

Master of Computer Application (MCA)

Programme Structure and Detailed Curriculum / Syllabus

Programme Structure

Sub Code	Subject Name	Credit	
		Theory	Practical
Semester – I			
MCA-101	Programming Concepts and Data Structure	4	
MCA-102	Relational Database Management System	4	
MCA-103	Internet and Web Designing	4	
MCA-104	Fundamental of Operating System	4	
MCA-105	Software Engineering	4	
MCA-106	Practical based on MCA-101, MCA-102 and MCA-103		4
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Semester – II			
MCA-201	Object Oriented Concepts and Programming	4	
MCA-202	Web Application Development – LAMP	4	
MCA-203	Object Oriented Analysis and Design using UML	4	
MCA-204	Fundamental of Computer Networking	4	
MCA-205	Cloud Infrastructure and Services	4	
MCA-206	Practical based on MCA-201, MCA-202		2
		22	
Semester – III			
MCA-301	Web Development Tools	4	
MCA-302	Mobile Application Development	4	
MCA-303	Object Oriented Technology	4	
MCA-304	Cyber Security	4	--
MCA-305	Practical based on MCA-301, MCA-202, MCA-303		4
		20	
Semester – IV			
MCA-401	Internship cum Software Development Project	--	12

Course Wise Detailed Syllabus

Course Name: Programming Concepts and Data Structure

Course Code: MCA-101

Unit	Detail syllabus
Unit-1	Introduction to Programming and C Language
	<ul style="list-style-type: none"> ❖ What is programming? , Problem solving methods with examples (Algorithm, Flowchart), Types of Programming languages, Characteristics of higher level language, Some Programming languages. ❖ Overview of C, Console IO Operations (Printf, Scanf). ❖ Variables and Data Types, Operators and Expressions. ❖ Decision Making with Branching and Looping: Exploring Different Types of Statements in C, Working with Conditional Statements, Working with Iterative Statements, Working with ❖ Jump Statements.
Unit-2	C Programming Concepts
	<ul style="list-style-type: none"> ❖ Working with Function: An introduced to functions (user- defined and standard library functions), what is a Function, Benefits of a Function, How does Function Works, Scope and Lifetime of Variables in function, Recursion. ❖ Working with Arrays and String: Introducing Arrays, Types of Arrays, Limitations of Arrays, Understanding Strings in C, Declaring and Initializing a String, Reading and Printing Strings, String Input and Output Functions, Single Character Input-Output Functions, Creating an Array of Strings, Performing String Operations, Using String Manipulation Functions. ❖ C Derived Data Types (Structures and Unions): Understanding utility of structures and unions, Declaring, initializing and using simple structures and unions, manipulating individual members of structures and unions. ❖ C Pointers.
Unit-3	Introduction to Data Structures
	<ul style="list-style-type: none"> ❖ Introduction to Data Structure, Primitive and Compound Data Types, Linear and Non Linear Data Structure, Arrays, Storage Structure for Arrays, Pointers. ❖ Stack: Stack Implementation, Applications of Stacks. ❖ Queues: Introduction of Queue, Single, Double and Circular Queue, Simulation, Priority Queues. ❖ Link List: Linked Allocation, Linked Linear Lists, Circularly ❖ Linked Linear Lists, and Doubly Linked Linear Lists, Applications of Linked Linear Lists.
Unit-4	Sorting & Searching , Nonlinear Data Structure
	<ul style="list-style-type: none"> ❖ Sorting: Introduction, Selection Sort, Bubble Sort, Merge Sort, Heap Sort, Quick Sort and Radix Sort. ❖ Searching: Sequential Searching, Binary Searching. ❖ Nonlinear Data Structure: Trees , Operations on Binary Trees , Storage Representation & Manipulation of Binary Trees, Conversion of General Tree to Binary Trees , Sequential & Other Representation of Trees, Application of Trees. ❖ Graph : Implementation of Graph, DFS & BFS

Course Name: Relational Database Management System

Course Code: MCA-102

Unit	Detail syllabus
Unit-1	Fundamental of Database management system
	<ul style="list-style-type: none"> ❖ Basic Concepts: data, database, database systems, Database management system: Introduction, Purpose and advantages of Database management system (over file systems). ❖ Architecture of DBMS: A rchitecture of DBMS, Various components of DBMS. ❖ Data models: Introduction, Data modeling and mapping. ❖ Tables (relations), rows (tuples), domains, columns (attributes), Database design process, Anomalies in a database.
Unit-2	Relational data model and Introduction to ORACLE Server
	<ul style="list-style-type: none"> ❖ Functional Dependencies (Lossless decomposition, Dependency preservice, Closure set of FD, CanonicalCover, Lossless Joins), Finding Candidate keys using Armstrong rules. ❖ Stages of Normalization: 1NF, 2NF, 3NF, BCNF (with general definition also) ❖ Multi valued Dependency: 4NF & 5NF (Project Join NF), Translation of E-R schemes. ❖ ORACLE Server & Instances, Database Structure & SpaceManagement, Memory & Process Structure, Schemas & Schema Objects, Client Server Architecture – Distributed Database Processing, Database Backup & Recovery, ORACLE Utility – Import, Export.
Unit-3	ORACLE Server & SQL
	<ul style="list-style-type: none"> ❖ Basic Data Types of ORACLE, Data Definition Language (DDL), Data Manipulation Language (DML), Transaction Processing Language (TPL), Data Constraints, Inbuilt Functions, queries, Sub queries, Join, Indexes, Views, Sequences, and Synonyms. ❖ ORACLE Database Object : Stored Procedures & Functions, ❖ Packages, Triggers, Users – Create & Delete User, Grant & Revoke Command. ❖ ORACLE Database Privileges & Roles: Privileges – System & Object Privileges, Assigning, Viewing, Revoking System & Object Privileges Roles – Create, Grant, View & Delete the Roles.
Unit-4	Introduction to PL/SQL
	<ul style="list-style-type: none"> ❖ Introduction, Advantages of PL/SQL and Generic PL/SQLBlock. ❖ Cursor: Implicit & Explicit Cursor, Cursor For Loop, Parameterized Cursor. ❖ Locking Strategy: Implicit & Explicit Locking, Lock Table. ❖ Exception Handling: Predefine exceptions, Users define exceptions, Handling Raised exceptions.

Course Name: Internet and Web Designing

Course Code: MCA-103

Unit	Detail syllabus
Unit-1	Fundamental of Internet, Intranet & Extranet
	<ul style="list-style-type: none">❖ Internet: Introduction to Internet, Intranet, Extranet, Connections of the Internet, Concept of Network, Different types of Network, Different Types of Network Topologies.❖ Internet Terminology: WWW, IP Addressing and Domain Name System, Working of Web Browser and Web Server, Web Hosting, Virtual Host, Multi Homing, Distributed Web Server Overview, Document Root, Internet Service Provider and their Services, Cookies, Static Web Sites and Dynamic Web sites.❖ Web server and Protocols: Apache, IIS, HTTP, POP3, IMAP and Mail clients, News Groups.❖ Recent Internet Technology Applications: E-mail, E-Commerce: B2B, B2C, E-Learning, E-Banking, E- Governance, Social networking, Chatting and Instant Messenger, Audio and Video Conference.
Unit-2	Developing Web Pages Using HTML
	<ul style="list-style-type: none">❖ Introduction of HTML, HTML Tags, Heading, linking, Images, Special character and Horizontal Rules, Lists, Internal Linking, Meta Elements.❖ Designing HTML Tables in HTML.❖ Designing HTML Forms in HTML.❖ Designing Webpage layout in HTML.
Unit-3	Cascading Style Sheet
	<ul style="list-style-type: none">❖ Introduction to CSS, Features of CSS, CSS Selectors.❖ Attributes of CSS: Font attributes, Color And Background attributes, Text attributes, Border attributes, Margin attributes, Padding attributes, Font attributes, List attributes, Table attributes, Float attributes:❖ Effects in CSS: Pseudo-elements, Layers Effect, Dropdown effect.❖ Other effects in CSS: Image Opacity, Rounded Corners, Shadows, Transitions, Animation, 2D / 3D transforms.
Unit-4	Introduction to Java Script
	<ul style="list-style-type: none">❖ Introduction to JavaScript, Writing JavaScript into HTML, Data Types and Literal, Type Casting, Creating Variable, Incorporating Variables in a JavaScript, JavaScript Array, Operators and Expressions in JavaScript, Special Operators, Constructor, Condition Checking, Endless Loop.❖ Functions and Dialog: Functions in JavaScript, User Define Function, Dialog Boxes, The JavaScript Document Object Model, Built in objects in JavaScript, Form used By a website, Cookies.❖ Events, Method and Properties of JavaScript: Events of JavaScript, Windows object Properties and methods, Document object Properties and methods, Form object Properties and methods, Form Control object Properties and method, Image object Properties, Frames object Properties and methods.❖ Built in Function: String built in functions, Date Built in functions, Mathematical Built in functions.

Reference Books

- (1) HTML, Java Script, DHTML and PHP, BPB Publication, New Delhiby Ivan Bayross,
- (2) The Internet, PHI, Second Edition, May 2000 Douglas E Comer.
- (3) "HTML and CSS: The complete Reference" by Thomas A. Powell,Fifth edition, McGraw Hill Publication.
- (4) "The Internet Complete Reference" by Harley Hahn, Second Edition,Tata- McGraw Hill Publication.
- (5) Web Technology Theory and Practice by M.Srinivasan, PearsonPublication.
- (6) World Wide Web Design with HTML, Tata McGraw Hill Publication,2000 by Xavier C.
- (7) Web Technologies by Uttam K. Roy, Oxford Higher educationpublication.
- (8) "JavaScript Bible" by Danny Goodman, Michael Morrison, Paul Novitskiand Tia GustaffRayl, Seventh Edition, Wiley Publishing.
- (9) "Sams Teach Yourself JavaScript in 24 hours" by Michael Moncur, Fourth edition, Pearson education India.

Course Name: Fundamental of Operating System

Course Code: MCA-104

Unit	Detail syllabus
Unit-1	Introduction of OS and Process Management
	<ul style="list-style-type: none"> ❖ What is OS, Processor Register, Instruction execution, Interrupts, Memory hierarchy, Cache, I/O Communication General categories of OS – Desktop system, Multiprocessor systems, Distributed systems, clustered systems, Real time systems, Handheld systems. ❖ Process concepts: States of process, Scheduling, Scheduling Criteria, Scheduling Algorithms. ❖ Threads: User & Kernel Threads, Single & Multi-Threaded, Processes, Multi-Threading Models. ❖ System Deadlocks and Starvation: Criteria for deadlock arise, Deadlock, prevention, Deadlock Avoidance – Banker’s Algorithm, Detection and recovery, Starvation.
Unit-2	Memory and File Management
	<ul style="list-style-type: none"> ❖ Memory Concepts: Logical and physical address, Swapping, Contiguous Memory, Allocation, ❖ Paging and Segmentation: Paging, Segmentation, Segmentation with paging, ❖ Virtual memory: Demand Paging, Page replacement algorithms. ❖ File Concept: Access Methods, Directory Structure, File System Structure, Allocation methods, free space management, Directory implementation, Redirecting input and output, Concept of Piping.
Unit-3	Introduction to Linux/Unix
	<ul style="list-style-type: none"> ❖ Log in; log out, basic shell commands, Files and directories, users and groups, Permissions. ❖ Moving around, Looking at the contents of directories, Creating new directories, Copying files, Moving files, Deleting files and directories, Looking at files, Getting online help. ❖ General purpose utilities: clear: Clear the Screen, script: Record your session. ❖ General purpose utilities on file: chmod: Changing file permission, chown and chgrp: changing file ownership, find: Search for files, head: Displaying Beginning of a File, tail: Displaying Ending of a File, WC: Word Count, touch: Updating a File's Time and Date, who: Login Details.
Unit-4	Process, file management & Shell programming in Linux/Unix
	<ul style="list-style-type: none"> ❖ PS: Process Status, Background and Foreground Processes, nice: Job Execution with Low Priority, kill: Premature Termination of Process, at: Execute on Specified Time, batch: Execute Later, cron: Running Jobs Periodically, crontab: Manipulate the crontab for a User, wait: Waiting for Process to Complete, sleep: Process to Sleep ❖ Finding Patterns : Regular Expressions, grep: Searching for Pattern, egrep: Extended grep, fgrep: Multiple String Searching, Working with Columns and Fields, cut: Splitting File Vertically, pest: pasting File, join: Joining Data, Tools for Sorting, sort: Ordering Data, uniq: Locating Repeated Lines, Comparing files, cmp: Comparing Two Files, comm: Finding What is Common, diff: Converting One File to Other, Changing information in Files, tr: Translating Characters, sed: stream editor, Examining File contents, od: Displaying Data in Octal, mount: Mounting File System, Unmounting File System

Course Name: Software Engineering

Course Code: MCA-105

Unit	Detail syllabus
Unit-1	Introduction
	<ul style="list-style-type: none"> ❖ Software and role of software, types (nature) of software, Software Engineering-A Layered Technology, Process Framework, Capability Maturing Model Integration (CMMI). ❖ Process Model: Waterfall Model, Incremental Process Model, RAD Model. ❖ Evolutionary Process Models: Prototyping, Spiral Model, Concurrent Development Model, Specialized Process Model – Component-Based Development. ❖ Agile Process, Agile Process Model – Extreme Programming, Adaptive Software Development, Dynamic Systems Development Method, Scrum, Crystal, Feature Driven ❖ Development, Agile Modeling.
Unit-2	Software Measurement & Quality Assurance
	<ul style="list-style-type: none"> ❖ Software Measurement. ❖ Quality Concepts, the Quality Movement, Software Quality Assurance, Software Reviews, Formal Technical Review, Formal Approaches to SQA, Statistical Quality Assurance, Software Reliability, the Sqa Plan. ❖ The ISO 9000 Quality Standards, The ISO Approach To Quality Assurance Systems. ❖ Technical Metrics For Software: Metrics For The Analysis Model, Metrics For The Design Model, Metrics For Source Code, ❖ Testing, Maintenance.
Unit-3	Software Requirement and Analysis Model
	<ul style="list-style-type: none"> ❖ Requirement Engineering Tasks, Requirements Engineering Process. ❖ Eliciting Requirements and Elaborating Requirements, Negotiating Requirements, Validating Requirements. ❖ Requirements Analysis, Elements of Analysis Model, Object Oriented Analysis. ❖ Data Modeling Concepts, Scenario Based Modeling, Flow-Oriented Modeling; Class Based Modeling, Behavioral Model.
Unit-4	Software Designing and testing
	<ul style="list-style-type: none"> ❖ Design Concepts, Design Model, Pattern Based Software Design, Designing Class-Based Component, Conducting Component Level Design. ❖ Test Strategies: Test Strategies for Conventional Software, Test Strategies for object Oriented Software. ❖ System Testing: Unit Testing, Integration Testing, Validation Testing, System Testing, Debugging ❖ Software Testing Methods: Black Box Testing, White Box Testing, Control Structure Testing.

Course Name: Object Oriented Concepts and Programming

Course Code: MCA-201

Unit	Detail syllabus
Unit-1	Basics of classes, objects and method in Java
	<ul style="list-style-type: none">❖ Java Environment, Java Features and support, Sample program & Compilation, Using block of code, Lexical Issues (White space, identifiers, Literals, Comments, Separators, Keyword), Java Class Library, Data type, Operators, Control structures, Arrays and String Class.❖ class, object & method, Defining class, adding variables, adding methods, creating objects, Constructor, this key word, garbage collection, finalize() method, Accessing class members, methods overloading, static members, nesting of methods, Vectors & wrapper classes, Implementation of O.O.P concept in java.❖ Inheritance, Subclasses, subclass constructor, multiple inheritance, hierarchical inheritance, overriding methods, Abstract Class, Final variables and methods, final classes, Method Using final to Prevent Overriding & overloading, finalize methods, The Object Class.❖ Visibility control – public access, friendly access, protected access, private protected access, rules of thumb, Method Overloading, Object as parameters, Argument Passing, Returning Objects, recursion, Access control, static, final, Nested & Inner Classes, String class, Command-Line arguments.
Unit-2	Packages, Interfaces and Exception Handling
	<ul style="list-style-type: none">❖ Defining package, understanding CLASSPATH, Access protection, Importing Packages.❖ Defining Interfaces in JAVA.❖ Exception Types, Uncaught Exceptions, Multiple catch Clauses, Nested try Statements, Throw, Throws, Finally, Java's Built-in Exceptions.❖ Creating Your Own Exception Subclasses.
Unit-3	Multithreaded programming
	<ul style="list-style-type: none">❖ Creating threads, run() method, new thread, thread class, stopping & blocking threads.❖ Life cycle of thread – newborn, runnable, running, blocked, dead, waiting, sleeping, suspended, blocked, Using thread methods.❖ Thread exceptions, thread priority, synchronization.❖ Implementing the 'Runnable' interface.
Unit-4	Applet and Event Handling
	<ul style="list-style-type: none">❖ What is an Applet, Applet Lifecycle, Applet class, Applet Context class, passing parameters to applet, Use of java.awt.Graphics class and its various methods in an applet, Event Delegation Model or Event Class Hierarchy, All classes and interfaces of Event Delegation Model, Programmes related to event handling covering all types of events.❖ Graphics: Layout managers (Flow Layout, Border Layout, Card Layout, Grid Bag Layout, Grid Layout).❖ AWT controls (Labels, buttons, canvases, checkboxes, check box group, choices, text fields, text areas, lists, scrollbars, panels, windows, frames, menus, menu bars).❖ I/O files in java : Concept of streams, Difference between Character Streams and Byte Streams, Character Streams (Reader, Writer, Buffered Reader, Input Stream

	Reader, File Reader, Buffered Writer, Output Stream Reader, File Writer, Print Writer), Byte Streams (Input Stream, File Input Stream, Filter Input Stream, Buffered Input Stream, Data Input Stream, Output Stream, File Output Stream, Filter Output Stream, Buffered Output Stream, Data Output Stream, Print Stream), Other Classes (Random Access File, Stream Tokenizer, File)
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Course Name: Web Application Development – LAMP

Course Code: MCA-202

Unit	Detail syllabus
Unit-1	Open Source & Linux Administration
	<ul style="list-style-type: none">❖ Overview of open source software, Open source products, Development philosophy, Pros and cons.❖ Comparison between Open source, closed source, free software, and source-available.❖ Open Source Development tools.❖ Configuring the bash shell, Finding and processing files,❖ Managing users, groups and permissions, Investigating and managing processes, Essential system administration tools.
Unit-2	Database Management Using MySQL
	<ul style="list-style-type: none">❖ Getting started with MySQL, Installing MySQL on Linux configuring your system, Creating databases, tables, and indexes, Inserting, deleting, and updating data.❖ Querying MySQL, Working with advanced queries.❖ Understanding the different join types using MySQL.❖ Built-in functions with SELECT.
Unit-3	PHP Programming
	<ul style="list-style-type: none">❖ Getting started with PHP, Working with variables in PHP, Working with constants in PHP, Working with simple expressions and operators in PHP❖ Using control and looping statements, working with advance program flow statement.❖ Working with functions.❖ Working with arrays, Storing data in arrays using PHP, Manipulating arrays.
Unit-4	Processing Web Forms and Handling Database in PHP
	<ul style="list-style-type: none">❖ Working with forms in PHP, Validating input data, using magic quotes, saving form data: Saving form data using cookies, saving form data using sessions.❖ File and directory access in PHP, PHP file handling, PHP directory handling.❖ Working and formatting with strings, Investigating and manipulating strings, Handling Databases: Working with the DBA functions, Database integration—SQL.

Course Name: Object Oriented Analysis and Design using UML

Course Code: MCA-203

Unit	Detail syllabus
Unit-1	Introduction to Object Oriented Analysis
	<ul style="list-style-type: none">❖ Domain Analysis, Generic components of the OO Analysis Model, The OOA Process.❖ Models: The Object-Relationship Model, Object-Behavior Model.❖ Object Oriented Design: Design for Object Oriented Systems, System Design Process, Object Design Process.❖ Design Patterns.
Unit-2	Introduction to Web Engineering
	<ul style="list-style-type: none">❖ Introduction to Web Engineering, Web Engineering team.❖ Analysis for Web Application: Requirements Analysis for Web Apps, The Analysis Model for Web Apps, The content Model, The Interaction Model, The Functional Model, The Configuration Model, Relationship-Navigation Analysis.❖ Design for Web Application: Introduction, Design Issues for Web Engineering, Web E-Design Pyramid.❖ Web Design: Web App Interface Design, Aesthetic Design, Content Design, Architecture Design, Navigation Design, Component level Design, Hypermedia Design Patterns, Object- Oriented Hypermedia Design Method.
Unit-3	Introduction to UML & Diagrams
	<ul style="list-style-type: none">❖ Introduction to UML, Classes, Advanced Classes, Relationships, Advanced Relationships.❖ UML Interfaces, types, Roles, Packages.❖ Class Diagram.❖ Use Case Diagram.
Unit-4	UML Interaction Diagram
	<ul style="list-style-type: none">❖ Sequence Diagram & Collaboration Diagram, Forward and Reverse Engineering.❖ Activity Diagram, State Chart Diagram, Patterns and Frameworks.❖ Component Diagram.❖ Deployment Diagram.

Course Name: Fundamental of Computer Networking

Course Code: MCA-204

Unit	Detail syllabus
Unit-1	Introduction of Computer Network
	<ul style="list-style-type: none">❖ Introduction to Networking, Components of Networking, Different Computing Models of Network, Centralized, Distributed, Collaborative, Networking Configuration Client/Server Based, Peer To Peer Networking, Local and Wide Area Network.❖ Intranets and Internets Network Services, FileServices, File Transfer Services, Printing Services, Application Services.❖ Fundamentals of communication theory, Analog and Digital Signal, Periodic aperiodic signal, Peak Amplitude, bit rate, frequency, Decibel, bit Interval, Transmission Impairment, Attenuation, Distortion, Noise, thermal, Induced, cross talk, Impulse Noise❖ Throughput, Propagation Speed, waveforms, bandwidth.
Unit-2	Networking Standards
	<ul style="list-style-type: none">❖ Introduction to Standards, Standard Organization and the OSI rules and the Communication Process.❖ The OSI reference Model, How Peer OSI Layer Communicates, Protocol Stacks.❖ Conceptualizing the layers of the OSI Model, OSI physical layer, OSI Data Link Layer, Concepts of OSI Network Layer, Transport Layer, Session Layer, Presentation Layer, Application Layer.❖ IEEE802 family standard.
Unit-3	Transmission Media & TCP/IP
	<ul style="list-style-type: none">❖ Introduction to Transmission Media, Characteristics, Cost, Installation, Requirements, Bandwidth Band Usage, Attenuation and Electromagnetic Interference.❖ Cable Media Coaxial Cable, Twisted-Pair Cable, Fiber Optic Cable, Summary of Cable.❖ Wireless Media, Reason for wireless Network, Wireless Communication with LANs, Comparison of Different Wireless Media, Time Division Multiplexing (TDM), Time Division Multiple Access (TDMA).❖ TCP/IP: TCP/IP and internetworking, related protocols, ports and sockets, The IP address structure, IP datagram.
Unit-4	Connectivity Devices, Network Topologies and architectures
	<ul style="list-style-type: none">❖ Connectivity Devices: Introduction to Modems, Asynchronous Transmission, Synchronous Transmission, Network Adapter card, Repeaters Hubs Passive, Active, Intelligent, Bridges, Routers, Brouters, Gateways, Routing Algorithms, Distance Vector Routing, Link State Routing.❖ Network architectures: Introduction to Access Methods, Contention Polling, Token Passing, Comparing Contention and Token Passing, Demand Priority.❖ Topologies: Network Topologies, Bus Topologies, Ring Topologies and Star Topologies, Mesh Topology.❖ Switching & Routing In Networks: Message Switching, Packet switching when and when not to use packet switching, packet routing, and packet switching support to circuit switching.

Course Name: Cloud Infrastructure and Services

Course Code: MCA-205

Unit	Detail syllabus
Unit-1	Introduction to cloud computing
	<ul style="list-style-type: none"> ❖ Introduction, Cloud and other similar configuration. ❖ Cloud v/s Other Architecture: cloud computing versus peer to peer architecture, cloud computing versus client server architecture, cloud computing versus grid computing, server virtualization versus cloud computing. ❖ Cloud computing in a nutshell, system models for distributed and cloud computing, roots of cloud computing, layers and types of clouds, desired features of a cloud, basic principles of cloud computing, challenges and risks, service models. ❖ Cloud types and models – private cloud, components of private cloud, implementation phase of a private cloud, pro and cons of private cloud, public cloud and hybrid cloud.
Unit-2	Cloud computing services
	<ul style="list-style-type: none"> ❖ Infrastructure as a Service (IaaS), Platform as a Service (PaaS) ❖ Software as a Service (SaaS), Database as a Service (DaaS). ❖ Security as a Service. ❖ Specialized cloud services.
Unit-3	Application architecture for cloud and Cloud deployment techniques
	<ul style="list-style-type: none"> ❖ Introductions, Cloud application requirement, architecture for traditional versus cloud application, assumption for traditional and cloud applications. ❖ Recommendations & fundamental requirement for cloud application architecture, SOA for cloud applications, parallelization within cloud applications. ❖ Factors for a successful cloud implementation, cloud network topologies, automation for cloud deployment, self-service feature in a cloud deployment, federated cloud deployment, cloud performance- monitoring and tuning, impact of memory on cloud performance. ❖ Improving cloud database performance and cloud services brokerage.
Unit-4	Risks, Security in cloud, consequences and costs of cloud computing
	<ul style="list-style-type: none"> ❖ Risk in cloud computing, risk assessment and management, risk of vendor lock-in, loss of control, risk of resource scarcity / poor provisioning, risk in multi-tenant+ environment, risk of failure risk of malware and internet attacks, risk of management of cloud resource risk of network outages, risk of physical infrastructure legal risk, risk with software and application licensing. ❖ Data security in the cloud - data redundancy, data recovery, data backup data replication, data residency or location, data reliability, data fragmentation, data integration, data transformation, data migration, data confidentiality & encryption, key protection, data availability, data integrity, cloud data management interface, cloud storage gateways and its advantages, cloud firewall, virtual firewall. ❖ Application security in the cloud – Cloud application software lifecycle, application security in an IaaS, PaaS and SaaS environment and its protection. ❖ TCO for cloud computing, direct and indirect cloud cost, cost allocations in a cloud, chargeback models for allocation of direct and indirect cost, chargeback methodology, billable items, maintaining strategic flexibility in a cloud.

Course Name: Web Development Tools

Course Code: MCA-301

Unit	Detail syllabus
Unit-1	.NET architecture and Programming
	<ul style="list-style-type: none"> ❖ Components of the .NET Architecture MS .NET Runtime, Managed / Unmanaged Code, Intermediate Language, Common Type System, MS .NET Base Class Library (BCL), Assemblies, ❖ Metadata, and Modules, Just In Time Compilation, Garbage Collection. ❖ Introduction to C# .Net language, C# Program Console Application Development, Compiling and Executing, Defining a Class, Declaring the Main () Method, Organizing Libraries with Namespaces, Using the using Keyword, Adding Comments. ❖ C# Data Types, Value Types-Primitive Data Types, Reference Types.
Unit-2	C# Controls structure , Properties, Delegates & Exception Handling
	<ul style="list-style-type: none"> ❖ C# Control Structures -Using the if Statement, Using the if- else Statement, Using the switch case Statement, C# looping controls and jumping statements: Using the for Statement, Using the while Statement, Using the do while Statement, Using the break Statement, Using the continue Statement, Using the return Statement, Using the goto Statement. ❖ C# Properties – Using Properties- Get Accessor, Set Accessor. ❖ Delegates in C# - Single Cast, Multicast Delegates. ❖ Exception Handling in C# -Using the try Block, Using the catch Block, Using the finally Block, Using the throw Statement.
Unit-3	Inheritance, interface and generics
	<ul style="list-style-type: none"> ❖ Inheritance, in C#. ❖ Interfaces in C#. ❖ Structures in C# ❖ Operator Overloading in C#, Using Generics in C#.
Unit-4	Threading , file handling, C# controls
	<ul style="list-style-type: none"> ❖ Multithreading -Getting started with threads, managing thread lifetimes, destroying threads, scheduling threads, communicating data to a thread. ❖ File I/O with streams - Stream classes file stream, stream reader and stream writer, string readers and writers file system classes directory and directory info, file and file info, parsing paths. ❖ C# Windows form and Controls -General Controls with important properties, events and Methods (Label, text box, button, listbox, combo box, check box, radio button picture box, date time pickerprogress bar, timer. Status strip, user defined controls). ❖ Containers (Groupbox, panel, split container, tab control, tab layout panel, flow layout panel),Menu and Tools Bars, Menustrip, context menu strip, status strip, tool strip, Dialogs (Color dialog, folder browser dialog, font dialog, open file dialog, save file dialog).

Reference Books

Beginning C#, Wrox Publication.

Professional C#, Wrox Publication.

Course Name: Mobile Application Development

Course Code: MCA-302

Unit	Detail syllabus
Unit-1	Introduction to Mobile Computing
	<ul style="list-style-type: none">❖ Introduction to Mobile technology and generations, characteristics of GSM and CDMA.❖ Services and architecture of GSM AND Mobile Computing.❖ Characteristics & Application of mobile computing.❖ Security issue of Mobile Computing.
Unit-2	Introduction to Android
	<ul style="list-style-type: none">❖ Analyze Open source mobile technology, Basics of Application development.❖ Application Framework, SDK, Emulation.❖ Android Application structure.
Unit-3	Android Activities and GUI Design Concepts
	<ul style="list-style-type: none">❖ Android Activities lifecycle and UI Layout, Expressions, Manifest, other necessary UI concept, GUI Objects, Layout Design concepts.❖ Android Event driven Programming.❖ Android Exception handling.❖ Working with menu and dialog, Themes, Animation, Database operation.
Unit-4	Using common Android API
	<ul style="list-style-type: none">❖ Android Data and Storage API.❖ Network API.❖ Web API.❖ Telephony API.

Course Name: Object Oriented Technology

Course Code: MCA-303

Unit	Detail syllabus
Unit-1	Java Swings
	<ul style="list-style-type: none">❖ Fundamental of Swing & Key features of Swing, Components & Containers, Swing Packages & Applications, Painting Fundamentals.❖ Swing Components and Event handling: Working with JFrame, JApplet, JPanel, JTextField, JPasswordField, JButton, JCheckBox, JRadioButton, JList, JScrollPane, JComboBox, Event handling.❖ Swing Menu Component: JMenu, JMenuBar, JMenuItem, JPopupMenu.❖ Swing Tree and Table Component: JTree, JTable.
Unit-2	JDBC (Java Database Connectivity)
	<ul style="list-style-type: none">❖ Introduction of JDBC, JDBC Architecture, Data types in JDBC❖ Processing Queries in JDBC.❖ Exception Handling: Database Exception Handling❖ JDBC Drivers.
Unit-3	Java Network Programming
	<ul style="list-style-type: none">❖ Networking Basis – TCP/IP models, Network Addressing, Domain Name Services (DNS), Ports, Sockets, Simple Client Server Program using TCP, Simple Client Server Program using UDP.❖ RMI Architecture: Introduction to RMI Architecture (Stub and Skeleton), Object Serialization.❖ Implementing Remote class & Interfaces.❖ Client Server Program using RMI.
Unit-4	Servlets & JSP
	<ul style="list-style-type: none">❖ Introduction of Servlet, HTTP Servlet Basics, Type of Servlet and Life cycle, Retrieving Information into Servlet, Making session and cookies into Servlet, Servlet Methods(getWriter(), getInitParametor(), getInitParametorNames(), getServletContext(), getServletName(), getServletInfo(), limit(), forward(), service, getAttribute(), getAttributeNames()).❖ Servlet with JDBC.❖ Introduction JSP and JSP Basics, Directives (page, include, taglib), Scripting Elements (Declaration, scriptlets, expressing), Standard Action (JSP: useBean, JSP:getProperty, JSP:setProperty, JSP:param, JSP:include, JSP:Forward, JSP:plugin), Life cycle of JSP, JSP and Java Beans, JSP:session & cookies, Error Handling with JSP. JDBC with JSP.

Course Name: Cyber Security

Course Code: MCA-304

Unit	Detail syllabus
Unit-1	Introduction to Cyber Security
	<ul style="list-style-type: none">❖ Introduction, Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control and Cryptography.❖ Web attack: Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.❖ Network Vulnerabilities: Overview of vulnerability scanning, Open Port / Service Identification, Banner /Version Check, Traffic Probe, Vulnerability Probe, Vulnerability Examples, OpenVAS, Metasploit.❖ Networks Vulnerability Scanning (Ncat, Socat), Network❖ Sniffers and Injection tools.
Unit-2	Network Defense tools
	<ul style="list-style-type: none">❖ Firewalls and Packet Filters: Firewall Basics, Packet Filter Vs Firewall, How a Firewall Protects a Network, Packet Characteristic to Filter, Stateless Vs Stateful Firewalls, Network Address Translation (NAT) and Port Forwarding.❖ VPN: the basic of Virtual Private Networks.❖ Firewall: Introduction, Linux Firewall, Windows Firewall.❖ Snort: Introduction Detection System.
Unit-3	Web Application Tools
	<ul style="list-style-type: none">❖ Scanning for web vulnerabilities tools: Nikto, W3af,❖ HTTP utilities - Curl, OpenSSL and Stunnel.❖ Application Inspection tools – Zed Attack Proxy, Sqlmap, DVWA, Webgoat.❖ Password Cracking and Brute-Force Tools: John the Ripper,❖ LOhtcrack, Pwdump, HTC-Hydra.
Unit-4	Introduction to Cyber Crime, law and Investigation
	<ul style="list-style-type: none">❖ Cyber Crimes, Types of Cybercrime, Hacking, Attack vectors, Cyberspace and Criminal Behavior, Clarification of Terms, Traditional Problems Associated with Computer Crime, Introduction to Incident Response, Digital Forensics, Computer Language, Network Language, Realms of the Cyber world.❖ Internet crime and Act: A Brief History of the Internet, Recognizing and Defining Computer Crime, Contemporary Crimes, Computers as Targets, Contaminants and Destruction of Data, Indian IT ACT 2000.❖ Firewalls and Packet Filters, password Cracking, Keyloggers and Spyware, Virus and Worms, Trojan and backdoors, Steganography, DOS and DDOS attack, SQL injection, Buffer❖ Overflow, Attack on wireless Networks.

Course Name: Software Development Project

Course Code: MCA-401

1. Basic Information

Semester	Course Code	Course Name	CP	TYPE
IV	MCA-401	Software Development Project	8	PR

Project Guidelines

A. Project Guide Eligibility Criteria:

Full Time Faculties in the Department of Computer Science/ Information Technology of BAOU/ Colleges/ Institutions affiliated to any Indian University recognized by UGC and having minimum 2 years teaching experience.

OR

A person having minimum M. Tech, MCA, M.Sc. in ComputerScience/Information Technology from a UGC recognized universities with 4 years' experience in Industry/teaching.

B. Type of Project

Learner may choose any topics according to Master of Science - Information Technology standards.

Most of the project work falls under the following types

- a. Database oriented (e.g. payroll system, Loan management system etc.)
- b. Application oriented (e.g. Mobile apps development, web baseddevelopment)
- c. R & D project (e.g. Image processing, speech processing, data mining, networking etc.)

C. Project Proposal (Synopsis)

The project proposal or the synopsis is the frame work for carrying out the project. It should be prepared in consultation with Guide. The necessary parts of a project proposal are given in the following form:

- Title of the Project.
- Introduction and Objectives of the Project.
- Project Category (RDBMS/ Application/ R & D).
- Tools, Platform, Hardware and Software Requirement specifications.
- Whether the project is done for any Industry/Client? The Name and Address of the Industry or Client is to be mentioned.
- Methodology
- Expected output
- Conclusion

D. Application Areas & Related Tools

A list of selected area for developing the project work is given below:

Applications:

Financial/ Manufacturing/ Multimedia/ Computer Graphics/ Instructional Design/ Database Management System/ Internet/ Intranet/ Computer Networking-Communication Software/ E-Commerce/ TCP/IP Internals/Routing protocols/ Implementation of Switches & Routers/ Image processing,/ Mobile apps development etc..

Related Tools:

- **Front End / GUI Tools:** PhP, Scripting languages etc.
- **RDBMS/Back End:** Oracle, MYSQL, No SQL, DB2 etc.
- **Languages:** C, C++, Java, VC++, C#, Mat lab, Python, Scilab etc.
- **Internet Technologies :** DHTML, Java script, VB Script, HTML, Java, Active X, SWING, JSP,ASP, PHP, XML, Java Beans, Java Servlets, CSS, VB.Net, AWT, J2EE.
- **Networking Technologies:** ATM, Frame Relay, TCP/IP, SNMP, GSM, VoIP, PPP, IP-PSTN, SONET/SDH
- **Wireless Technologies:** Bluetooth, 3G, ISDN, EDGE
- **Operating Systems:** Windows/ DOS / UNIX / Linux /Android.

Software Project Report Guideline

The Project report should prepared in well-structured preferably typed in Latex. Depending on the type of project the report should be as follows:

Acknowledgement

Content with page number

Declaration Certificate

Certificate from Guide

Chapter-1: Introduction

- 1.1 Brief idea about the project
- 1.2 Objective of the project
- 1.3 Scope of the project
- 1.4 Existing system
- 1.5 Proposed System
- 1.6 Platform used (Hardware & Software)
- 1.7 Project location

Chapter-2: Requirement Analysis

- 2.1 Introduction
- 2.2 Tools used for Requirement gathering
- 2.3 Problem in Existing System
- 2.4 Conclusion

Chapter-3: Logical Design

- 3.1 Introduction
- 3.2 DFD (0th, 1st, 2nd level)
- 3.3 ER diagram
- 3.4 Use case diagram
- 3.5 Activity diagram
- 3.6 Conclusion

Chapter-4: Physical Design

- 4.1 Introduction
- 4.2 Database Design (Give your normalized database here)
- 4.3 Module design
- 4.4 Input/output design
- 4.5 Conclusion

Chapter-5: Implementation

- 5.1 Introduction
- 5.2 Process description (if any)
- 5.3 Output & Report
- 5.4 Conclusion

Chapter-6: Testing

- 6.1 Introduction
- 6.2 Types of testing performed
- 6.3 Conclusion

References Appendix (if any)

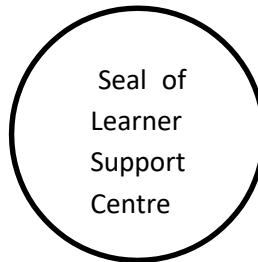
Certificate of Originality from the Guide

This is to certify that the project report entitled.....
..... submitted to **Dr. Babasaheb Ambedkar**
Open University in partial fulfillment of the requirement for the award of the degree of **Master of**
Computer Application is an original work carried out by Mr./ Ms.
..... Enrolment No.: under the supervision
of Mr./Mr./Ms.....

The matter embodied in this project is a genuine work done by the learner and has not been submitted either to this University or to any other University/Institute for the fulfillment of the requirement of any course of study.

Signature of the Learner
Name
Address
Enrolment No.:

Signature of the Guide
Name
Designation
Address



Format of the Software Project Report

A Project Report on Title of the Project

**In fulfillment of the requirement for the 4th Semester of
Master of Computer Application Programme**



Submitted by

.....
(Name of the Learner) Enrollment No.:
Session:

Under the Guidance of

.....
(Name of the Project Guide)

Learner Support Centre

.....
(Name of the Learner Support Centre)

.....
(Location)