MCA Syllabus

Semester I

S. No.	Subject Code	Subject	Teaching Hours			Credit
			L	T	P	
1	01MCA101	Computer Architecture	3	1	0	4
2	01MCA102	Accounting and Financial Management	3	1	0	4
3	01MCA103	Database management System	3	1	0	4
4	01MCA104	Programming in C	3	1	0	4
5	01MCA105	Discrete Mathematics	3	1	0	4
6	01MCA201	Office management Lab	0	0	4	2
7	01MCA202	DBMS Lab	0	0	4	2
8	01MCA203	Programming in C Lab	0	0	4	2
9	01MCA204	Microprocessor Lab	0	0	4	2
10	01MCA301	Discipline & Co Curricular Activities	0	0	4	1
		Grand Total	15	5	20	29

Semester II

S. No.	Subject Code	Subject	Teaching Hours			Credit
			L	T	P	
1	02MCA101	Data Structure through 'C++'	3	1	0	4
2	02MCA102	Computer oriented Numerical and Methods	3	1	0	4
3	02MCA103	Programming in Java	3	1	0	4
4	02MCA104	Operating System	3	1	0	4
5	02MCA105	Data Communications & Computer Networks	3	1	0	4
6	02MCA201	Data Structure Lab	0	0	4	2
7	02MCA202	CONM Lab	0	0	4	2
8	02MCA203	Java Lab	0	0	4	2
9	02MCA204	Communication & Soft Skill Lab	0	0	4	2
10	02MCA301	Discipline & Co Curricular Activities	0	0	4	1
Grand Total			15	5	20	29

Semester III

S. No.	Subject Code	Subject	Teaching Hours			Credit
			L	T	P	
1	03MCA101	Java Technologies	3	1	0	4
2	03MCA102	Web Technologies	3	1	0	4
3	03MCA103	Computer Graphics	3	1	0	4
4	03MCA104	Advanced Database System	3	1	0	4
5	03MCA105	System Analysis and Design	3	1	0	4
6	03MCA201	Advanced Java Lab	0	0	4	2
7	03MCA202	Web Design Lab	0	0	4	2
8	03MCA203	Computer Graphics Lab	0	0	4	2
9	03MCA204	Advanced DBMS Lab (Oracle/ DB2/MySQL)	0	0	4	2
10	03MCA301	Discipline & Co Curricular Activities	0	0	4	1
Grand Total			15	5	20	29

Semester IV

S. No.	Subject Code	Subject	Teaching Hours			Credit
			L	T	P	
1	04MCA101	Software Engineering	3	1	0	4
2	04MCA102	Net Framework and Programming in AS	3	1	0	4
3	04MCA103	Open source Operating System	3	1	0	4
4	04MCA104	Artificial Intelligence	3	1	0	4
5	04MCA105	E Commerce	3	1	0	4
6	04MCA201	System Design Project	0	0	4	2
7	04MCA202	.NET Lab	0	0	4	2
8	04MCA203	Advanced Java Lab	0	0	4	2
9	04MCA204	Colloquium (Group Discussion)	0	0	4	2
10	04MCA301	Discipline & Co Curriculum Activities	0	0	4	1
		Grand Total	15	5	20	29

Semester V

S. No.	Subject Code	Subject	Teaching Hours			Credit
			L	**T**	**P**	
1	05MCA101	Object Oriented Software Engineering	3	1	0	4
2	05MCA102	Analysis and Design of Algorithms	3	1	0	4
3	05MCA103	Wireless Technologies	3	1	0	4
4	05MCA104	Information Protection and Security	3	1	0	4
5	05MCA105	ERP Systems	3	1	0	4
6	05MCA201	Software Project	0	0	4	2
7	05MCA202	ADA Lab	0	0	4	2
8	05MCA203	Wireless Tech Lab	0	0	4	2
9	05MCA204	Seminar	0	0	4	2
10	05MCA301	Discipline & Co Curricular Activities	0	0	4	1
Grand Total			15	5	20	29

Semester VI

Course No.	Title	Teaching Hours			Credit Points
		L	T	P	
06MCA101	Industrial project a) Continuous Evaluation b) Project Report c) Viva Voice	5 6 6	0	0	17
06MCA301	Discipline & Co curricular Activities	0	0	4	1
	Total	17	0	4	18

Semester I

01MCA101

COMPUTER ARCHITECTURE

Course/Paper: 01MCA-101
MCA Semester-I

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.

Suggested readings –
1.   Computer System Architecture   Mano   Pearson
2.   Digital logic & Computer Design   Mano   Pearson

01MCA102

ACCOUNTING AND FINANCIAL MANAGEMENT

Course/Paper: 01MCA-102
MCA Semester-I

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.

Suggested readings –
1.   Double Entry Book-keeping   TS Garewal
2.   Financial Management   MR Agarwal   Garima, Jaipur
3.   Management Accounting   MR Agarwal   Garima, Jaipur
4.   Financial management   SN Maheshwari
5.   Financial Management   Khan, Jain   TMH

01MCA103

DATABASE MANAGEMENT SYSTEM

Course/Paper: 01MCA-103
MCA Semester-I

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, hierarchal model: from network to hierarchical, relational model, comparison of network, hierarchal 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 , extended ER model,

relationships of higher degree. Relational model: storage organizations for relations, relational algebra, and 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, , views and indexes, Queries and sub queries, Aggregate functions, insert, update and delete operations, Joins, Unions, Intersection,

Minus in SQL

Suggested readings –
1.	Database System Concepts	Korth, Sudarshan	TMH
2.	Database Concepts	Elmasri, Nawathe	Pearson
3.	Database Management Systems	Raghuramakrishan	
4.	SQL, PL/SQL, The Programming language Oracle	Bayross	BPB
5.	Introduction to Database Management Systems	Kahate	Pearson

01MCA104

PROGRAMMING IN C

Course/Paper: 01MCA-104
MCA Semester-I

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 specifies,

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 call.

Suggested readings –
1.	Fundamentals of Computers	Sinha, Sinha	BPB
2.	Computer Fundamentals	B. Ram	New Age Int. Pub. Delhi
3.	Let us C	Y. Kanitkar	BPB
4.	Programming with C	B. Gottfried	Schaum's Outline, TMH
5.	Computer Programming in C	Rajaraman	PHI

01MCA105

DISCRETE MATHEMATICS

Course/Paper: 01MCA-105

MCA Semester-I

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, Closers of Relations, Methods of Proof-Direct Proofs, Indirect Proofs, Mathematical Induction, Method of Contradiction.

Combinatory: 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 Prepositional 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.

Suggested readings –

1.	Discrete Mathematical Structures	Kolman, Busby, Ross	PHI
2.	Discrete Mathematical Structures	Chourasiya, Srivastava	Genius Publication, Jaipur
3.	Discrete Mathematics	Olympia Nicodemi CBS, Delhi	
4.	Discrete Mathematics	Akerkar	Pearson/PHI

01MCA-201

OFFICE MANAGEMENT LAB

Course/Paper: 01MCA-201

MCA Semester-I

01MCA-202

DATABASE MANAGEMENT SYSTEM LAB

Course/Paper: 01MCA-202

MCA Semester-I

01MCA-203

PROGRAMMING IN C LAB

Course/Paper: 01MCA-203

MCA Semester-I

01MCA-204

MICROPROCESSOR LAB

Course/Paper: 01MCA-204

MCA Semester-I

Semester II

02MCA101

C++ AND ALGORITHM AND DATA STRUCTURE

Course/Paper: 02MCA-101
MCA Semester-II

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 specifies, 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.

Suggested readings –

1.	Data Structures	Lipschutz	Schaum's Outline, TMH
2.	Data Structure & program design	Kruse	Pearson/PHI
3.	Data Structures & Algorithms	Trivedi, Gupta	Ashirwad, Jaipur
4.	Data Structures & Algorithms using C	Khanna, Tulli, Chaturvedi	Genius, Jaipur
5.	Programming & Data Structures	Kamthane	PHI

02MCA-102

COMPUTER ORIENTED NUMERICAL AND METHODS

Course/Paper: 02MCA-102
MCA Semester-II

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)

. Suggested readings-

1) Computer Oriented Numerical Methods V.Rajaraman (PHI)

2) Introduction to Numerical Anylysis S.S. Sastri (PHI)

3).Numerical Method. Er Ginish Nayyar.(S.K Kataia & Sons)

4).Advanced Engineering Mathematics.Prof RohitMukherjee,Drvivek.(Genius Publications)

02MCA103

PROGRAMMING IN JAVA

Course/Paper: 02MCA-103
MCA Semester-II

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, Bean Info, 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, Result set and Result set Metadata Object.

Suggested readings –
1.	Java2 – The Complete Reference	Schildt	TMH
2.	Programming with Java – A Primer	Balagurusamy	TMH
3.	Java: How to Program	Deitel	Pearson
4.	Programming with Java	Bhave	PHI

02MCA104

OPERATING SYSTEM

Course/Paper: 02MCA-104
MCA Semester-II

Introduction: Definition and types of operating systems, Batch Systems, multi programming, timesharing 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, Disk structure, disk scheduling methods, Disk management, 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.

Suggested readings –

1.	Operating System Principles	Galvin,Gagne	John Willey & sons
2.	Modern Operating Systems	Tanenbaum	Pearson

| 3. | Operating Systems | Dhamdhere | MGH |
| 4. | Operating System concepts | Manish k. Sah | Ashirwad, Jaipur |

02MCA105

DATA COMMUNICATIONS AND COMPUTER NETWORKS

Course/Paper: 02MCA-105
MCA Semester-II

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.

Suggested readings –
1.	Data Communication & Networking	Foruazan TMH	
2.	Computer Networks	Tanenbaum	Pearson
3.	Data & Computer Communications	Stallings	Pearson
4.	Understanding Data Communications Held		Pearson

02MCA-201

DATA STRUCTURE LAB

Course/Paper: 02MCA-201
MCA Semester-II

02MCA-202

CONM LAB

Course/Paper: 02MCA-202
MCA Semester-II

02MCA-203

JAVA LAB

Course/Paper: 02MCA-203
MCA Semester-II

02MCA-204

COMMUNICATION AND SOFT SKILL LAB

Course/Paper: 02MCA-204
MCA Semester-II

Semester III

JAVA TECHNOLOGIES

03MCA101

Course/Paper: 03MCA-101
MCA Semester-III

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.

Suggested readings –

1.	Java2 – The Complete Reference	Schildt	TMH
2.	Programming with Java – A Primer	Balagurusamy	TMH
3.	Programming with Java	Bhave	PHI

03MCA102

WEB TECHNOLOGIES AND DEVELOPMENT

Course/Paper: 03MCA-102
MCA Semester-III

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.

. **Suggested readings-**

1).H.T.M.L,D.H.T.M.L,C.G.I   .Ievan Bayross   (BPB)

2).Web Technology.   Pankaj Sharma   (S.K.Kataris & Sons)

3).Internet How to Program. Deitel   (Person)

03MCA103

<u>COMPUTER GRAPHICS</u>

Course/Paper: 03MCA-103
MCA Semester-III

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. Scan- 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.

Suggested readings –
1.	Computer Graphics	Donald, Bacher	Pearson
2.	Computer Graphics: Principles & Practice in C	Foley	Pearson
3.	Computer Graphics	Prajapati	Pragati Prakashan
4.	Computer Graphics	Pachghare	Laxmi Publication
5.	Computer Graphics	Sinha, Vdai	TMH

03MCA104

<u>ADVANCED DATABASE SYSTEM</u>

Course/Paper: 03MCA-104
MCA Semester-III

Object-based Databases : Object-Oriented Databases: Object-oriented data model, ObjectOriented Languages, Persistent Programming Languages. Object-Relational Databases: Nested Relations, Complex Types, Inheritance, ReferenceTypes, 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.

Suggested readings –
1.	Database System Concepts	Korth, Sudarshan	TMH
2.	Database Management Systems	Raghuramakrishan	
3.	SQL, PL/SQL, The Programming language Oracle	I. Bayross	BPB
4.	Introduction to Database Management Systems	Kahate	Pearson

03MCA105

<u>SYSTEM ANALYSIS AND DESIGN</u>

Course/Paper: 03MCA-105
MCA Semester-III

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.

Suggested readings –
1.	System Analysis & Design	Awad	Galgotia, Delhi

03MCA-201

<u>ADVANCED JAVA LAB</u>

Course/Paper: 03MCA-201
MCA Semester-III

03MCA-202

<u>WEB DESIGN LAB</u>

Course/Paper: 03MCA-202
MCA Semester-III

03MCA-203

COMPUTER GRAPHICS LAB

Course/Paper: 03MCA-203
MCA Semester-III

03MCA-204

ADVANCED DBMS LAB(Oracle,DB2, Mysql)

Course/Paper: 03MCA-204
MCA Semester-III

Semester IV

SOFTWARE ENGINEERING

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, 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.

Suggested readings –
1.	Software Engineering	Pressman	TMH
2.	Software Engineering	Sommerville	Pearson
3.	Advance Software Engineering	Shalini Puri	Genius, Jaipur

03MCA-201

COMMUNICATION AND SOFT SKILL LAB

Course/Paper: 03MCA-201
MCA Semester-III

04MCA102

.NET FRAMEWORK AND PROGRAMMING IN ASP.NET

Course/Paper: 04MCA-102
MCA Semester-IV

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.

Suggested readings –
1.   ASP.NET in 21 Days   Chris Payne   Techmedia
2.   Beginning ASP.NET 2.0   Chris Hart   Wrox

04MCA103

OPEN SOURCE OPERATING SYSTEM

Course/Paper:
04MCA-103
MCA Semester-IV

Introduction to the 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.
Suggested readings –
1.   Red Hat Linux 7.1   Arman Danesh   Red Hat
2.   Unix Shell Programming   Yashwant Kanetkar   BPB

04MCA104

ARTIFICIAL INTELLIGENCE

Course/Paper: 04MCA-104
MCA Semester-IV

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, semantics 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, uzzy logic. Concept of learning, inductive and deductive. nowledge 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.

Suggested readings –
1.   Artificial Intelligence   Peter Norving   Pearson
2.   Artificial Intelligence   E Laine Rich   Tata Mcgraw-Hill

04MCA105

E-COMMERCE

Course/Paper: 04MCA-105
MCA Semester-IV

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-me diary 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

Suggested readings –
1.   E-Commerce   Whitely   TMH
2.   Frontiers of E-Commerce   Kalakota   Pearson
3.   E-Commerce   Pilania, Dixit   Genius, Jaipur

04MCA-201

SYSTEM DESIGN PROJECT

Course/Paper: 04MCA-201
MCA Semester-IV

04MCA-202

.NET LAB

Course/Paper: 04MCA-202
MCA Semester-IV

04MCA-203

ADVANCED JAVA LAB

Course/Paper: 04MCA-203
MCA Semester-IV

04MCA-204

COLLOQUIUM (Group Discussion)

Course/Paper: 04MCA-204
MCA Semester-IV

Semester V
05MCA101

OBJECT ORIENTED SOFTWARE ENGINEERING

Course/Paper: 05MCA-101
MCA Semester-V

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.

Suggested readings –
1.   Software Engineering   Whitely   Tata Mcgraw-Hill

05MCA102

ANALYSIS AND DESIGN OF ALGORITHMS

Course/Paper: 05MCA-102
MCA Semester-V

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.

Suggested readings –
1.   Introduction to Algorithms   Coreman   PHI
2.   Algorithm   Micheal T. Goodrich   Wiley

05MCA103

WIRELESS TECHNOLOGIES

Course/Paper: 05MCA-103
MCA Semester-V

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.

Suggested readings –
1.   Wireless Communication & Networks   William Stallings   Pearson
2.   Wireless Communications   Theodore S. Rappaport   Pearson

05 MCA 104

<u>INFORMATION PROTECTION AND SECURITY</u>

Course/Paper: 05MCA-104
MCA Semester-V

Introduction to Cryptography: Introduction To Security: Attacks, Services & Mechanisms, Security, Attacks, Security Services. Conventional Encryption: Classical Techniques, Conventional Encryption Model, and graphy, 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.

Suggested readings –
1.   Cryptograph & N/W Security   William Stallings   Pearson

05 MCA 105

<u>ERP SYSTEMS</u>

Course/Paper: 05MCA-105
MCA Semester-V

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 framework, area of application like public sector, service industry.

Suggested readings –

1. ERP   Alexis Leon   Tata Mcgraw-Hill

05MCA-201

SOFTWARE PROJECT

Course/Paper: 05MCA-201
MCA Semester-V

05MCA-202

ADA LAB

Course/Paper: 05MCA-202
MCA Semester-V

05MCA-203

WIRELESS TECH. LAB

Course/Paper: 05MCA-203
MCA Semester-V

05MCA-204

SEMINAR

Course/Paper: 05MCA-204
MCA Semester-V

Semester VI

06MCA-101

INDUSTRIAL PROJECT

Course/Paper: 06MCA-101
MCA Semester-VI