farley, W Crawford an Kris Magnusson, Java enterprise in a Nutshell, Shroff Publishers, Calcutta
2. P J Perrone, V S R Chaganti, Building Java Enterprise Systems wit J2EE, SAMS, BPB Publications

2	MCA-302	Web Technologies and Development	3	1		20	80	100

The internet: history of the world wide web, hardware and software trend, object technology – java script object, scripting for the web-browser portability.

Introduction of HTML: introduction, markup language, editing HTML : common tags, headers, text styles, linking, images, formatting text, horizontal rules and more line breaks, unordered lists, nested and ordered lists, basic HTML tables : intermediate HTML tables and formatting : basic HTML forms, more complex HTML forms, internal linking, creating and using image maps.

Java script – introduction to scripting: introduction- memory concepts- arithmetic- decision making. Java script control structures, Java script functions: introduction – program modules in

java script - function definitions, duration of identifiers, scope rules, recursion, java script global functions.

Java script arrays: introduction, array-declaring and allocating arrays, references and reference parameters – passing arrays to functions, multiple subscripted arrays. Java script objects: introduction, math, string, data, boolean and number objects.

Dynamic HTML : CSS : introduction – inline styles, creating style sheets with the style element, conflicting styles, linking external style sheets, positioning elements, backgrounds, element dimensions, text flow and the box model, user style sheets.

Dynamic HTML: object model and collections: introduction, object referencing, collections all and children, dynamic style, dynamic positioning, using the frames collection, navigator object.

Dynamic HTML: event model : introduction, event ON CLICK, event ON LOAD – error handling with ON ERROR, tracking the mouse with event, more DHTML events.

Filters and Transitions: Dynamical HTML: Client side scripting with VB script: Introduction - operators- data types and control structures – VB script functions – arrays –string manipulation classes and objects.

Introduction to PHP – Advantages of PHP – Functions – Data types – Arrays – SQL – Connecting Databases using ODBC – Files – Forms – Images –Imap objects.

Text/References:
1. Internet & World Wide Web How to Program, Dietel & Dietel, Pearson.
2. Web Programming, Bai wt.al, Thomson

3	MCA-303	Computer Graphics	3	1		20	80	100

Introduction: Elements of graphics workstation. Video Display Devices.Raster Scan Systems. Random Scan systems. Input devices. Graphics Software Coordinate Representations, Fundamental Problems in Geometry.

Algorithms: Line drawing algorithms- DDA Algorithm. Bresenham's Line Algorithm. Frame buffers. Circle and Eclipse generating algorithms. Midpoint Circle Algorithm. Sean-line polygon fill algorithm. Inside-Outside tests. Sean- Line fill of curved Boundary Areas. Boundary fill Algorithm. Flood fill Algorithm. Character generation. Attributes of lines, curves, filling, characters. etc.

Graphics Primitives: Primitive Operations, The display file interpreter-Normalized Device Coordinates. Display- File structure. Display – file algorithm. Display control and Polygons-polygon representation.

Attributes of output primitives: Line attributes - Line type. Line width. Pen and Brush options. Line Color. Color and gray scale levels. Color-tables. Gray scale. Area- Fill Attributes- Fill styles. Pattern fill. Soft fill. Character Attributes. Text attributes.

Geometric Transformations: Matrices. Scaling Transformations. Sin and Cos Rotation. Homogeneous Co-ordinates and Translation. Co-ordinate Translations. Rotation about an arbitrary point. Inverse Transformations, Transformations Routines.

2-D Viewing- The viewing pipeline. Viewing co-ordinate, Reference Frame. Windows to view ports . co-ordinate transformation 2-D Viewing functions. Clipping operations point clipping. Line clipping. Cohen- Sutherland. Line Clipping. Polygon clipping. Sutherland Hodge man clipping.

3-D concepts. Three dimensional Display Methods Parallel projection. Perspective projection. Visible line and surface identification. Surface rendering. Three Dimensional Object representations. Bezier curves and surfaces. B-Spline curves and surfaces.

Visibility , Image and object precision Z- buffer algorithm. Floating horizons.

Computer Animation: Design of Animation Sequences. General Computer Animation Functions-Raster Animations. Key Frame Systems. Morphing Simulating Accelerations. Motion Specifications. Kinematics and Dynamics.

Text/References:

1. J. Foley, A. Van Dam, S. Feiner, J. Hughes: Computer Graphics- Principles and Practice, Pearson

2. Hearn and Baker: Computer Graphics, PHI.

4	MCA-304	Advanced Database System	3	1		20	80	100

Object-based Databases : Object-Oriented Databases: Object-oriented data model, Object Oriented Languages, Persistent Programming Languages. Object-Relational Databases: Nested Relations, Complex Types, Inheritance, Reference Types, Querying with Complex Types, Functions and Procedures Storage for Object Databases

Distributed Databases : Distributed Data Storage, Distributed Transactions, Commit protocol, Concurrency Control in Distributed Databases, Availability, Distributed Query Processing

Parallel Databases : I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Design of Parallel Systems

Deductive Databases : Introduction to Recursive Queries, Theoretical Foundations, Recursive Queries with Negation, From Datalog to SQL, Evaluating Recursive Queries

Information Retrieval and XML Data : Introduction to Information Retrieval, Indexing for Text Search, Web Search Engines, Managing Text in a DBMS, A Data Model for XML, Xquery, Efficient Evaluation of XML Queries.

PL/SQL basics, blocks, architecture, variables an constants, attributes, character set, PL/SQL sentence structure, data types, precompiler, conditional and sequential control statements, control structures, conditional control, sequential control, cursors, exceptions, triggers, procedures and packages.

Text/References:
1. Elmasri R and Navathe SB, Fundamentals of Database Systems, 3rd Edition, Addison Wesley, 2000.
2. Connolly T, Begg C and Strachan A, Database Systems, 2nd Edition, Addison Wesley, 1999
3. Ceri Pelagatti , Distributed Database: Principles and System - (McGraw Hill)
4. Simon AR, Strategic Database Technology: Management for the Year 2000, Morgan Kaufmann, 1995
5. Gray J and Reuter A, Transaction Processing: Concepts and Techniques, Morgan Kaufmann, 1993

5	MCA-305	System Analysis and Design	3	1		20	80	100

System Concepts and Information Systems Environment: The System Concept: Definition, Characteristics of Systems, Elements of a System, Open and Closed System, Formal and Informal Information Systems, Computer based Information Systems, Management

Information System, Decision Support System, General Business Knowledge, and Interpersonal Communicational System.

System Development Life Cycle: Recognition of needs, Impetus for System Change, Feasibility Study, Analysis, Design, Implementation, Post implementation and Maintenance.

Role of the Systems Analyst, The Analyst/User Interface, Behavioral issues.

Systems Planning and Initial Investigation: Strategies for Determining Information Requirement, Problem Definition & Project initiation, Background Analysis, Fact Analysis, Review of Written Documents, Onsite Observations, Interviews and Questionnaires, Fact Analysis, Performance Analysis, Efficiency Analysis, Service Analysis.

Information Gathering: need, Information about the firms, Information gathering tools, Interviewing, Arranging the Interview, Guides to a Successful Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives.

Tools of Structured Analysis: The Dataflow Diagram (DFD), Data Dictionary, Decision Trees and Structured English.

Feasibility Study: System performance, Economic Feasibility, Technical Feasibility, Behavioral Feasibility, Steps in Feasibility Analysis.

Input/Output and Forms Design: Input Design, CRT Screen Design, Output Design, and Requirements of form Design.

H/W / S/W Selection, Make V/s Buy decision and Maintenance, Documentation: Importance, Types of documentation, Security and disaster planning and management.

Text/References:
1. Systems Analysis and Design, Howryskiewycz, PHI
2. System Analysis & Design, Shelly Cashman Series, 4th Ed., Thomson Press
3. Analysis and Design of Information Systems, Senn, TMH
4. System Analysis and Design Methods, Whitten, Bentley
5. System Analysis and Design, Awad
6. Analysis and Design of Information Systems, Rajaraman,PHI

S.No.	COURSE CODE	SUBJECT	PERIODS			INTERNAL ASSESMENT	ESE	Subject TOTAL
			L	T	P			
MCA Year 2 Semester IV								
1	MCA-401	Software Engineering	3	1		20	80	100
2	MCA-402	.Net Framework and Programming in ASP.Net	3	1		20	80	100
3	MCA-403	Open source Operating System	3	1		20	80	100
4	MCA-404	Artificial Intelligence	3	1		20	80	100
5	MCA-___	Elective 1*	3	1		20	80	100
Practicals								
1	MCA-451	System Design Project			4	20	80	100
2	MCA-452	.Net Lab			4	20	80	100
3	MCA-453	Linux Lab			4	20	80	100
4	MCA-455	Colloquium (Group Discussion)			4	20	80	100
		Total				180	720	900
		*Elective 1						
	MCA-405	E-Commerce						
	MCA-406	Compiler Design						
	MCA-407	Data Mining and Data Warehousing						

1	MCA-401	Software Engineering	3	1		20	80	100

Software Engineering Paradigms : Software Characteristics, Software myths, Software Applications, Software Engineering Definitions, Various Software Process Models, Process iteration, Process activities, The Rational Unified Process, Computer-aided software engineering

Project Management, Management activities, Project planning, Project scheduling, Risk management

Software Requirements, Functional and non-functional requirements, User requirements, System requirements, Interface specification, software requirement document

Requirements Engineering Processes, Feasibility studies, Requirements elicitation and analysis, Requirements validation, Requirements management

System Models, Critical Systems Specification, Risk-driven specification, Safety specification, Security specification, Software reliability specification

Software Metrics and Measures — Process Metrics, Project metrics, Software Project Planning, Empirical, Putnam, COCOMO. Risk Identification and Projection: RMMM, Project Scheduling and Tracking.

Application Architectures — Data processing systems, Transaction processing systems, Event processing systems, Language processing systems, User Interface Design — Design issues, The user interface design process, User analysis, User interface prototyping, Interface evaluation

Rapid Software Development — Agile methods, Extreme programming, Rapid application development, Software prototyping. Software Reuse — Design patterns, Generator-based reuse, Application frameworks, Application system reuse, Software Evolution

Verification and validation,— Planning verification and validation, Software inspections, Automated static analysis, Verification and formal methods.

Software Testing — System testing, Component testing, Test case design, Test automation.

Software Cost Estimation — Software productivity, Estimation techniques, Algorithmic cost modeling, Project duration and staffing.

Quality Management — Process and product quality, Quality assurance and standards, Quality planning, Quality control, Software measurement and metrics

Process Improvement — Process and product quality improvement, Process classification, Process measurement — Process analysis and modeling, Process change, The CMMI process improvement framework.

Text/References:
1. Software Engineering, Pressman, TMH
2. Software engineering, Ian Sommerville, 8th Ed., Addison Wesley Longman.
3. Software Engineering Fundamentals, Ali Behforooz, Hudson, Oxford

2	MCA-402	.Net Framework and Programming in ASP.Net	3	1		20	80	100

Introduction to .NET Framework : Genesis of .Net – Features of .Net - .Net binaries – Microsoft Intermediate Language – Meta Data - .Net types and .net name spaces – Common Language Runtime – Common Type System – Common Language Specification - .Net Applications using command line compiler and visual studio .net IDE.

Basics of ASP. NET : Introducing ASP .NET – Creating and deploying ASP .NET applications – Web forms – Web controls – working with events – Rich web controls – Custom web controls – Validation controls – Debugging ASP .NET pages.

Advanced ASP .NET : ASP .NET configuration – Business objects – HTTP Handlers – Caching in ASP .NET – ASP .NET security – Localizing ASP .NET applications – Deployment projects.

Building Web Services : Introduction to web services – Web services Infrastructure – SOAP – Building a web service – Deploying and publishing web services – Finding web services – Consuming web services.

ADO .NET: Basics of ADO .NET – Changes from ADO – Data Table – Data Views – Data Set – Data Relation Type – ADO .NET Managed Providers – OLEDB and SQL Managed Providers – OleDb Data Adapter Type.

Text/References:
1. Applied Microsoft.NET framework programming, Jeffrey Richter, MS Press.
2. NET framework essentials Thuan L. Thai, Hoang Q. Lam, O'Reilly.
3. Programming .NET components, By Juval Löwy, O'Reilly.

3	MCA-403	Open Source Operating System	3	1		20	80	100

Introduction to concept of Open source software, Linux , Linux Architecture, Linux file system (inode, Super block, Mounting and Unmounting), Essential Linux Commands, Kernel, Process Management in Linux, Signal Handling, System call, System call for Files, Processes and Signals.

Shell Programming – Introduction to Shell, Various Shell of Linux, Shell Commands, I/O Redirection and Piping, Vi and Emacs editor, Shell control statements, Variables, if-then-else, case-switch, While, Until, Find, Shell Metacharacters, Shell Scripts, Shell keywords, Tips and Traps, Built in Commands, Shell Procedures and Reporting, Handling documents, C language programming, Prototyping, Coding, Compiling, Testing and Debugging.

Linux System Administrations – File listings, Ownership and Access Permissions, File and Directory types, Managing Files, User and its Home Directory, Booting and Shutting down (BootLoaders, LILO, GRUB, Bootstrapping, init Process, System services, Internet and Web service tools, E-mail, Remote Login and FTP, Networks and server setup, LAN, Connection with Internet, Setting up routers, Proxy Servers, Print Servers, File Server, Mail server, FTP server, Web server and News server, DHCP and NIS, Database server.

Text/References:
1. A practical Guide to Linux, Sobell, Pearson.
2. A Practical Guide to Linux Commands, Editors, and Shell Programming, Sobell, Pearson.
3. A Practical Guide to Fedora and Red Hat Enterprise Linux, Sobell, 5e, Pearson.

4	MCA-404	Artificial Intelligence	3	1		20	80	100

Concept of intelligence, Artificial intelligence, definition turning test, areas of application.

Search techniques, state space, Production rules, problem characteristics, production system characteristic, depth first, breadth first search methods and their analysis, Heuristic search method, generate and test, hill climbing, best first method, graph search, AND OR search methods, constraint satisfaction, backtracking.

Introduction to list and string processing and dynamic databases concept of knowledge, characteristics and representation schemes, Logic, prepositional and predicate calculus, resolution, semiatics nets, frames, conceptual dependency, scripts Monotonic reasoning, logical reasoning induction, natural deduction.

Nonmonotonic reasoning – default reasoning minimalist reasoning, statistical reasoning – Baye's theorem, certainty factors, dempster shafer theory, Fuzzy logic.

Concept of learning, inductive and deductive. Knowledge acquisition, rote learning, discovery analogy.

Concept of expert system, need for an expert system, Component and categories of an expert system, need for an expert system, Stages in the development of an expert system.

Text/References:
1. Artificial Intelligence: Elaine Rich, Kevin Knight, Mc-Graw Hill.
2. Introduction to AI & Expert System: Dan W. Patterson, PHI.
3. Artificial Intelligence by Luger (Pearson Education)
4. Russel & Norvig, Artificial Intelligence: A Modern Approach, Prentice-Hall

5	MCA-405	E-Commerce						

Introduction, Definition, Objectives, Advantages and disadvantages, Forces driving E-Commerce, Traditional commerce Vs. E-Commerce, E-Commerce opportunities for industries, Growth of E-Commerce.

E-Commerce Models: Business to consumer, Business to Business, Consumer to Consumer, other models – Brokerage Model, Aggregator Model, Info-mediary Model, Community Model and value chain Model.

Electronic Payment Systems: Special features required in payment systems, Types of E-payment systems, E-Cash, E-cheque, credit card, Smart Card, Electronic Purses.

E-Marketing, E-Customer Relationship Management, E-Supply Chain Management.

Security Issues in E-Commerce: Security risk of E-Commerce, Types of threats, Security tools and risk management approach. Cyber laws, Business Ethics, EDI Application in business.

Text/References:
1. Ravi Kalakota, Andrew Winston, "Frontiers of Electronic Commerce", Addison Wesley.
2. Bajaj and Nag, "E-Commerce the cutting edge of Business", TMH
3. P. Loshin, John Vacca, "Electronic commerce", Firewall Media, New Delhi

6	MCA-406	Compiler Design									

Introduction to translators, compilers, interpreters, compilation process. Programming language grammars, derivations, reductions, regular expression, context free language and grammar.

Lexical analyzer, input buffering, specification and recognition of tokens, introduction to finite automata, regular expressions to NFA, minimization of DFA, keywords and reserve word policies, LEX – the lexical analyzer generator.

Syntax analyzer, context free grammars, top down parsing, brute force parser, recursive descent parser, LL(1) parser, Bottom up parsing, operator precedence parsing, simple precedence parsing, LR parser, LALR parser, YACC – the parser generator.

Syntax directed translation schemes, implementation of syntax directed translators, synthesized attributes, inherited attributes, dependency graph, evaluation order, construction of syntax trees, directed acyclic graph of expression, bottom up evaluation of S- attributed definitions, L-attributed definitions, top down translation of L - attributed definitions.

Errors, lexical phase errors, syntactic phase errors.

Intermediate languages, postfix notation, syntax trees, parse trees, three address code, triples and indirect triples.

Translation of assignment statements, Boolean expressions, statements that alter flow of control array references, procedure calls, declarations, case statement, record structures.

Symbol tables, operation on symbol tables, symbol table organization for non-block structured languages, symbol table organization for block – structured languages.

Run time storage management, storage allocation and referencing data in block structured language, storage allocation.

Code optimization, sources of optimization, loop optimization, DAG and optimization of basic blocks. Code generation, a machine model, next use information register allocation and assignment, a simple code generator, code generation from DAG's, Peephole optimization.

Text/References:
1. Aho, Ullman and Sethi: Compilers, Addison Wesley.
2. Holub, Compiler Design in C, PHI.

7	MCA-407	Data Mining and Data Warehousing									

Data Warehousing: Introduction, Definition, Multidimensional data transformation, OLAP operations, Ware house schema, Ware house Server, Other features. Data Mining: Introduction, Definition, KDD vs. DM, DBMS vs. DM, DM Techniques, Issues and Challenges in DM, DM Applications. Association Rules: A Prior Algorithm, Partition, Pincer search, Incremental, Border, FP-tree growth algorithms, Generalized association rule.

Classification: Parametric and non-parametric technology: Bayesian classification, two class and generalized class classification, classification error, Decision boundary, Discriminate functions, Non-parametric methods for classification.

Clustering: Hierarchical and non-hierarchical techniques, K-MEDOID Algorithm, Partitioning, Clara, Clarans. Advanced Hierarchical algorithms

Decision Trees: Decision tree induction, Tree pruning, Extracting classification rules from decision trees, Decision tree construction algorithms, Decision tree construction with presorting. Other Techniques for Data mining: Introduction, Learning, Neural Networks, Data mining using neural networks, Genetic algorithms.   Web Mining: Web mining, Text mining, Content mining, Web structure mining. Searching Techniques: Optimal, non-optimal, Min-max, $\alpha - \beta$ pruning.

Text/References:

1.   Jiawei Han, Micheline Kamber, Data Mining: Concepts and Techniques, Harcourt India Pvt.
2.   Richard O. Duda, Peter E. Hart, Pattern Recognition and Scene Analysis, Tata McGraw Hill.
3.   Ian H. Witten, Eibe Frank, Data Mining Practical Machine Learning Tools and Techniques With Java Implementations, Morgan Kaufmann Publishers.
4.   Alex Berson, Stephen J. Smith, Data Warehousing, Data Mining and OLAP, McGrawHill.
5.   D. Hand, H. Mannila, and P. Smyth, Principles of Data Mining, MIT Press.
6.   Michael J.A. Berry & Gordon Linoff , Mastering Data Mining The Art and Science of Customer Relationship Management, John Wiley & Sons Inc.
7.   W. H. Innmon, Building the Data Warehouse, Wiley Computer Publishing.
8.   Elaine Rich, Artificial Intelligence, Springer-Verlag.
9.   Erik Thomsen, OLAP Solutions Building Multidimensional Information Systems, Wiley Dreamtech. India Pvt. Ltd.
10.   Tom Soukup, Ian Davidson, Visual Data Mining, Wiley Dreamtech India Pvt. Ltd.

MCA Year 3 Semester V								
S.No.	COURSE CODE	SUBJECT	PERIODS			INTERNAL ASSESMENT	ESE	Subject TOTAL
			L	T	P			
1	MCA-501	Object Oriented Software Engineering	3	1		20	80	100
2	MCA-502	Analysis and Design of Algorithms	3	1		20	80	100
3	MCA-503	Wireless Technologies	3	1		20	80	100
4	MCA-___	Elective 2*	3	1		20	80	100
5	MCA-___	Elective 3**	3	1		20	80	100
Practicals								
1	MCA-551	Software Project			4	20	80	100
2	MCA-552	ADA Lab			4	20	80	100
3	MCA-553	Wireless Tech. Lab			4	20	80	100
4	MCA-554	Seminar			4	20	80	100
		Total				180	720	900
		*Elective 2						
	MCA-504	Bio-Informatics						
	MCA-505	Geo-Informatics						
	MCA-506	Information Protection and Security						
		**Elective 3						
	MCA-507	Embedded Systems						
	MCA-508	ERP Systems						
	MCA-509	Soft Computing						

1	MCA-501	Object Oriented Software Engineering	3	1		20	80	100

Unified Modeling Language, Basic structures and modeling classes, common modeling techniques, relationships, common mechanism, class diagrams

Advanced structured modeling, advanced classes and relationships, interfaces, types and roles, instances and object diagram. Basic idea of behavioral modeling.

Object- oriented concepts and principles. Identifying the elements of an object model. Object oriented projects metrics and estimation.

Design for object – oriented systems. The system design process.

Object – oriented testing – testing OOA and OOD models. The object – oriented testing strategies. Inter class testing.

Technical metrics for O-O systems. Class oriented metrics and metrics for O-O projects.

Advanced topics in software engineering. Component based software engineering and development. Classifying and retrieving components.

Text/References:
1. Designing Flexible Object Oriented Systems with UML. By Charls Richter Techmedia.
2. UML users guide by Booch. Rumbaugh, Jacobson –Addison Wesley
3. Object Oriented Modeling and Design by Rumbaugh.
4. Object Oriented Analysis & Design – Practical Applications By Booch – Addison Wesley.

| 2 | MCA-502 | Analysis and Design of Algorithms | 3 | 1 | | 20 | 80 | 100 |

Introduction:- algorithm definition and specification – Design of Algorithms, and Complexity of Algorithms, Asymptotic Notations, Growth of function, Recurrences, Performance analysis – Elementary Data structures:- stacks and queues – trees – dictionaries – priority queues –sets and disjoint set union – graphs – basic traversal and search techniques.

Divide – and – conquer:- General method – binary search – merge sort – Quick sort – The Greedy method:-General method – knapsack problem – minimum cost spanning tree – single source shortest path.

Dynamic Programming – general method – multistage graphs – all pair shortest path – optimal binary search trees – 0/1 Knapsack – traveling salesman problem – flow shop scheduling.

Backtracking:- general method – 8-Queens problem – sum of subsets – graph coloring – Hamiltonian cycles – knapsack problem – Branch and bound:- The Method – 0/1 Knapsack problem – traveling salesperson.

Parallel models:-Basic concepts, performance Measures, Parallel Algorithms: Parallel complexity, Analysis of Parallel Addition, Parallel Multiplication and division, parallel Evaluation of General Arithmetic Expressions, First-Order Linear recurrence.

Text/References:
1. .Cormen, Leiserson, Rivest: Introduction to Algorithms, Prentice Hall of India.
2. Horowitz and Sahani: Fundamental of Computer algorithms.
3. Aho A.V , J.D Ulman: Design and analysis of Algorithms, Addison Wesley

| 3 | MCA-503 | Wireless Technoolgies | 3 | 1 | | 20 | 80 | 100 |

Introduction, wireless transmission - frequencies for radio transmission - signals - antennas - signal propagation - multiplexing - modulation - spread spectrum - cellular systems - medium access control - specialized MAC - SDMA - FDMA - TDMA - aloha - CSMA - collision avoidance - polling - CDMA - comparison of S/T/F/CDMA

Telecommunication systems - mobile services - system architecture - radio interface - protocols - localization and calling - handover - security - new data services - satellite systems- broadcast systems - digital audio broadcasting - digital video broadcasting, WDM Optical networks.

Wireless LAN - infrared Vs radio transmissions - infrastructure and adhoc networks - IEEE 802.11 b/a/g - bluetooth - IEEE 802.16, Mobile network layer - mobile IP - packet delivery - registration - tunneling and encapsulation - optimizations - reverse tunneling - dynamic host configuration protocol

Adhoc networks - routing - algorithms - metrics - mobile transport layer - TCP - indirect TCP - snooping TCP - mobile TCP - retransmission - recovery - transaction oriented TACP - support for mobility - file systems - WWW - WAP - architecture - datagram protocol - transport security - transaction protocol - session protocol - application - environment - WML - WML script - wireless telephony application.

Text/References:
1. Shambhu Upadhyaya, Abhijeet Chaudhary, Kevin Kwiat, Mark Weises, "Mobile Computing", Kluwer Academic Publishers
2. UWE Hansmann, Lothar Merk, Martin-S-Nickious, Thomas Stohe, "Principles of Mobile Computing", Springer International Edition
3. Stallings, W; Wireless Communications and Networks
4. Umar, A., Mobile Computing and Wireless Networks – Technology Briefing

5. Blake Roy, Wireless Communication Technology, Thompson
6. Schiller J., Mobile Communications, Pearson Education.
7. C. Siva Ram Murthy, Ad Hoc Wireless Networks: Architectures and Protocols, Pearson Education.
8. C. Siva Ram Murthy, WDM Optical Networks: Concepts, Design, and Algorithms, Pearson Education.
9. Singhal et.al S., The Wireless Application Protocol, Addison Wesley

| 4 | MCA-504 | Bio-Informatics | | | | | | | | |

Introduction – Importance of Bioinformatics – Biological Sequence Structure – Deficit – Genome Projects – Status – Sequence analysis – Homology and analogy.

EMBNET – NCBI – virtual Tourism.

Primary Sequence Databases Biological data base – Primary Sequence Database – Composite Protein Sequence Database – Secondary Database - Composite Protein – Pattern database structure and classification of database.

Genome Information Resources - DNA Sequence data base – Specialised genomic Resources.

DNA Sequence analysis : Why analyse DNA? – Gene structure – Features of DNA sequence analysis – Issues in the interpretation and EST search – Approach of Gene hunting – Cell CDNA libraries and ESTs – Approaches to EST analysis – Effect of EST data on DNA data base examples of EST analysis.

Data Base Searchers and Pair Wise Alignment Data base searching – Alphabets and Complexity – Comparing Two Sequences – Sub-Sequence – Identity and Similarity – Dot plots – Simple alignment – Gaps – Scoring Matrices – Dynamic programming – BLAST and its relative – FSTA and related algorithms – Alignment scores and statistical significance of data base sequences.

Global and local Alignments : Algorithms – Similarities – Semi global alignment

Multiple Sequence Alignment : Goal – Definition – Consensus – Complex – methods – Database of multiple Alignment – searching database with multiple alignment.

Methods of Photo Genetics.: Distance Based Methods – Based Methods – Comparison.

RNA Structure: Amino Acids – Polypeptide Composition Algorithm – Modeling protein folding prediction – RNA Sequence Structure.

Proteomics: Classification – Techniques – Inheritors – Drying Design – Structures – X-Ray Crystal – NMR – Empirical methods and prediction techniques.

Text/References:
1. T.K.Attwood, D.J. Parry-Smith, Introduction to Bioinformatics, Pearson Education Asia
2. Dan E. Krane, Michale L. Raymer, Fundamental Concepts of Bioinformatics,   Pearson Education Asia.

| 5 | MCA-505 | Geo-Informatics | | | | | | | | |

Basic concepts about Spatial information, Definition, Historical evolution and need for spatially based resource information system, objectives of GIS - Manual v/s automated GIS.

Data structure types of data structure, Raster and Vector formats, advantages and disadvantages of various data structures and data formats.

Data input: data pre-processing, methods of data capture, digitization and scanning methods, commonly used map projections and ellipsoids.

The format of GIS - Handling digital Geographical Information Data - Analysis of single data planes in Raster format - Analysis of Multiple data planes in Raster format - Uses of topographic data in Raster format - Data structures for thematic maps.

Digital Elevation Model (DEM): need, methods, data sources and products of DEM - Digital Terrain Modeling (DTM) - Input verification, storage and methods of data analysis for Spatial modeling - Methods of GIS and Spatial interpolation

Text/References:

1. Geographical Information System for Geoscientists by Bonham-Carter G.F., Pergamon Press, Tarrytown, New York, 1994.
2. Principles of Geographical Information System for Land Resources Assessment by Burrough, PA., Clarendon, Press, Oxford, 1986.
3. Geographical Information System by Fraser Taylor, D.R., The Microcomputer and Modem Cartography, Pergamon Press, 1991.
4. Mathematical Geography by Jameson, A.H. and Mormsby, M.t. Mormsby., Vol I and II, Sir Issac Pitman and Sons Ltd. London.
5. Cartographical design and production by Keates, J.S., London, Longman group, 1973.
6. Topographic Surveying by Wilson, H.M., John Wiley and sons, New York.
7. Geographic Information System by Les Worall, (Ed), Development and Applications, Beihaven Press, 1990
8. Remote Sensing and Image Interpretations by Thomas M. Lillesand and Ralph W. Kiefer., John Wiley and Sons, New York, 1994.
9. Mapping from Aerial Photographs by Burnside, CD., Collins Publishers. 1985.
10. Maps and Map making - Royal Geographical Society by Reeves, E.A., London.
11. Coordinate Systems and Map Projections by Mailing, D.H., George Philip and Sons Ltd.

| 6 | MCA-506 | Information Protection and Security | | | | | | | |

Introduction to Cryptography: Introduction To Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services. Conventional Encryption: Classical Techniques, Conventional Encryption Model, and Steganography, Classical Encryption Techniques. Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential & Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.

Conventional Encryption Algorithms: Triples DES, Blowfish, International Data Encryption Algorithm, RCS, CAST-128, RC2 Placement & Encryption Function, Key Distribution, Random Number Generation, Placement Of Encryption Function.

Public Key Encryption: Public-Key Cryptography: Principles of Public-Key Cryptosystems, RSA Algorithm, Key Management, Fermat's & Euler's Theorem, Primality, The Chinese Remainder Theorem.

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

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

Text/References:
1. Kaufman, c., Perlman, R., and Speciner, M., Network Security, Private Communication in a public world, 2nd ed., Prentice Hall.
2. Stallings, W.,. Cryptography and Network Security: Principles and Practice, 3rd ed., Prentice Hall PTR.
3. Pieprzyk Josef and et.al; Fundamentals of Computer Security, Springer-Verlag, 2008.
4. Trappe & Washington, Introduction to Cryptography, 2nd Ed. Pearson.
5. Johannes A. Buchmann, "Introduction to cryptography", Springer- Verlag.

| 7 | MCA-507 | Embedded Systems | | | | | | | |

An Overview of Embedded system, Requirements, Challenges issues, and trends in software development.

Application market segments, control system and industrial automation, Data communication, Networked Information Appliances, Telecommunications.

Hardware Architecture: Processor, Memory, Latches and buffers, ADC & DAC, Application specific control, Display units, keypads, DSP.

Microcontrollers and their applications, Communication interfaces: Serial interface, IEEE 1394, USB, Infra red, Ethernet and PCI bus.

Embedded system development process : requirement , system architecture, operating system and processes. Development platform and tools, HLL support Cross compilers, Linux and Windows CE based development Tools. Mobile/ handheld systems.

Basic idea of embedded system application like mobile networks, GPS, Real time system, Database applications, Networked and JAVA-enabled information appliances, Mobile JAVA applications.

Text/References:
1. Embedded System Design, A Unified Hardware/Software Introduction, Frank Vahid / Tony Givargis, 2006 reprint, John Wiley Student Edition.
2. An Embedded Software Primer, David .E. Simon, Fourth Impression 2007, Pearson Education.
3. Embedded Microcomputer Systems, Valvano, Thomson.

4. Performance Issues of an Embedded System http://embedded.com.
5. Computers As Components: Principles of Embedded Computing System Design, 2nd Edition. Morgan Kauffman.

8	MCA-508	ERP Systems								

Enterprise wide information system, Custom built and packaged approaches, Needs and Evolution of ERP Systems, Common myths and evolving realities, ERP and Related Technologies, Business Process Reengineering and Information Technology, Supply Chain Management, Relevance to Data Warehousing, Data Mining and OLAP, ERP Drivers, Decision support system.

ERP Domain, ERP Benefits classification, Present global and Indian market scenario, milestones and pitfalls, Forecast, Market players and profiles, Evaluation criterion for ERP product, ERP Life Cycle: Adoption decision, Acquisition, Implementation, Use & Maintenance, Evolution and Retirement phases, ERP Modules.

Framework for evaluating ERP acquisition, Analytical Hierarchy Processes (AHP), Applications of AHP in evaluating ERP, Selection of Weights, Role of consultants, vendors and users in ERP implementation; Implementation vendors evaluation criterion, ERP Implementation approaches and methodology, ERP implementation strategies, ERP Customization, ERP-A manufacturing Perspective.

Critical success and failure factors for implementation, Model for improving ERP effectiveness, ROI of ERP implementation, Hidden costs, ERP success inhibitors and accelerators, Management concern for ERP success, Strategic Grid: Useful guidelines for ERP Implementations.

Technologies in ERP Systems and Extended ERP, Case Studies Development and Analysis of ERP Implementations in focusing the various issues discussed in above units through Soft System approaches or qualitative Analysis tools, Learning and Emerging Issues, ERP and E-Commerce.

Concept of E – Governance: Concept, E – Governance frame work, area of application like public sector, service industry.

Text/References:
1. A. Lexis Leon, Enterprise Resource Planning, TMH
2. Brady, Manu, Wegner, Enterprise Resource Planning, TMH

9	MCA-509	Soft Computing								

Overview of Crisp sets and fuzzy sets : Basic concepts of crisp sets and fuzzy sets, Basic types of fuzzy sets, Fuzzy sets verses crisp sets, Representation and extension principle for fuzzy sets, Operations on Fuzzy sets

Fuzzy Relations and Fuzzy Logic: Crisp versus Fuzzy relations, Binary relations on fuzzy sets, Equivalence, compatibility and ordering relations, Morphisms and compositions of relations, Fuzzy relations equations, Fuzzy measures and possibility theory, Classical logic and multivalued logics, Fuzzy propositions and approximate reasoning

Fuzzy systems and neuro fuzzy systems : Relevance of integration between fuzzy sets and neural networks – pros and cons, Fuzzy neurons, Fuzzy neural networks, Neuro fuzzy systems, Fuzzy associative memories

Introduction to Genetic Algorithms : What are genetic algorithms?, Robustness of traditional optimisation and search methods, The Goals of optimisation, How are genetic algorithms different from traditional methods?, A simple genetic algorithm, Genetic algorithms at work – a Simulation by hand, Grist for the Search Mill – Important Similarities, Similarity Templates (Schemata), Learning the Lingo.

Genetic Algorithms Revisited : Mathematical Foundations, Who shall live and who shall die? The fundamental Theorem, Schema processing at work: An example by hand revisited. The two-armed and k-armed bandit problem, How many schemata are processed usefully?, The building block hypothesis, Another perspective: The minimal deceptive problem, Schemata revisited: similarity templates as hyper planes.

Computer Implementation of A Genetic Algorithm : Data Structures, Reproduction, Crossover, and mutation, A Time to reproduce, a time to cross, Get with the main program, How well does it work?, Mapping objective functions to fitness form, Fitness scaling, Codings, A multiparameter, Mapped, Fixed-Point coding, Discretization, Constraints

Introduction To Genetic-Based Machine Learning : Genetics-Based machine learning: whence it came, What is a classifier system?, Rule and message system, Apportionment of credit: The bucket brigade, Genetic algorithm, A simple classifier system in Pascal, Results using the simple classifier system

Text/References:
1. G. Klir and B. Yuan "Fuzzy Sets and Fuzzy Logic: Theory and Applications", Prentice Hall of India, 1997.
2. B. Kosko "Neural Networks and Fuzzy Systems" A Dynamical Systems Approach to Machine Intelligence", Prentice Hall of India, 1997.
3. David E. Goldberg, "Genetic Algorithms in Search, Optimization and Machine Learning, Addison-Wesley an imprint of Pearson Education Asia .

MCA Year 3 Semester VI								
			PERIODS			INTERNAL	ESE	Subject
S.No.	COURSE CODE	SUBJECT	L	T	P	ASSESMENT		TOTAL
1	MCA-601	Industrial Project***				50	150	200
		Total				50	150	200
		Grand Total						4700

Guidelines:

1. Paper MCA – 104, Excercises must be carried out in Linux environments.
2. Paper MCA – 457, At least one case study of an industry standard software must be carried out with one system design project. This will be a group activity having maximum of 3 students.
3. Paper MCA – 551 will be a group activity having maximum of 3 students.
4. Paper MCA – 554 will be individual activity in which student has to prepare and present a seminar along with report on some latest topic related with information technology.