

SYLLABUS WEF FROM SESSION 2015-16

MCA - I Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
MCA111	C Programming	3	3 hrs	20	80	100
MCA112	Web Designing	3	3 hrs	20	80	100
MCA113	Data Structures	3	3 hrs	20	80	100
MCA114	Computer Oriented Numerical & Statistical Methods	3	3 hrs	20	80	100
MCA115	Digital Logic	3	3 hrs	20	80	100
MCA121	C Programming Lab	4	3 hrs	20	80	100
MCA122	Web Designing Lab	4	3 hrs	20	80	100
MCA123	Data Structures Lab	4	3 hrs	20	80	100
MCA124	CONM Lab	4	3 hrs	20	80	100
	TOTAL					900
MCA - II Semester						
Code	Description	Pd/w	Exam	CIA	ESE	TOTAL
MCA211	Visual Programming With .NET	3	3 hrs	20	80	100
MCA212	Programming in Java	3	3 hrs	20	80	100
MCA213	Microprocessor and Applications	3	3 hrs	20	80	100
MCA214	Computer networks and Data communications	3	3 hrs	20	80	100
MCA215	Discrete Mathematical Structures	3	3 hrs	20	80	100
MCA221	.NET Lab	4	3 hrs	20	80	100
MCA222	Java Lab	4	3 hrs	20	80	100
MCA223	Microprocessor Lab	4	3 hrs	20	80	100
MCA224	Soft Communication /Report Writing Lab	4	3 hrs	20	80	100
	TOTAL					900

I Semester

Unit	MCA111: C Programming
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.
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.
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.
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.
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.

Suggested Readings

- The Complete Reference C, Herbert Schildt, TMH
- Let Us C, Yashavant P. Kanetkar , BPB Publications
- Programming in ANSI C, Balaguruswamy, Mc Graw Hill

Unit	MCA112: Web Designing
I	Publishing Web Content, Understanding HTML and XHTML Connections, Understanding Cascading Style Sheets, Understanding JavaScript, Working with Fonts, Text Blocks, and Lists, Using Tables to Display Information, Using External and Internal Links, Working with Colors, Images, and Multimedia.
II	Advanced Web Page Design with CSS - Working with Margins, Padding, Alignment, and Floating, Understanding the CSS Box Model and Positioning, Using CSS to Do More with Lists, Text, and Navigation, Creating Fixed or Liquid Layouts.
III	Dynamic Web Sites - Understanding Dynamic Web Sites, Getting Started with JavaScript Programming, Working with the Document Object Model (DOM), Using JavaScript Variables, Strings, and Arrays, Using JavaScript Functions and Objects, Controlling Flow with Conditions and Loops, Responding to Events, Using Windows and Frames.
IV	Advanced JavaScript Programming - Using Unobtrusive JavaScript, Using Third Party Libraries, Greasemonkey: Enhancing the Web with JavaScript, AJAX: Remote Scripting.
V	Advanced Web Site Functionality and Management - -Creating Print-Friendly Web Pages, Working with Web-Based Forms, Organizing and Managing a Web Site, Helping People Find Your Web Pages.

Suggested Readings

- Sams Teach Yourself HTML, CSS, and JavaScript All in One by Julie Meloni

Unit	MCA113: Data Structures
I	Data, Structured data, Data Structure, Types of data structures : Linear and Nonlinear, Arrays: One dimensional and Multidimensional array, Memory representation of array, Operations on one dimensional and multi-dimensional array, Sparse matrix, Application of arrays, Advantages and Disadvantages of arrays.
II	Linked List: Static and Dynamic representation, Different operations on linked list : Traversal, Insertion, Deletion and Search. Circular linked list, Doubly linked list, Applications of linked list.
III	Stacks: Push and Pop operations on stack, Implementation of stack using arrays and linked list, Applications of Stack: Conversion of Infix to Prefix and Postfix expression, Evaluation of Postfix expression, Recursion. Queue: Linear and Circular queue, Operations: Insertion, Deletion and Update, Application of queue: Priority queue.
IV	Trees : Basic concepts, Binary trees, Representation of binary tree, Traversal: Preorder, In order and Post order, Searching, Insertion and Deletion in binary trees, Binary Search Tree. Graphs : Basic concepts, Representation of graph, Traversing a graph, DFS and BFS, Spanning tree, Warshall's algorithm, Dijkstra's algorithm, Prim's algorithm, Kruskal's algorithm, Applications of graph.
V	Searching: Linear and Binary search Algorithm. Internal and External Sorting. Sorting algorithms: Insertion, Selection, Merge, Radix, Bubble, Quick, Heap, Merging.

Suggested Readings

- Schaum's outline Data Structures with C, Seymour Lipschutz, Tata McGraw Hill

Unit	MCA114: Computer Oriented Numerical & Statistical Methods
I	Representation of numbers, operations, floating point numbers, normalization, pitfalls of floating point representation, errors in numerical computation. Concepts of roots synthetic division, value and values of derivative of a polynomial by synthetic division, Descarte's Rule of sign.
II	Iterative Methods - Bisection, Regula-Falsi, Newton Raphson, Secant, Baristow's method for finding complex roots, rate of convergence (without proof). Simultaneous Linear Equations - Solutions of system of Linear equations, Gauss Elimination method, pivoting, Ill Conditioned system of equations, refinement of solution. Iterative method – Gauss Seidal, Jacobi, Gauss-Jorden method.
III	Solution of ordinary differential equations - Taylor's method, Euler's method, Runge Kutta methods, Picard's method, modified Euler's method. Numerical Integration -Introduction, Trapezoidal rule, Simpson's rules.
IV	Interpolation: Finite differences, forward, backward and divided differences, difference table, Newton's forward and backward formula. Interpolation with unequal intervals -Lagrange's Interpolation, Newton Divided difference formula. Curve fitting - Method of least squares, fitting of straight lines, polynomials, exponential curves.
V	The basic concepts: Variables and Attributes, Statistics, Population and sample, complete enumeration vs sample surveys, probability and purposive sampling, simple random sampling Frequency distributions: Frequency distributions, histograms, Frequency polygons, frequency curves, cumulative frequency, distributions, ogives, Measure of Central Tendency, Median, mode, arithmetic mean, geometric mean, harmonic mean, partition values: quartiles, deciles and percentiles.

Suggested Readings

- Computer Oriented Numerical Methods, R S Salaria, Khanna Publication
- Computer Oriented Numerical Methods, P Thangaraj, PHI Publication
- Computer Oriented Numerical Methods, V Rajaraman, Prentice Hall India

Unit	MCA115: Digital Logic
I	Number Systems and Codes: Number Systems - decimal, binary, octal, Hexadecimal, base-n, inter-conversion methods. Binary Arithmetic: addition and subtraction. Compliment Arithmetic: Base Compliment, Base-1 Compliment. Binary Codes: Weighted and Non-Weighted Codes, 8421 BCD Code, Excess-3 Code, Gray Code, ASCII and EBCDIC. Boolean Algebra: Introduction to Logic, basic logic Operations. Principle of Duality, laws of Boolean algebra and De-Morgan's Theorem.
II	Digital Circuits - Introduction to Combinational and Sequential Circuits, classification of gates: basic gates, universal gates and exclusive gates, minterms and maxterms, Representation of gates using Sum of Products (SOP) & Products of Sum (POS). Introduction to Level Circuits - zero, one and two. AND-OR circuit, OR-AND circuit, NAND-NAND circuit, NOR-NOR circuit.

III	Combinational Circuits : Arithmetic Circuits - Half-Adder, Half-Subtractor, Full Adder, Full Subtractor, Parallel Adder, 2's Compliment Adder-Subtractor. Multiplexers, De-Multiplexers, Decoders, Encoders, Magnitude Comparator (2-1 Bit, 2-2 Bit & 2-4 Bit). Reduction Techniques: Need of Reduction. Reduction by Boolean Algebra, Karnaugh Maps: 2, 3, and 4 Variable.
IV	Sequential Circuits: Flip-Flops: RS, D using NAND and NOR gates, Introduction to clock & timing diagrams. Gated Flip-Flops (Latches). J-K Flip-Flop, T-Flip-Flop, J-K Master Slave Flip-Flop. Characteristic equation of Flip Flops, transition table of Flip Flops, Registers - SISO, SIPO, PISO, PIPO, SHL, SHR. Counters - Asynchronous and Synchronous, Ripple Up, Ripple Down Counters, Modulo Counters. Design of Synchronous Counters.
V	PLD-ROM, PLA & PAL, Memories: Memory Hierarchy, Memory Technologies; Magnetic, Semiconductor, Optical. RAM & ROM addressing techniques and Expansion. Introduction to VHDL.

Suggested Readings

- Kumar Anand. A., Fundamentals of Digital Circuits, PHI New Delhi
- Jain R. P., Modern Digital Electronics, Tata Mc Graw Hill , New Delhi
- Mano Morris, M. Digital Design, PHI, New Delhi
- Bartee Thomas, C., Digital Computer Fundamentals, Mc Graw Hill

MCA121: C Programming Lab
Practical Exercises
Exercises based on control statements, looping statements, functions, arrays (searching and sorting), pointers with its arithmetic, structure and union, dynamic memory allocation, macros and file handling.

MCA122: Web Designing Lab
Practical Exercises
Exercises based on Understanding HTML and XHTML Connections, Understanding Cascading Style Sheets, Understanding JavaScript, Working with Fonts, Text Blocks, and Lists, Using Tables to Display Information, Using External and Internal Links, Working with Colors, Images, and Multimedia.
Exercises based on Working with Margins, Padding, Alignment, and Floating, Understanding the CSS Box Model and Positioning, Using CSS to Do More with Lists, Text, and Navigation, Creating Fixed or Liquid Layouts.
Exercises based on Working with the Document Object Model (DOM), Using JavaScript Variables, Strings, and Arrays, Using JavaScript Functions and Objects, Controlling Flow with Conditions and Loops, Responding to Events, Using Windows and Frames.
Exercises based on Using Unobtrusive JavaScript, Using Third Party Libraries, AJAX: Remote Scripting.
Exercises based on designing of some example of websites.

MCA123:Data Structures Lab

Practical Exercises

Exercises based on Heap, Hash Tables, Sorted Array, Sparse Matrix, addition of two large Numbers, stacks, queues, linked list, circular linked list

MCA124:CONM Lab

Practical Exercises

Exercise based on Bisection Method, False position Method, Newton Raphson Method, Euler's Method, Modified Euler's Method, Runga Kutta Methods, Trapezoidal Method and Simpsons Method, Gauss Seidel Method, Gauss Jordon Method, Gauss Elimination Method, Jacobi Method, curve fitting.

II Semester

Unit	MCA211: Visual Programming with .NET
I	DOT NET Framework: Framework classes, Overview and Base Class Library, Common Language Runtime (CLR): Loading and Executing code, Common Type System and Common Language Specification ,name spaces and DLL, Windows Application v/s Web Application, Installing Visual.NET IDE, Creating a simple Application.
II	VB.NET: Data Types and Variables, Constants, Scope of variables, Expression, Type Conversions, Operators, Structures, Arrays: Array Class Members and Array of Arrays. Control Structures: if-then-else, Select Case, for-next, for Each....Next, Do loop, While...End While. Use of Classes and Objects, Procedures and functions , Debugging of Application
III	C#.NET: Data Types, Variables, Operators Expression, Statements, Decision Statements, Iterative Statements, Creating Objects with Class. Constructors, this Keyword, Static and Instance Members, Destroying Objects, Method Overloading, Passing Arguments and Objects, Passing by Value, Passing by Reference. Arrays and String, Inheritance, Interfaces and Polymorphism, Exception Handling.
IV	Components of VS.NET, Design Window, Code Window, Server Explorer, Toolbox, Docking Windows, Properties Explorer, Solution Explorer, Object Browser. Adding Controls, Adding an Event Handler, Adding Controls at Runtime, Attaching an Event Handler at Runtime, Creating a Menu, Adding a New Form, Creating a Multiple Document Interface, Creating a Dialog Form, Using Form Inheritance, Adding a TabControl, Changing the Startup Form, Connecting the Dialog
V	Introducing ADO.NET, ADO.NET Architecture, Understanding the Connection Object, Building the Connection String, Understanding the Command Object, Understanding DataReaders, Understanding DataSets and DataAdapters, DataTable, DataColumn, DataRow, Differences between DataReader Model and DataSet Model, Working with System.Data.OleDb and Sql Server 2008.

Suggested Readings

- The Visual Basic .NET Bible by Bill Evjen, Jason Beres

MCA212: Programming in Java	
Unit	
I	Object Oriented Concepts in Java, Java features like security, portability, byte code, java virtual machine, object oriented, robust, multithreading, architectural neutral, distributed and dynamic. Java Source File Structure, Compilation, Execution, Lexical Tokens, Identifiers, Keywords, Literals, Comments, Primitive Datatypes, Operators, Assignments, Command line argument, Control structures.
II	Class Fundamentals, Object & Object reference, Object Life time & Garbage Collection, Creating and Operating Objects, Constructor & initialization code block, Access Control, Modifiers, Abstract Class, Interfaces, Implementing Interfaces, Defining Methods, Argument Passing Mechanism, Method Overloading, Recursion, Static Members, Finalize() Method, use of this keyword, Modifiers with Classes & Methods, Array, Initializing & Accessing Array, Multi –Dimensional Array.

III	Inheritance - Benefits of Inheritance in OOP, Types of Inheritance, Inheriting Data Members and Methods, Role of Constructors in inheritance, Overriding Super Class Methods, use of super keyword, Polymorphism in inheritance, Organizing Classes and Interfaces in Packages, Package as Access Protection, Defining Package, CLASSPATH Setting for Packages, Naming Convention For Packages.
IV	Exception, Exceptions & Errors, Types of Exception, Control Flow in Exceptions, JVM reaction to Exceptions, Use of try, catch, finally, throw, throws in Exception Handling. In-built and User Defined Exceptions, Checked and Un-Checked Exceptions. Threads, Need of Multi-Threaded Programming, Thread Life-Cycle, Thread Priorities, Synchronizing Threads, Inter Communication of Threads, Input/output Operation in Java (java.io Package), Streams, Classes for Input and Output, Standard Streams.
V	AWT Classes, Window fundamentals, frame windows, Applets, Execution of applet with different methods, frame window in applet, parameter passing in applet, Graphics class, use of color, fonts and text. Event Handling Mechanisms, Delegation Event Model, Event Class, Event Listener Interfaces, Adapter Classes. JDBC – Basic steps to JDBC, setting up a connection to database, Creating and executing SQL statements, Resultset and Resultset MetaData Object.

Suggested Readings

- Herbert Schildt: JAVA 2 - The Complete Reference, Fifth Edition TMH, Delhi.
- Database Programming With JDBC And Java by George Reese.

MCA213: Microprocessor and Applications	
Unit	
I	Evolution of microprocessors, Microprocessor based system, microcontroller architecture, MCS-51 family. General architecture of 8051 family. Pins of 8051 microcontroller
II	8051 assembly language programming: Register & memory organization. Introduction to 8051 assembly language, directives, registers and stack. Addressing modes of 8051. I/O ports and SFR
III	8051 Instructions: Data transfer, Arithmetic, logic, branching, subroutines, stack & Boolean variables manipulation. Advanced instruction of 8051
IV	Programming in 8051: basic I/O programming, timer, counter programming. Serial communication programming. Interrupt programming. Time delays and loops.
V	Interfacing 8051: LED, LCD, keyboard interfacing. ADC/DAC interfacing. Sensor Interfacing. Stepper/Servo/DC motor interfacing and driver circuits.

Suggested Readings

- 8051 Microcontroller internals, instructions, programming and interfacing.
- Subrata Ghosal, Pearson Publications.
- The 8051 Microcontroller and Embedded Systems using assembly and C II Ed. Mazidi Muhammad Ali et. Al.PHI

Unit	MCA214: Computer Networks & Data Communications
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I	Introduction to Communication, Introduction to Networking. Basic Modes of Communication. DTE-DCE communication system. Connecting Devices: Repeater, Hubs, Switch, Bridge, Routers and Gateways. Network architecture, ISO-OSI architecture, IBM SNA architecture, their functions and implementations.
II	Signal conversion methods. A/D, D/A, A/A and D/D. Unipolar, Polar and Bipolar methods of signal representation. Multichannel Data Communication, TDM, FDM and WDM. Introduction to Network Topologies. Introduction to Ethernet and Cabling standards.
III	Error detecting and correcting code, Hamming code, parity generation and detection, single error detection and correction, single error correction code. Transmission media, twisted pair, coaxial cable, optical fiber. LAN topologies: bus, ring, and star etc. LAN access techniques: ALOHA, CSMA, CSMA/CD, token-ring and token-bus.
IV	Introduction to Network Security. Model of Network Security. Ceaser Cipher, Transposition Cipher. DES. Issues related to Network reliability and security. SSL and VPN. Introduction to Firewalls. Introduction to TCP/IP protocol Family, IPV4 and IPV6 representation of addresses. Routing Algorithms; Distance Vector Routing, Link State Routing. Cyber Laws in India.
V	Flow Control Protocols, Stop-and-wait Flow Control, Sliding – Window Flow Control, Error Control, Stop-and-wait ARQ, Go-back-N, Selective-repeat, Introduction to Switching Theory; Circuit, Packet and Network Switching.

Suggested Readings

- Stalling, Data & Computer Communication.
- Tanenbaum, Computer Network, Pearson.Ed., Pearson.
- Kurose, Computer Networking, Pearson.
- Youlu Zheng, Shakil Akhtar, Networks for Computer Scientists and Engineers, Oxford Press.

Unit	MCA215: Discrete Mathematical Structures
I	Introduction to Discrete Mathematical Structures, Formal Methods: Induction and Analogy, Abstraction. Sets, sequences, empty set, power set, operations on sets, Venn diagram, ordered pair, principle of inclusion and exclusion. Counting and Combinatorics.
II	Introduction to mathematical logic, statements and notations, well-formed formulas, tautologies, tautological implications, normal forms, the theory of Inference for statement calculus, predicate logic. Graph Terminology, Degrees of Nodes, Isomorphic Graphs, Dijkstra's Shortest Path Algorithm, Planar Graphs, Eulerian Graphs, Hamiltonian Graphs, Traveling Salesman Problem.
III	Trees, Introduction, Rooted and Other Trees, Representation of Prefix Codes, representation of Arithmetic Expression, Representation of Prefix Codes, Spanning Trees, Traversing Binary Trees, Binary Search Trees.
IV	Relations, matrix and graph representation of relation, properties of relations,

	partitions. Equivalence Relations, Compatibility Relations, Composition of Binary Relations, Transitive and symmetric closures, partially ordered set, lattices. Recurrence relations.
V	Functions, Matrix representation of functions, composition of function, inverse function. Algebraic Structures, General properties of algebraic systems, groupoids, semigroup, monoids, group, rings. Applications of algebra to control structure of a program. Homomorphism, congruences, admissible partitions. Groups and their graphs.

Suggested Readings

- Management & Organization- Louis A. Allen, McGraw Hill, publications
- Management & Organization- C.B. Gupta, Sultan Chand Publications
- Management: A Global Perspective, Koontz & Weirich, McGraw Hill publications
- Management- Koontz & O' Donnel, Tata McGraw Hill publications
- Essentials of Management- Massie, Prentice Hall publications

MCA221: .NET Lab	
Practical Exercises	
Exercises based on Events such as Click, Index changed etc., Controls like button, textbox, checkbox, etc., on Control structures like for..next, while etc., Assignment on Numeric Parsing and System, functions and subroutines, Use of File, FileInfo, Directory and DirectoryInfo classes, Use of Multithreading and Exception Handling, Creation of DataBases and insert update select and delete	

MCA222: Programming In Java Lab	
Practical Exercises	
Exercises based on Command line argument, Control structures, Class Fundamentals, Object & Object reference, Constructor, Abstract Class, Interfaces, Methods, Argument Passing Mechanism, Method Overloading, Recursion, Static Members, Finalize() Method, this keyword, Array, Inheritance, Overriding Super Class Methods, use of super keyword, Polymorphism in inheritance, Package as Access Protection, CLASSPATH Setting for Packages, Exceptions & Errors, Threads, Thread Priorities, AWT Classes, Window fundamentals, frame windows, Applets, parameter passing in applet, Graphics class, use of color, fonts and text. JDBC – setting up a connection to database, Creating and executing SQL statements, Resultset and Resultset MetaData Object.	

MCA223: Microprocessor Lab

Practical Exercises

Exercises based on I/O examples of 8051: switch and relays, Interrupt handling examples, Driving a stepper motor, LCD display programming, Serial communication: polled and interrupt based, Sensor interfacing.
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MCA224: Soft Skills And Report Writing Lab

Practical Exercises

Essentials of Grammar: Parts of Speech, Tenses, Modals, Phonetics
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Letter and Resume writing: Types of Letters Formal / Informal, Drafting the Applications, Preparation of the Resume, Do and Don'ts of Resume

Presentation Skills: Importance of Presentation Skills.
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Guidelines to make Presentation Interesting, Body Language, Voice Modulation, Audience Awareness, Presentation Plan, Visual Aids, Styles of Presentation.

Group Discussion – Definition, Process Guidelines, Helpful Expressions, Evaluation.
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Interview Preparation: Types of Interview, Preparing for the interviews, attending the Interview. Interview Process, General Etiquettes, Dressing Sense, Postures and Gestures.
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