



JODHPUR NATIONAL UNIVERSITY

JODHPUR

Faculty of Computer Application

MCA Program
Syllabus

For the Session

1st Year 2012-13,

2nd Year 2013-14 and

3rd Year 2014-15

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JODHPUR NATIONAL UNIVERSITY
FACULTY OF COMPUTER APPLICATION
MCA TEACHING & EXAMINATION SCHEME

MCA I Semester								
S No.	Code	Subject	Teaching Scheme			Max. Marks		
			L	T	P	Internal	External	Total
1	<i>MCA 101</i>	<i>Computer Organization and Architecture</i>	3	1		30	70	100
2	<i>MCA 102</i>	<i>C Programming</i>	3	1		30	70	100
3	MCA 103	Computer Oriented Numerical Statistical Method	3	2		30	70	100
4	MCA 104	Management Accounting and Economics	3	2		30	70	100
5	MCA 105	Art of Communication	3	2		30	70	100
6	MCA 106	Introduction to Internet Technology	3	2		30	70	100
7	MCA 107	C Programming Lab			4	30	70	100
8	MCA 108	Office Management & Internet Lab			4	30	70	100
							Total	800

L: - Lecture T: - Tutorial P: - Practical

MCA II Semester								
S No.	Code	Subject	Teaching Scheme			Max. Marks		
			L	T	P	Internal	External	Total
1	<i>MCA 201</i>	<i>C++ Programming</i>	3	1		30	70	100
2	MCA 202	Data Base Management System	3	2		30	70	100
3	MCA 203	Data Structures	3	1		30	70	100
4	MCA 204	Data Communications and Networking	3	2		30	70	100
5	<i>MCA 205</i>	<i>Java Programming</i>	3	1		30	70	100
6	MCA 206	Java Programming Lab			4	30	70	100
7	MCA 207	C++ Programming Lab			4	30	70	100
8	MCA 208	Data Structures lab			4	30	70	100
							Total	800

L: - Lecture T: - Tutorial P: - Practical

Bold for Subject change # Italics for Subject content change

MCA III Semester								
S No.	Code	Subject	Teaching Scheme			Max. Marks		
			L	T	P	Internal	External	Total
1	MCA 301	Relational Database Management System	3	1		30	70	100
2	MCA 302	Web Technologies & Development	3	1		30	70	100
3	MCA 303	Operating System	3	2		30	70	100
4	MCA 304	Computer Graphics	3	1		30	70	100
5	MCA 305	Discrete Mathematical Structures	3	2		30	70	100
6	MCA 306	RDBMS Lab			4	30	70	100
7	MCA 307	Web Technologies Lab			4	30	70	100
8	MCA 308	Computer Graphics Lab			4	30	70	100
							Total	800

L: - Lecture T: - Tutorial P: - Practical

MCA IV Semester								
S No.	Code	Subject	Teaching Scheme			Max. Marks		
			L	T	P	Internal	External	Total
1	MCA 401	Web Applications using ASP.Net	3	1		30	70	100
2	MCA 402	E Commerce	3	2		30	70	100
3	MCA 403	Open Source Operating System	3	1		30	70	100
4	MCA 404	System Analysis & Design	3	1		30	70	100
5	MCA 405	Elective *	3	2		30	70	100
6	MCA 406	Web Applications using ASP.Net Lab			4	30	70	100
7	MCA 407	Open Source Operating System Lab			4	30	70	100
8	MCA 408	System Design Project			4	30	70	100
							Total	800

*Elective	
MCA 405-E1	Management Information Systems
MCA 405-E2	System Software
MCA 405-E3	Data Warehousing and Mining

MCA V Semester								
S No.	Code	Subject	Teaching Scheme			Max. Marks		
			L	T	P	Internal	External	Total
1	MCA501	Software Engineering	3	1		30	70	100
2	MCA 502	Analysis & Design of Algorithms	3	1		30	70	100
3	MCA 503	Web Technology Using PHP	3	1		30	70	100
4	MCA 504	Artificial Intelligence	3	2		30	70	100
5	MCA 505	Elective *	3	2		30	70	100
6	MCA 506	Software Project			4	30	70	100
7	MCA 507	Web Technology Lab			4	30	70	100
8	MCA 508	DAA Lab			4	30	70	100
							Total	800

*Elective	
MCA 505-E1	Information Protection and Security System
MCA 505-E2	ERP Systems
MCA 505-E3	Embedded Systems

L: - Lecture T: - Tutorial P: - Practical

MCA VI Semester								
S No.	Code	Subject				Max. Marks		
						Internal	External	Total
1	MCA 601	Seminar				50	100	150
2	MCA 602	Project /Training				50	200	250

MCA I Semester								
S No.	Code	Subject	Teaching Scheme			Max. Marks		
			L	T	P	Internal	External	Total
1	MCA 101	Computer Organization and Architecture	3	1		30	70	100
2	MCA 102	C Programming	3	1		30	70	100
3	MCA 103	Computer Oriented Numerical Statistical Method	3	2		30	70	100
4	MCA 104	Management Accounting and Economics	3	2		30	70	100
5	MCA 105	Art of Communication	3	2		30	70	100
6	MCA 106	Introduction to Internet Technology	3	2		30	70	100
7	MCA 107	C Programming Lab			4	30	70	100
8	MCA 108	Office Management & Internet Lab			4	30	70	100
							Total	800

L: - Lecture

T: - Tutorial

P: - Practical

MCA 101 Computer Organization and Architecture

UNIT I

Data types and Number systems, Binary number system, Octal & Hexa-decimal number system, 1's & 2's complement, Binary Fixed- Point Representation, Arithmetic operation on Binary numbers, Overflow & underflow, Floating Point Representation, Codes, ASCII, EBCDIC codes, Gray code, Excess-3 & BCD, Error detection & correcting codes.

UNIT II

Boolean algebra, simplification of Boolean expressions, k-map, tabulation method. Implementation of Boolean functions with logic gates, universal gates, combinational circuits, half adder, full adder, BCD adder, comparator, multiplexer, demultiplexer, encoder, decoder, priority encoder.

UNIT III

Sequential logic, flip-flops, registers, up/down counters, BCD/Binary counters, Analysis and design of synchronous sequential systems, state assignment, races and hazards. Introduction to threshold logic & relay circuits.

UNIT IV

Introduction to switching devices. Positive and Negative logic of OR, AND, NOR, NAND, Exclusive OR and Exclusive NOR gates. RTL, DTL, DCTL, TTL, RCTL, ECL, HTL, MOS and CMOS logic circuit and their realization. Speed and delay in logic circuit and their realization. Fan-in, Fan-out, wired-or, wired-and, and noise immunity.

UNIT V

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,

MCA 102 C Programming

UNIT I

About C, Evolution of C, Programming languages, Structure of a C program, Compiling a C program, Character set in C, Keywords in C, Hierarchy of operators, Basic data types, Qualifiers used with basic data types, Variables in C, Type declaration, Output function, Input function and format specifiers, arithmetic operators, Unary operators, Relational and logical operators.

UNIT II

Control statements, if statement, if else statement, for statement, while loop, do while statements, break statements, continue statements, switch statement, goto statement, ternary operators.

Arrays, types of arrays, array declaration, array initialization, multidimensional arrays, string and character handling, Working with string and string function.

UNIT III

Functions, advantages of functions, declaring a function, calling a function, variables, passing arguments to a function, nested functions, passing array to functions, recursion in functions, Call by value and Call by reference.

Pointers and function, Array of pointers, Pointer and Strings, Pointer to structure, Pointers within structures

UNIT IV

Structure, declaration of structure, Union, difference between structure and union, Pointers, pointers operators, pointer arithmetic, Introduction of Static and Dynamic memory allocation, The process of Dynamic memory allocation, DMA functions malloc() function, Sizeof() operator, Function free(), Function realloc()

Preprocessor, # define, defining functions like macros, # error, #include, creating header files, include user defined header files. Conditional compilation directives.

UNIT V

Introduction File handling:-File structure, File handling function, File types, Streams, Text, Binary, File system basics, The file pointer, Opening a file, Closing a file, Writing a character, Reading a character, Using fopen(), getc(), putc(), and fclose(), Using feof(), Command line arguments.

MCA 103 Computer Oriented Numerical Statistical Method

UNIT I

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, Regula-Falsi method, Newton Raphson method, Secant method, Rate of convergence of iterative methods.

UNIT II

Linear equations, Gauss Elimination direct method and pivoting, Ill Conditioned system of equations, Refinement of solution. Gauss Seidal iterative method, Gauss-Jordan Method. 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. Langrange's Interpolation, Newton Divided difference formula.

UNIT III

Numerical Differentiation, Numerical Integration, Trapezoidal rule, Simpson's rules, Boole's Rule, Weddle's Rule, Euler- Maclaurin's Formula, Picard's Method, Euler's Method, Taylor's Method, Runge-Kutta methods, Predictor-corrector method, Automatic error monitoring, stability of solution.

UNIT IV

Measures of Central Tendency: Meaning and Definition; Types of Average, Median, Mode, Arithmetic mean, Geometric mean, Harmonic mean; Comparative Study of different Averages.

UNIT V

Measures of Dispersion and Skewness: Absolute and relative measures of dispersion range, Quartile deviation, mean and standard deviation and Coefficient: Correlation theory, measures of correlation coefficient of correlation, rank correlation

MCA 104 Management Accounting and Economics

UNIT I

Double Entry Book Keeping - Data Entry in the primary and secondary books of accounts - Preparation of Trial Balance, Preparation of Final Accounts

UNIT II

Cost Accounting - Relationship with Financial Accounting - Elements of Cost - Preparation of Cost Sheet

UNIT III

Materials Cost - Materials purchasing, receiving, storing, issuing including pricing of issues, Labor Cost - Time Keeping and Time Booking - Idle Time - Labour Turnover

UNIT IV

Definition, nature and scope of Managerial Economics - Managerial Economics and Micro-economics
Demand Analysis - Determinants of Market Demand - Law of Demand - Elasticity of Demand -
Measurement and its use

UNIT V

Cost Benefit Analysis - Private vs. Public Goods, Steps in cost benefit analysis - Justification for the
use of cost benefit analysis

MCA 105 Art of Communication

UNIT I

Words and Sentences, Parts of speech, Articles, Conditionals, Verbs/ Tenses, Reported Speech,
Modals, The passive,

UNIT II

Introduction to Communication: -Meaning and Definition, Objectives, Principles of Communication,
Scope, Limitations. Barriers to Communication.

UNIT III

Communication process: - Meaning & Concept, Elements of Communication, and Media of
Communication: Written, Oral, face-face, visual, audiovisual, computer based communication

UNIT IV

Transactional Analysis: What makes us say what we say, the four life positions and analysis of
transactions, perception and reality, the art of listening.

UNIT V

Composition, Paragraph writing. Business Letters: Need and functions of business letters -Planning &
layout of business letter - Types of business letters and letter writing, Application for employment and
resume - Notices, Agenda and Minutes of the Meetings.

MCA 106 Introduction to Internet Technology

UNIT I

Internet – current state, hardware and software requirement, ISP, an internet account, web home page,
URL, browser, security on web, searching tools, search engines, FTP, Gopher, Telnet, emails.

UNIT II

Web browser architecture, web page and multimedia, static dynamic and active web page, simple mail
transfer protocol, simple network management protocol, Introduction to search engines., WWW and
their working

UNIT III

Basic idea of client/server computing, naming computers and domain names, Hosting . Concept
of File Transfer Protocol, Remote Login, E-mail : Features and Concepts- Message headers, Address

book, Attachment, Filtering and forwarding mails, Introduction to SMTP, POP protocol, HTTP protocol.

UNIT IV

Introduction to Data Warehouse and Data Marts- advantages, components, Metadata, Summarized data, Structure of a data warehouse, use of data warehouse, Introduction to data mining.

UNIT V

Computer Viruses, Types of Viruses, Ways to catch Computer Virus, virus detections and preventions, Worms. Security in IT- Attacks, hackers, crackers, cryptology, encryption and decryption, firewall etc.

MCA II Semester								
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1	MCA 201	C++ Programming	3	1		30	70	100
2	MCA 202	Data Base Management System	3	2		30	70	100
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6	MCA 206	Java Programming Lab			4	30	70	100
7	MCA 207	C++ Programming Lab			4	30	70	100
8	MCA 208	Data Structures lab			4	30	70	100
							Total	800

L: - Lecture

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MCA 201 C++ Programming

UNIT I

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.

UNIT II

Conditional Statements, 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.

UNIT III

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.

UNIT IV

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 function

UNIT V

Files Handling : opening and closing of files, stream state member functions, binary file operations, structures and file operations, classes and file operations, random access file processing.

MCA 202 Data Base Management System

UNIT I

Overview of database management system, Database System Vs File System, Database system concepts and architecture, data models schema and instances, data independence and data base language and interfaces, Data definitions language, DML, Overall Database Structure. 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.

UNIT II

Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus, basic operations.

UNIT III

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.

UNIT IV

Transaction system, Testing of serializability, Serializability of schedules, conflict and view serializable schedule, recoverability, recovery from transaction failures, log based recovery, checkpoints, deadlock handling

UNIT V

Introduction to distributed systems, types of distributed databases, Transaction processing in distributed system, data fragmentation, Replication and allocation techniques for distributed system

MCA 203 Data Structures

UNIT I

Introduction to primitive and composite data structures. Linear data structure, Array, stack, queue, their applications and implementation using sequential and linked storage representation.

UNIT II

Linked list, implementation linked list using arrays, implementation of linked list using dynamic memory allocation circular link list, doubly linked list. Stacks - their concepts and implementation, multiple stacks. Conversion of infix to postfix notation using stack, evaluation of postfix expression, recursion, how recursion- works. Queues their concepts and implementation, dequeue .

UNIT III

Trees, Binary tree - their representation and operations, tree traversals, threaded binary trees, conversion of general trees to binary trees, binary expression tree, and applications of trees. sequential searching, binary search, height balanced tree and weight balanced trees, multiway search trees, digital search, trees, hashing and collision - resolution techniques.

UNIT IV

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.

UNIT V

Sorting : Sorting, different sorting techniques such as selection sort, heap sort, bubble sort, quick sort, insertion sort, merge sort and radix sort.

Searching: Searching algorithms such as linear search and binary search, hashing, and external sorting.

MCA 204 Data Communications and Networking

UNIT I

Overview, evolution of computer networks, computer telephony. Data communications – advantages of digital communication, transmission media, and fundamentals of digital communications, transmission media, modulation techniques and modems.

UNIT II

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.

UNIT III

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

UNIT IV

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.

UNIT V

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

MCA 205 Java Programming

UNIT I

Introduction to Java, history, characteristics, Object Oriented Programming, data types, Variables, arrays, difference between Java and C++ , Simple Java Program, Java Virtual Machine.
Control statements: Selection, iteration, jump statements, operators

UNIT II

Defining a Class, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class, Defining a subclass, Subclass constructor, Multilevel inheritance, Hierarchical inheritance, Overriding Methods, Final Variables and Methods, Final Classes, Finalizer Methods, Abstract Methods and Classes, Visibility Control

UNIT III

Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables. System Packages, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes. Exceptions, Exception Handling, Using finally Statement, Throwing Our Own Exceptions.

I/O File Handling (Input Streams & Output Streams, File Input Stream & File Output Stream)

UNIT IV

Java Library, string handling, string comparison, string buffer, utility classes.

Applets, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle (Initialization state, Running State, Idle or stopped state, Dead state, Display state), Creating an Executable Applet , introduction to AWT, Graphics Class, Lines and Rectangles, Circles and Ellipses, Drawing Arcs, Drawing Polygons, Line Graphs, Using Control Loops in Applets.

UNIT V

Java Beans, beans architecture, AWT components, advantage of Java Beans, JDBC, class and methods, API components, JDBC components, driver, connectivity to database processing result and interfaces

TCP/IP Protocol, UDP Protocol, Ports, Using TCP/IP Sockets, Using UDP Sockets.

MCA III Semester									
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			L	T	P	Internal	External	Total	
1	MCA 301	Relational Database Management System	3	1		30	70	100	
2	MCA 302	Web Technologies & Development	3	1		30	70	100	
3	MCA 303	Operating System	3	2		30	70	100	
4	MCA 304	Computer Graphics	3	1		30	70	100	
5	MCA 305	Discrete Mathematical Structures	3	2		30	70	100	
6	MCA 306	RDBMS Lab			4	30	70	100	
7	MCA 307	Web Technologies Lab			4	30	70	100	
8	MCA 308	Computer Graphics Lab			4	30	70	100	
							Total	800	

L: - Lecture

T: - Tutorial

P: - Practical

MCA 301 Relational Database Management Systems

UNIT I

SQL commands, Data Definition Language Commands, Data Manipulation Language Commands, The Data types a cell can hold, insertion of data into the tables, Viewing of data into the tables, Deletion operations, updating the contents of the table, modifying the structure of the table, renaming table, destroying tables, Data Constraints, Type of Data Constraint, Column Level Constraint, Table Level Constraint, Null value Concepts, UNIQUE Constraint, The PRIMARY constraint, The FOREIGN key constraint, The CHECK Constraint, Viewing the User Constraints

UNIT II

Computations on Table Data, Arithmetic Operators, Logical Operators, Comparison Operators, Range Searching, Pattern Searching, ORACLE FUNCTIONS, Number Functions, Group Functions, Scalar Functions, Data Conversion Functions, Manipulating Dates in SQL , Character Functions, Joins, Equi Joins, Non Equi Joins, Self Joins, Outer Joins, SubQueries, Correlated Queries, Using Set Operators:- Union , Intersect, Minus, Views, Creating and Altering Views, Using Views, Indexed Views, Partitioned views, Definition and Advantages of Indexes, Composite Index and Unique Indexes, Accessing Data With and without Indexes, Creating Indexes and Statistics.

UNIT III

PL/SQL, The Generic PL/SQL Block, The Declaration Section, The Begin Section, The End Section, The Character set, Literals, PL/SQL Data types, Variables, Constants, Logical Comparison, Conditional Control in PL/SQL, Iterative Control, Types of Cursors, Implicit Cursor, Explicit Cursor, Explicit Cursor attributes, Cursor For Loop, Parameterized Cursor.

UNIT IV

Error Handling in PL/SQL, Internal Exceptions, User Defined Exceptions. Stored Procedures and Functions:- Advantages of using a Procedure or Function, Procedure Versus Functions, Creating stored Procedures and Functions, Parameters to Procedures and Functions, Deleting a Stored Procedure or a Functions.

UNIT V

Packages, Components of a Package, Package Objects, Private and Public , Package state, Package Dependency, Triggers, Use of Database Triggers, Database Triggers V/s Procedures, Types of Triggers, Row Triggers, statement Triggers, Before V/S After Triggers, Deleting a Trigger.

MCA 302 Web Technologies & Development

UNIT I

HTML, Browsers and their types, URL's, web sites, Domain Names, static and dynamic sites and active web pages, Files Creation, Web Server, Web Client/Browser Hyper Text Markup Language, HTML Tags, Paired Tags, Commonly used HTML Commands Titles and Footers, Paragraph Breaks, Line Breaks, Heading Styles, Drawing Lines, Text Styles, Other Text Effects, Indenting Text, Lists, Types of Lists.

UNIT II

Using the Border attribute, Using the Width and Height Attribute, Using the Align Attribute, Using the ALT Attribute, Tables - Header, Data rows, The Caption Tag, Attributes - Width and Border, cellpadding, BGCOLOR, COLSPAN, ROWSPAN, External Document References, Internal Document References, Images as Hyperlinks, Introduction to Frames, tag, <FRAME> tag, Targeting NamedFrame. DHTML Introduction, use and its elements, Cascading Style Sheets, working with classes , using span tag external style sheet and use of DIV tags.

UNIT III

JavaScript, Advantages, JavaScript Syntax, Data Types and Literal, Type Casting, Variables, Incorporating variables in a Script, Array, Operators and Expressions, Arithmetic Operators, Logical Operators, Comparison Operators, String Operators, Assignment Operators, Conditional Expression, Ternary and Special Operators, JavaScript Programming Constructs, If - then - else, Immediate If, For Loop, Built-in Functions, User Defined functions, Declaring functions, Place of Declaration, Passing Parameters, Variable Scope, Return Values, Recursive Functions, Placing text in a Browser, Dialog Boxes - Alert dialog box, Prompt dialog box, Confirm dialog box.

UNIT IV

JavaScript Assisted Style Sheets DOM (JSSS DOM), Understanding Objects in HTML-Properties, Methods, Browser Objects - The Web Page HTML Object Hierarchy, Access to Elements of a Web Page, How a Web Page Element is Manipulated, Handling, WEB PAGE, Events Using JavaScript, Named JavaScript Event handlers.

UNIT V

The Form Object, The Form Object's Methods, Text Element, Password Element, Button Element, Submit Button Element, Reset Button Element, Checkbox Element, Radio Element, Text Area Element, Select and Option Element, Multi Choice Select Lists Element, Other Built-In Objects in JavaScript - String, Math, Date Object, Creating a User Defined Object, Instances, Objects within Objects. Client side scripting with VB script: Introduction - operators- data types and control structures – VB script functions – arrays –string manipulation classes and objects.

MCA 303 Operating System

UNIT I

Introduction to Operating Systems, Operating system services, multiprogramming, time-sharing system, storage structures, system calls, multiprocessor system. Basic concepts of CPU scheduling, Scheduling criteria, Scheduling algorithms, algorithm evaluation, multiple processor scheduling, real time scheduling I/O devices organization, I/O devices organization, I/O devices organization, I/O buffering.

UNIT II

Process concept, process scheduling, operations on processes, threads, interposes communication, precedence graphs, critical section problem, Semaphores, classical problems of synchronization. Deadlock problem, deadlock characterization, deadlock prevention, deadlock avoidance, deadlock detection, recovery from deadlock, Methods for deadlock handling.

UNIT III

Concepts of memory management, logical and physical address space, swapping, contiguous and non-contiguous allocation, paging, segmentation, and paging combined with segmentation.

UNIT IV

Concepts of virtual memory, demand paging, page replacement algorithms, allocation of frames, thrashing, demand segmentation. Security threads protection intruders-Viruses-trusted system.

UNIT V

Disk scheduling, file concepts, file access methods, allocation methods, directory systems, file protection, introduction to distributed systems and parallel processing case study.

UNIT I

Raster scan displays, Storage tube displays, refreshing, flickering, interlacing, color monitors, display processors resolution, working principle of dot matrix, inkjet laser printers, working principles of keyboard, mouse scanner, digitizing camera, track ball, tablets and joysticks, graphical input techniques, positioning techniques, rubber band techniques, dragging etc.

UNIT II

Scan conversion techniques, image representation, line drawing, simple DDA, Bresenham's Algorithm, Circle drawing, general method, symmetric DDA, Bresenham's Algorithm, curves, parametric function, Bezier Method, B-spline Method.

UNIT III

2D & 3D Co-ordinate system, Translation, Rotation, Scaling, Reflection Inverse transformation, Composite transformation, world coordinate system, screen coordinate system, parallel and perspective projection, Representation of 3D object on 2D screen.

UNIT IV

Point Clipping. Line Clipping Algorithms, Polygon Clipping algorithms, Introduction to Hidden Surface elimination, Basic illumination model, diffuse reflection, Specular reflection, Phong shading, Gourand shading ray tracing, color models like RGB, YIQ, CMY, HSV etc.

UNIT V

Multimedia components, Multimedia Hardware, SCSI, IDE, MCI, Multimedia data and file formats, RTF, TIFF, MIDI, JPEG, DIB, MPEG, Multimedia Tools, Presentation tools, Authoring tools, presentation.

MCA 305 Discrete Mathematical Structures

UNIT 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, Closures of Relations

UNIT II

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

UNIT III

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.

UNIT IV

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.

UNIT V

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

MCA IV Semester									
S No.	Code	Subject	Teaching Scheme			Max. Marks			
			L	T	P	Internal	External	Total	
1	MCA 401	Web Applications using ASP.Net	3	1		30	70	100	
2	MCA 402	E Commerce	3	2		30	70	100	
3	MCA 403	Open Source Operating System	3	1		30	70	100	
4	MCA 404	System Analysis & Design	3	1		30	70	100	
5	MCA 405	Elective *	3	2		30	70	100	
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8	MCA 408	System Design Project			4	30	70	100	
							Total	800	

	*Elective
MCA 405-E1	Management Information Systems
MCA 405-E2	System Software
MCA 405-E3	Data Warehousing and Mining

L: - Lecture

T: - Tutorial

P: - Practical

MCA 401 Web Applications using ASP.Net

UNIT I

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

Variables, Constants, Arrays, types of array, control array, Collections, Procedures, subroutines, functions, Control flow statements and conditional statements, Loop statements.

UNIT II

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.

UNIT III

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

UNIT IV

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.

UNIT V

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 – Ole Db Data Adapter Type.

MCA 402 E Commerce

UNIT I

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

UNIT II

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.

UNIT III

Electronic Payment Systems: Digital Token –Based Smart Card, credit cards, Risk in Electronic Payment System. Inter Organizational Commerce –EDI Application in business. EDI implementation, Value added networks

UNIT IV

E Marketing, E-Customer Relationship Management (E-CRM), Customer Relationship management concepts, E-CRM solutions advantages E-CRM capabilities and examples of E-CRM, E-Supply Chain Management, Introduction, components, architecture, Major trends in E-SCM and examples of ESCM

UNIT V

Security Issues in E-Commerce: Security risk of E-Commerce, Types of threats, Security tools and risk management approach. Data message security and Electronic Mail, Cyber laws, Business Ethics.

MCA 403 Open Source Operating System

UNIT I

Introduction to the Concept of Open Source Software, Linux, Linux Architecture, Linux file system (inode, Super block, Mounting and Un mounting), Essential Linux Commands, Kernel, Process Management in Linux, Signal Handling, System call, System call for Files, Processes and Signals.

UNIT II

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.

UNIT III

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.

UNIT IV

Linux System Administration – File listings, Ownership and Access Permissions, File and Directory types, Managing Files, User and its Home Directory, Booting and Shutting down (Boot Loaders, LILO, GRUB, Bootstrapping, init Process, System services, Internet and Web service tools, E-mail, Remote Login and FTP.

UNIT V

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.

MCA 404 System Analysis & Design

UNIT I

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.

UNIT II

SDLC, Recognition of needs, Impetus for System Change, Feasibility Study, Analysis, Design, Implementation, Post implementation & Maintenance. The Role of the Systems Analyst: Historical Perspective, The War Effort, What Does it take to do System Analysis, Academic & Personal Qualifications, The Multifaceted role of the Analyst, The Analyst/User Interface, Behavioral issues.

UNIT III

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

UNIT IV

Information, Information gathering tools, The art of Interviewing, Arranging the Interview, Guides to a Successful Interview, Types of Interviews and Questionnaires, The Structured and Unstructured Alternatives. Structured Analysis, The Dataflow Diagram (DFD), Data Dictionary, Decision Trees and Structured English.

UNIT V

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, Requirements of form Design. H/W / S/W Selection and Maintenance: The Computer Industry, S/W Industry, a Procedure for H/W / S/W Selection, Major Phases in Selection, Criteria for S/W Selection, The Used Computer, The Computer Contract.

MCA 405-E1 Management Information Systems

UNIT I

Introduction to information system in business, fundamentals of information systems, solving business problems with information systems, Types of information systems, Effectiveness and efficiency criteria in information system.

UNIT II

Definition of a management information system, MIS versus Data processing, MIS & Decision Support Systems, MIS & Information Resources Management, End user computing, Concept of an MIS, Structure of a Management information system.

UNIT III

Concept of organizational planning, The Planning Process, Computational support for planning, Characteristics of control process, The nature of control in an organization.

UNIT IV

Internet & electronic commerce, Intranet, Extranet & Enterprise Solutions, Information System for Business Operations, Information System for Managerial Decision Support, Information System for Strategic Advantage.

UNIT V

Enterprise & global management, Security & Ethical challenges, Planning & implementing changes. Enterprise Resource Planning, Supply Chain Management, Customer Relationship Management, and Procurement Management.

MCA 405-E2 SYSTEM SOFTWARE

UNIT I

Introduction to System Software , Types of system software: Operating systems, Utilities software, Device drivers, Programming Language Translators : Compiler, Interpreter and Assembler.

UNIT II

Assemblers, introduction to general design procedure, data structure, format of Database, algorithm, modularity, table processing.

UNIT III

Macro language and macro processor, features - macro instruction, arguments, conditional macro expansion, macro calls within macros, instructions for definition of macros. Implementation of a restricted facility - two pass algorithm, single pass algorithm.

UNIT IV

Loaders, loader schemes 'Compile - and - Go' loaders, general loader, scheme, absolute loaders, subroutine linkages, relocating loaders, direct-linking loaders. Design of Direct Linking Loader. specification of data structures, Format of databases, algorithm

UNIT V

Functions of Operating System, operating system concepts, process, files, systems calls. CPU Scheduling: scheduling concepts, algorithms.

Concept of concurrency, precedence graph. Review of process concept , hierarchy of processes , critical section problem , semaphores, classical process coordination problem and inter process communication.

UNIT I

Information, Theoretic Approach to knowledge discovery – Data explosion in the Internet Age, Knowledge discovery in databases (KDD), Verification-Based Methods of Data Mining, Feature Selection Methods, Learning issues, Information theory-the data mining perspective, Data Modeling, Book Organization.

UNIT II

Automated data pre-processing – Discretization of Ordinal Features, Static Discretization Algorithms, The Partitioning Procedure, Computational Complexity of the static Algorithm, Static Discretization and Dimensionality Reduction.

UNIT III

Information-Theoretic Connectionist Networks - A Unified Approach to Data Modeling, Constant Structure information-Theoretic Networks, Multi-Layer Information-Theoretic Network, Dynamic Discretization of Ordinal Attributes. Post-Processing of Data Mining Results-Rule Extraction and Reduction, Prediction, From Local to Global Modeling.

UNIT IV

Methodology of Application - Overview of the Discovery Process, Understanding the Problem Domain, Obtaining and Understanding the Data, Preparation of the Data, Construction of the Knowledge Model from Data, Evaluation of the Model, Using the Model (Inter preparation and Post – Processing) Advanced data mining methods-Anytime Algorithm for Knowledge Discovery, Data Reliability.

UNIT V

Summary and Some Open Problems - Methods Benefits and Limitations Future Research.

MCA V Semester								
S No.	Code	Subject	Teaching Scheme			Max. Marks		
			L	T	P	Internal	External	Total
1	MCA501	Software Engineering	3	1		30	70	100
2	MCA 502	Analysis & Design of Algorithms	3	1		30	70	100
3	MCA 503	Web Technology Using PHP	3	1		30	70	100
4	MCA 504	Artificial Intelligence	3	2		30	70	100
5	MCA 505	Elective *	3	2		30	70	100
6	MCA 506	Software Project			4	30	70	100
7	MCA 507	Web Technology Lab			4	30	70	100
8	MCA 508	DAA Lab			4	30	70	100
							Total	800

	*Elective
MCA 505-E1	Information Protection and Security System
MCA 505-E2	ERP Systems
MCA 505-E3	Embedded Systems

L: - Lecture

T: - Tutorial

P: - Practical

MCA 501 Software Engineering

UNIT I

Software Engineering - A layered Technology, Software Process Models: Linear Sequential Model, Prototyping Model, RAD Model Evolutionary Software Process Models: Incremental Model, Spiral Model Component Assembly Model, Formal Methods, Fourth-Generation Techniques

UNIT II

Software and Software Engineering, The importance of software – software – software myths – software engineering paradigms, The elements of the analysis Model Data Modifying, Functional modeling, flow and behavior modeling, structured analysis and Data Dictionary. Requirement analysis – tasks – analyst – software prototyping – specification principles – representation and the software requirements specification.

UNIT III

Analysis Concepts and Principles, the Elements of the Analysis Model Data Modifying, Functional Modeling and Information Flow and Behavior Modeling, Mechanics of Structured Analysis, Data Dictionary. Software Design Process: Design Principles, Design Concepts: Effective Modular Design, Design Heuristics, Design Documentation, Design Methods: Data Design, Architectural Design, Interface Design, Human Computer Interface Design, Procedural Design.

UNIT IV

S/W Testing Fundamentals – white Box Testing; black Box Testing, software testing strategies, verification and Validation, System Testing, Unit testing, Integration testing and Debugging.

Software Maintenance Maintainability – maintenance Tasks, Software Quality Assurance Software quality factors – quality assurance, quality metrics and software measurement.

UNIT V

Introduction to UML: Importance of modeling, principles of modeling, object oriented modeling, conceptual model of the UML, Architecture, and Software Development Life Cycle. Basic Structural Modeling: Classes, Relationships, common Mechanisms, and diagrams.

MCA502 Analysis and Design of Algorithms

UNIT I

Algorithms, Designing algorithms, analyzing algorithms, asymptotic notations, trees and graphs, sets and disjoint sets, recursion, functions and subroutine, heap and heap sort.

UNIT II

Introduction to divide and conquer technique, analysis, design and comparison of various algorithms based on this technique, example binary search, merge sort, quick sort, strassen's matrix multiplication.

UNIT III

Study of Greedy strategy, examples of greed method like optimal merge patterns, minimum spanning trees, knapsack problem etc. Concept of dynamic programming and problems based on this approach such as 0/1 knapsack, multistage graph, reliability design etc.

UNIT IV

Backtracking concept and its examples like 8 queen's problem, Hamiltonian cycle etc. Introduction to branch & bound method, examples of branch and bound method like traveling salesman problem etc. Meaning of lower bound theory and its use in solving algebraic problem, introduction to parallel computation.

UNIT V

Binary search trees, height balanced trees, AVL trees, 2-3 trees, B-trees, basic search and traversal techniques for trees and graphs (In order, preorder, postorder, DFS, BFS), NP- completeness.

UNIT I

Introduction to PHP as a programming Language: - Advantages of PHP, the server side architecture Decomposed, overview of PHP, history, object oriented support, benefits in running PHP as a server side script. Installing a web server, Internet information server, and IIS installation, testing web server setup.

UNIT II

The basics of PHP: - data types, variables, constants, operators, Arrays, Conditional statements (if statement, Executing Multiple Statements, else if clause and switch statement), Iterations (for loop, while loop, controlling an array using a while loop, do while statement, foreach loop and special loop key words)

UNIT III

Functions, user defined functions, functions with arguments, built in functions(print(), includer(), header(), phpinfo()), PHP server Variables, working with date and time , performing mathematical operations , working with string functions . System Variable (GET, POST, cookies& Session, Forums)

UNIT IV

Working with forms, form elements (Text Box, Text Area, Password, Radio Button, Checkbox, The Combo Box, Hidden Field and image), adding elements to a form, uploading files to the Web Server using PHP, building a challenge and response subsystem and understanding the functionality of the FORM attribute Method Regular Expressions: - Engine, types of Regular Expressions, symbols used in Regular Expressions. Error handling in PHP: - Displaying errors, warnings, types of errors, error levels in PHP, logging Errors and Ignoring errors.

UNIT V

Data base connectivity using PHP (MySQL, ODBC, ORACLE, SQL) Performing, executing Commands, different types of Data Base Operations like Insertion, deletion, update and query on data

MCA504 Artificial Intelligence

UNIT I

Meaning and definition of artificial intelligence, Various types of production systems, Characteristics of production systems, Study and comparison of breadth first search and depth first search. Techniques, other Search Techniques like hill Climbing, Best first Search. A* algorithm, AO* algorithms etc, and various types of control strategies.

UNIT II

Knowledge Representation, Problems in representing knowledge, knowledge representation using propositional and predicate logic, comparison of propositional and predicate logic, Resolution, refutation, deduction, theorem proving, inferencing, monotonic and nonmonotonic reasoning.

UNIT III

Probabilistic reasoning, Baye's theorem, Semantic networks scripts schemas, frames, conceptual dependency, fuzzy logic, forward and backward reasoning.

UNIT IV

Game playing techniques like minimax procedure, alpha-beta cut-offs etc, planning, Study of the block world problem in robotics, Introduction to understanding and natural languages processing.

UNIT V

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.

MCA 505 E1 Information Protection and Security System

UNIT I

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

UNIT II

Modern Techniques: Simplified DES, Block Cipher Principles, DES Standard, DES Strength, Differential and Linear Cryptanalysis, Block Cipher Design Principles, Block Cipher Modes of Operation.

UNIT III

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

UNIT IV

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.

UNIT V

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.

UNIT I

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.

UNIT II

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.

UNIT III

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,

UNIT IV

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, ERP-A manufacturing Perspective. Critical success and failure factors for implementation, Model for improving ERP effectiveness

UNIT V

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.

MCA 505 E3 Embedded Systems

UNIT I

Introduction and Review of Embedded Hardware, Terminology Gates, Timing Diagram, Memory, microprocessors Buses, Direct Memory Access, interrupts, Built ins on the Microprocessor, Conventions Used on Schematic, Interrupts Microprocessor Architecture, Interrupt Basics, Shared Data Problem, Interrupt latency.

UNIT II

Pic Micro controller And Interfacing, CPU architecture, registers, instruction sets addressing modes Loop timing, M, Analog to digital converter, UART, Baud Rate, Data Handling, Initialisation, Special Features, serial Programming, Parallel Slave Port.

UNIT III

Embedded Microcomputer Systems, Motorola MC68H11 Family Architecture Registers, Addressing modes Programs. Interfacing methods parallel I/O interface, Parallel Port interfaces, Memory Interfacing, High Speed I/o Interfacing, Interrupts, interrupt service routing, features of interrupts, Interrupt vector and Priority, timing generation and measurements, Input capture, Output compare, Frequency Measurement, Serial I/O devices RS. 232, RS. 485. Analog Interfacing Applications.

UNIT IV

Embedded system evolution trends. Round, Robin, robin with Interrupts, function, One, Scheduling Architecture, Algorithms. Introduction to, asSemesterbler, compiler, cross compilers and Integrated Development Environment (IDE) Object Oriented Interfacing, Recursion, Debugging strategies, Simulators.

UNIT V

Real Time Operating Systems , Task and Task States, tasks and data, Semesteraphores and shared Data Operating system Services, Message queues, Timer Function, Events, Memory Management, Interrupt Routines in an RTOS environment, Basic design using RTOS.

MCA VI Semester								
S No.	Code	Subject				Max. Marks		
						Internal	External	Total
1	MCA 601	Seminar				50	100	150
2	MCA 602	Project /Training				50	200	250