

**OUTLINES OF TESTS,  
SYLLABI AND COURSES OF READINGS  
CHOICE-BASED CREDIT SYSTEM**

**FOR**

**MCA (MASTER OF COMPUTER APPLICATIONS)  
(SEMESTER SYSTEM)**

**Second Year (III<sup>rd</sup> & IV<sup>th</sup> Semester)**

**[Batch 2023-24 & 2024-25]**



**MATA GUJRI COLLEGE  
SRI FATEHGARH SAHIB-140406**

**MATA GUJRI COLLEGE**  
**SRI FATEHGARH SAHIB-140406**  
**(An Autonomous College)**  
**SYLLABUS, OUTLINES OF PAPERS AND TESTS**  
**CHOICE-BASED CREDIT SYSTEM**  
**M.C.A. (MASTER OF COMPUTER APPLICATIONS)**  
**SECOND YEAR-THIRD SEMESTER EXAMINATION**  
**Batch 2023-24 & 2024-25**  
**Semester- III**

CODE NO.	TITLE OF PAPER	Schedule of Teaching (Hours/Week)			Total Hours	Credits	Marks	
		L	T	P			Internal	External
MCA-231	Algorithm Analysis and Design	4	0	0	4	4	50	50
MCA-232	Object Oriented Software Engineering	4	0	0	4	4	50	50
MCA-233	Theory of Computation	4	0	0	4	4	50	50
<b>MCA-234</b>	<b>*Choice based Course-I</b>	4	0	0	4	4	50	50
<b>MCA-235</b>	<b>**Choice based Course-II</b>	4	0	0	4	4	50	50
MCA-236	Programming Lab -V (Based on Paper MCA-234)	0	0	4	4	2	60	40
MCA-237	Programming Lab -VI (Based on Paper MCA-235)	0	0	4	4	2	60	40
	Total	20	0	8	28	24	370	330

**\*Choice Based Course-I:** (Choose any one of the following subjects)

1.	MCA-234C1 Web Development using PHP	1.A	MCA-236C1 Programming Lab-V Based on MCA-234C1
2.	MCA-234C2 Web Development using NODE.JS	2.A	MCA-236C2 Programming Lab-V Based on MCA-234C2
3.	MCA-234C3 Web Development using Python	3.A	MCA-236C3 Programming Lab-V Based on MCA-234C3
4.	MCA-234C4 Web Development using ASP.NET	4.A	MCA-236C4 Programming Lab-V Based on MCA-234C4
5.	MCA-234C5 Mobile Application Development using Android	5.A	MCA-236C5 Programming Lab-V based on MCA-234C5
6.	MCA-234C6 Programming in Advance Java	6.A	MCA-236C6 Programming Lab-V based on MCA-234C6
7.	MCA-234C7 Mobile Application Development using iOS	7.A	MCA-236C7 Programming Lab-V based on MCA-234C7

**\*\*Choice based Course-II** (Choose any one of the following subjects)

1.	MCA-235C1 Artificial Intelligence and Machine Learning	1.B	MCA-237C1 Programming Lab-VI Based on MCA-235C1
2.	MCA-235C2 Big Data Analysis using HADOOP	2.B	MCA-237C2 Programming Lab-VI Based on MCA-235C2
3.	MCA-235C3 Data Science	3.B	MCA-237C3 Programming Lab-VI Based on MCA-235C3
4.	MCA-235C4 Cloud Computing	4.B	MCA-237C4 Programming Lab-VI Based on MCA-235C4

**CONTINUOUS ASSESSMENT (THEORY PAPERS)**

1.	Two tests will be conducted during a semester. Both the tests will be counted for assessment.	:	60% of the total marks allotted for continuous assessment.
2.	Assignment/Quizzes	:	20% of the total marks allotted for continuous assessment.
3.	Attendance	:	10% of the total marks allotted for continuous assessment.
4.	Class Participation and behaviour	:	10% of the total marks allotted for continuous assessment.

**CONTINUOUS ASSESSMENT (PRACTICAL LAB)**

1.	MCQ/Viva/Program Execution will be conducted during a semester.	:	60% of the total marks allotted for continuous assessment.
2.	Lab Assignments	:	30% of the total marks allotted for continuous assessment.
3.	Attendance	:	10% of the total marks allotted for continuous assessment.

## MCA-231: Algorithm Analysis and Design

**Maximum Marks: 100**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55**

### Course Objective:

The objective of the course is to analyze the asymptotic performance of algorithms and write rigorous correctness proofs for algorithms. Demonstrate a familiarity with major algorithms and data and apply important algorithmic design paradigms and methods of analysis.

### Course Outcomes:

CO1: Students will be able to choose appropriate advanced data structure for given problem and to calculate complexity.

CO2: Students will be able to apply the dynamic programming technique to solve the problems.

CO3: Students will be able to apply the greedy programming technique to solve the problems.

### A) Instructions for paper-setter

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

### B) Instructions for candidates

1. Candidates are required to attempt two questions each from unit I and II . Unit III is compulsory.
2. Use of scientific calculator is allowed.

## UNIT-I

**Introduction to algorithm analysis:** Introduction to algorithms, Random-access-machine model, concept of problem size, Asymptotic behaviour of time/space complexity, Estimation of time/space complexity, worst-case time/space complexity analysis.

**Recursion and Induction:** Recursive procedures, Induction proofs, proving correctness, Recurrence equations.

**Brute force algorithms:** Linear search, Bubble sort, Selection sort, Insertion Sort and their Performance Analysis

**Divide and conquer algorithms:** General Method, Quick sort, Merge Sort, Binary search and their Performance Analysis.

## UNIT-II

**Greedy algorithms:** General Method, Knapsack Problem, Minimum-cost Spanning Trees: Prim's algorithm, Kruskal's minimal spanning trees, Single source shortest path.

**Dynamic Programming:** General Method, All Pair Shortest Paths, Optimal Binary Search Trees.

**Back Tracking Algorithm:** n-Queen problem, Graph Coloring.

**Randomized Algorithms:** Description of Randomized algorithms, Repeated Elements in array, Primality Testing, Advantages and Disadvantages of using randomized algorithms.

**Nondeterministic Algorithms:** NP Hard and NP complete Problems, NP Hard Graph Problem(Travelling Salesman problem), NP Hard Scheduling Problems (Job Shop Scheduling).

### Text Book:

1. Ellis Horowitz, Sartaj Sahni ,Sanguthevar Rajasekaran : Fundamentals of Computer Algorithms, second edition, Universities Press.
2. Anany Levitin : The Design and Analysis of Algorithms, second edition, Pearson Education

### References:

1. Coreman, Leiserson&Rivest : Introduction to Algorithm, PHI Publication.
1. Aho ,Ullman. : Design & Analysis of Computer Algorithm, Pearson Education.
2. Infosys, Campus Connect, Analysis of Algorithms, Vol-3.

## Teaching Plan

<b>Week-I</b>	Introduction to algorithm analysis: Introduction to algorithms, Random-access-machine model, concept of problem size.
<b>Week-II</b>	Asymptotic behaviour of time/space complexity, Estimation of time/space complexity, worst-case time/space complexity analysis.
<b>Week-III</b>	Recursion and Induction: Recursive procedures, Induction proofs, proving correctness, Recurrence equations.
<b>Week-IV</b>	Brute force algorithms: Linear search, Bubble sort, Selection sort, Insertion Sort and their Performance Analysis
<b>Week-V</b>	Divide and conquer algorithms: General Method, Quick sort, Merge Sort, Binary search, and their Performance Analysis.
<b>Week-VI</b>	Greedy algorithms: General Method, Knapsack Problem, Minimum-cost Spanning Trees
<b>Week-VII</b>	Prim's algorithm, Kruskal's minimal spanning trees, Single source shortest path.
<b>Week-VIII</b>	Dynamic Programming: General Method, All Pair Shortest Paths, Optimal Binary Search Trees.
<b>Week-IX</b>	Back Tracking Algorithm: n-Queen problem, Graph Coloring.
<b>Week-X</b>	Randomized Algorithms: Description of Randomized algorithms, Repeated Elements in array, Primality Testing, Advantages and Disadvantages of using randomized algorithms.
<b>Week-XI</b>	Nondeterministic Algorithms: NP Hard and NP complete Problems, NP Hard Graph Problem (Travelling Salesman problem), NP Hard Scheduling Problems (Job Shop Scheduling).
<b>Week-XII</b>	Revision of Syllabus

## MCA-232 Object Oriented Software Engineering

**Maximum Marks: 100**

**Maximum Time: 3 Hrs.**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Lectures to be delivered: 45-55**

**Course Objectives:** To give students the detailed knowledge about Objects, Classes, types of modelling and detailed system design students will also come across the comparison of different methodologies.

**Course Outcomes:** At the end of this course, students will be able to do the following:

CO1: Understanding Objects and classes and concept of generalization and inheritance

CO2: Learning Dynamic modelling and various functional models

CO3: Understanding system design and Object design

CO4: Comparing various methodologies and their implementation

### A) Instructions for paper-setter

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

### B) Instructions for candidates

1. Candidates are required to attempt two questions each from unit I and II. Unit III is compulsory.
2. Use of scientific calculator is allowed.

### UNIT-I

**Introduction to Object:** Object Orientation, OO Development, OO Themes, OO Modelling History, Modelling as design technique. UML2.0 Graphical Notations.

**Class modelling:** Objects and classes, Links and Association, Generalization and inheritance, Grouping constructs, Aggregation, Abstract Classes, Generalization as extension and restriction, Multiple inheritance, Meta data, Candidate keys, Constraints. Derived data, Packages

**State modelling:** Events and states, Transitions and conditions, state diagrams state diagram behavior, State modelling: Events and states, Transitions and conditions, state diagrams state diagram behavior.

**Interaction modelling:** Use Case Model, Sequence model, Activity Model, Use case relationships, Procedural sequence model.

### UNIT-II

**Analysis and Design:** system development stages and life cycle, system conception

**Domain analysis:** Domain Class Model, Domain State Model, Domain Interaction Model, Iterating analysis

**Application analysis:** Application Interaction Model, Application Class Model, Application State Model

**System design:** Overview, estimating Performance, Making reuse plan, Breaking of system into Subsystem, Identifying Concurrency, Allocation of subsystem, Management of data storage, Handling global resources, Choosing a software control strategy, setting trade off priorities, Handling boundary condition, common architectural style.

**Class Design:** Overview, Bridging the gap, realizing use cases, Designing Algorithms Recursing downward, Refactoring, Design Optimization, Reification of Behavior, Adjustment of inheritance Organizing a class design, Implementation Modelling, Database design, Programming Style, Iterative development, Managing Models.

### **Text Books:**

1. Rambough, "Object Oriented Modeling and Design with UML2", Pearson Education, 2005
2. Timothy C. Lethbridge, "Object Oriented Software Engineering", Tata McGraw-Hill

### **References:**

1. BOOCH, "Object Oriented Analysis and Design", Addison Wesley
2. Pierre-Alain Muller, "Instant UML", Shroff Publishers, 2000
3. Booch, Rumbaugh, Jacobson, "The Unified Modeling Language User Guide", Addison Wesley, 1999

## **Teaching Plan**

<b>Week-I</b>	Introduction to Object: Object Orientation, OO Development, OO Themes, OO Modelling History, Modelling as design technique.UML2.0 Graphical Notations.
<b>Week-II</b>	Class modelling: Objects and classes, Links and Association, Generalization and inheritance, Grouping constructs.
<b>Week-III</b>	Aggregation, Abstract Classes, Generalization as extension and restriction, Multiple inheritance, Meta data, Candidate keys, Constraints. Derived data, Packages
<b>Week-IV</b>	State modelling: Events and states, Transitions and conditions, state diagrams state diagram behavior, State modelling: Events and states, Transitions and conditions, state diagrams state diagram behavior.
<b>Week-V</b>	Interaction modelling: Use Case Model, Sequence model, Activity Model, Use case relationships, Procedural sequence model.
<b>Week-VI</b>	Analysis and Design: system development stages and life cycle, system conception
<b>Week-VII</b>	Domain analysis: Domain Class Model, Domain State Model, Domain Interaction Model, Iterating analysis. Application analysis: Application Interaction Model, Application Class Model, Application State Model
<b>Week-VIII</b>	System design: Overview, estimating Performance, Making reuse plan, Breaking of system into Subsystem, Identifying Concurrency, Allocation of subsystem, Management of data storage
<b>Week-IX</b>	Handling global resources, Choosing a software control strategy, setting trade off priorities, Handling boundary condition, common architectural style.
<b>Week-X</b>	Class Design: Overview, Bridging the gap, realizing use cases, Designing Algorithms Recursing downward, Refactoring, Design Optimization, Reification of Behavior, Adjustment of inheritance Organizing a class design
<b>Week-XI</b>	Implementation Modelling, Database design, Programming Style, Iterative development, Managing Models.
<b>Week-XII</b>	Revision

## MCA-233 Theory Of Computation

**Maximum Marks: 100**

**Maximum Time: 3 Hrs.**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Lectures to be delivered: 45-55**

### Course Objectives:

To provide the basic knowledge to the students to understand the relationship between the automata and regular expressions and to make them aware of the role of context free grammar, simplification of grammar and parsing. Throughout this course, students will strengthen their rigorous mathematical reasoning skills.

**Course Outcomes:** At the end of this course, students will be able to do the following:

CO1: Students will demonstrate knowledge of basic mathematical models of computation and describe how they relate to formal languages.

CO2: Students will understand that there are limitations on what computers can do, and learn examples of unsolvable problems.

### A) Instructions for paper-setter

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

### B) Instructions for candidates

1. Candidates are required to attempt two questions each from unit I and II . Unit III is compulsory.
2. Use of scientific calculator is allowed.

### UNIT-I

**Theory of Automata:** Finite Automata, Deterministic finite Automata, Non deterministic finite Automata, Transition System, Equivalence of NFA and DFA, Finite Automata with Null-moves. 2-Way Finite Automata, Crossing sequences, Moore and Mealy Machine, Inter Conversion of Moore and Mealy Machine, Application of finite automata i.e. Lexical Analyzers, text editors.

Minimization of finite Automata, construction of minimum automation, Formal languages.

**Chomsky Hierarchy of Languages:** Recursive and recursively-enumerable languages sets, Language and their relation, Languages and automata.

**Regular Expression and Languages:** Regular expression, Equivalence of finite Automata and Regular expressions, Conversion between regular expressions and finite automata.

**Application of Regular Expressions:** Regular Expression in UNIX, Lexical analysis, Finding pattern in text.

### UNIT-II

**Regular Languages and Regular sets:** Pumping lemma for regular sets, Applications of pumping lemma. Closure properties of regular language.

**Context free Grammar and Languages :** Context free Grammars : Derivation Trees, Leftmost and rightmost derivations, Ambiguity, Parsing techniques, **Properties of Context free Languages-** Normal forms for context free grammars.

**Pushdown Automata: Pushdown Automata:** Deterministic Push down Automata; Equivalence of Push Down Automata and Context free grammar. Linear Bounded Automata (LBA): Power of LBA, Closure Properties.

**Turing Machine (TM):** Introduction, One Tape, Multi-tape, Representation of Turing Machines, Acceptability of input string in Turing Machines



**Text Books:**

1. J.E. Hopcroft, R. Motwani and J.D. Ullamn, "Introduction to Automata Theory, Languages and Computation", Pearson Education Asia, 2nd Edition.
2. K.L.P Mishra and N. Chandrasekaran, "Theory of Computer Science", Prentice-Hall of India Pvt.Ltd. 3<sup>rd</sup> Edition"

**References:**

1. Daniel I.A. Cohen, "Introduction to Computer Theory", Wiley, Second edition.
2. B. M. Moret, "The Theory of Computation", Pearson Education Asia.
3. H.R. Lewis and C.H. Papa dimitriou, "Elements of the theory of Computation", Pearson Education Asia 2nd Edition.

**Teaching Plan**

<b>Week-I</b>	Theory of Automata: Finite Automata, Deterministic finite Automata, Non deterministic finite Automata, Application of finite automata i.e. Lexical Analyzers, text editors.
<b>Week-II</b>	Transition System, Equivalence of NFA and DFA, Finite Automata with Null-moves.
<b>Week-III</b>	2-Way Finite Automata, Crossing sequences, Moore and Mealy Machine, Inter Conversion of Moore and Mealy Machine, Minimization of finite Automata, construction of minimum automation, Formal languages.
<b>Week-IV</b>	Minimization of finite Automata, construction of minimum automation, Formal languages.
<b>Week-V</b>	Chomsky Hierarchy of Languages: Recursive and recursively-enumerable languages sets, Language and their relation, Languages and automata.
<b>Week-VI</b>	Regular Languages and Regular sets: Pumping lemma for regular sets, Applications of pumping lemma. Closure properties of regular language.
<b>Week-VII</b>	Application of Regular Expressions: Regular Expression in UNIX, Lexical analysis, Finding pattern in text. Regular Languages and Regular sets: Pumping lemma for regular sets, Applications of pumping lemma. Closure properties of regular language.
<b>Week-VIII</b>	Context free Grammar and Languages: Context free Grammars : Derivation Trees, Leftmost and rightmost derivations, Ambiguity, Parsing techniques, Properties of Context free Languages- Normal forms for context free grammars.
<b>Week-IX</b>	Early's Properties of Context free Languages- Normal forms for context free grammars,
<b>Week-X</b>	Pushdown Automata: Pushdown Automata: Deterministic Push down Automata; Equivalence of Push Down Automata and Context free grammar. Linear Bounded Automata (LBA): Power of LBA, Closure Properties.
<b>Week-XI</b>	Turing Machine (TM): Introduction, One Tape, Multi-tape, Representation of Turing Machines, Acceptability of input string in Turing Machines
<b>Week-XII</b>	Revision of Syllabus

**MCA-234C1 Web Development using PHP****Maximum Marks: 100****Maximum Time: 3 Hrs.****Internal Assessment: 50****External Examination: 50****Minimum Pass Marks: 40%****Lectures to be delivered: 45-55****Course Objective:**

The objective of the course is to make the students able to create Web applications and web sites after completing this course. Students will learn to handle Relational database using queries embedded in PHP functions.

**Course Outcomes:**

CO1: Successful students will be able to build Dynamic web site using server side PHP Programming and Database connectivity.

CO2: Use web application development software tools i.e. Ajax, Wordpress in order to identify the environments currently available on the market to design web site.

**A) Instructions for paper-setter**

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

**B) Instructions for candidates**

1. Candidates are required to attempt two questions each from unit I and II . Unit III is compulsory.
2. Use of scientific calculator is allowed.

**UNIT-I**

Introduction to PHP for Web Development & Web Applications, History & Future Scope of PHP.

Installation of tools for working in PHP like XAMPP, LAMP, WAMP for PHP Apache & MySQL.

**Introduction to Language constructs :** Variables, constants, Data types, Comments

**Outputting Data to the Browser:** print(), echo(), printf(), print\_r()

**Programming basic constructs:** operators, decision taking statements: if, if .. else, elseif, switch. iterative statements: while, do .. while, for, foreach. Break and Continue statements.

**Arrays:** Introduction to Array, use of array, indexed Array, Associative Array, Multi-Dimensional Array

**PHP Functions:** User Defining functions, Passing parameter & return value.

**Built-in Functions:** Math functions, String functions, Array Functions. Date & time functions, Date formats, Include, Require.

**Object-Oriented PHP:** Classes, Objects, Constructor & Destructor, Access Specifier, Inheritance, Overloading.

**UNIT-II**

**PHP super-global variables:** Interactive with client using \$\_SERVER, \$\_GET, \$\_POST, \$\_REQUEST, \$\_COOKIE, \$\_SESSION, \$\_FILES

**Form Handling:** Creating Forms using HTML, GET/POST/REQUEST.

**Connecting with database:** SQL queries: insert, select, update, delete, alter table, Primary Key, Foreign Key. Select query with where, Having, Group by, Order by, like, in, not in, between, joins. Database Connectivity: mysqli\_connect, mysqli\_select\_db. Queries: mysqli\_query, mysqli\_fetch\_array, mysqli\_fetch\_assoc, mysqli\_fetch\_row, mysqli\_fetch\_object, mysqli\_insert\_id()

**AJAX:** Introduction to AJAX, AJAX Model, Implementation of Ajax.

**PHP Framework:** Introduction to PHP Framework, Types of Frameworks, Difference Between CMS and MVC.

**WordPress:** Introduction to wordpress, Use and Benefits of Wordpress, Installing Wordpress, WordPress Administration Dashboard & Bar.

**Wordpress Setting:** General Setting, Writing Setting, Reading Setting, Discussion Settings, Media Settings, Privacy Settings, Permalinks. **Pages and Posts:** Difference Between Pages and Posts, Creating Posts, Creating Pages, Creating Child Pages.

**Textbooks:**

1. PHP and MYSQL web development (5<sup>th</sup> Edition) by Luke Welling & Laura Thomson.
2. PHP for Beginners by Ivan Bross.

**Reference Books:**

- 1.PHP: The Complete Reference by Steven Holzner
2. PHP Pocket Reference by PHP Pocket Reference.
3. PHP- MySQL Development by Laura Thomson and Luke Welling
4. Head First PHP and MySQL by Beighley

**Teaching Plan**

<b>Week-I</b>	Introduction to PHP for Web Development & Web Applications, History& Future Scope of PHP. Installation of tools for working in PHP like XAMPP, LAMP, WAMP for PHP Apache & MySQL. Introduction to Language constructs :Variables, constants, Data types, Comments
<b>Week-II</b>	Outputting Data to the Browser: print(), echo(), printf(), print_r() Programming basic constructs: operators, decision taking statements: if, if .. else, elseif, switch. iterative statements: whole, do .. while, for, foreach. Break and Continue statements.
<b>Week-III</b>	Arrays: Introduction to Array, use of array, indexed Array, Associative Array, Multi-Dimensional Array PHP Functions: User Defining functions, Passing parameter & return value.
<b>Week-IV</b>	Built-in Functions: Math functions, String functions, Array Functions. Date & time functions, Date formats, Include, Require.
<b>Week-V</b>	Object-Oriented PHP: Classes, Objects, Constructor & Destructor, Access Specifier, Inheritance, Overloading.
<b>Week-VI</b>	PHP super-global variables: Interactive with client using \$_SERVER, \$_GET, \$_POST, \$_REQUEST, \$_COOKIE, \$_SESSION, \$_FILES Form Handling: Creating Forms using HTML, GET/POST/REQUEST.
<b>Week-VII</b>	Connecting with database: SQL queries: insert, select, update, delete, alter table, Primary Key, Foreign Key. Select query with where, Having, Group by, Order by, like, in, not in, between, joins. Database Connectivity: mysqli_connect, mysqli_select_db. Queries: mysqli_query, mysqli_fetch_array, mysqli_fetch_assoc, mysqli_fetch_row, mysqli_fetch_object, mysql_insert_id()
<b>Week-VIII</b>	AJAX: Introduction to AJAX, AJAX Model, Implementation of Ajax.
<b>Week-IX</b>	PHP Framework: Introduction to PHP Framework, Types of Frameworks, Difference Between CMS and MVC.
<b>Week-X</b>	WordPress: Introduction to wordpress, Use and Benefits of Wordpress, Installing Wordpress, WordPress Administration Dashboard & Bar.
<b>Week-XI</b>	Wordpress Setting: General Setting, Writing Setting, Reading Setting, Discussion Settings, Media Settings, Privacy Settings, Permalinks.Pages and Posts: Difference Between Pages and Posts, Creating Posts, Creating Pages, Creating Child Pages.
<b>Week-XII</b>	Revision of Syllabus

## MCA-234C2 Web Development using NODE.JS

**Maximum Marks: 100**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55**

### **Course Objective:**

The objective of the course is to enable the students to understand and build web applications quickly and efficiently with the help of JavaScript.

### **Course Outcomes:**

**CO1:** Create basic web applications with Node.js.

**CO2:** Build an HTTP server using the core modules in Node.js

**CO3:** Interface to a MongoDB database and a web service.

### **A) Instructions for paper-setter**

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

### **B) Instructions for candidates**

1. Candidates are required to attempt two questions each from unit I and II . Unit III is compulsory.
2. Use of scientific calculator is allowed.

## **UNIT- I**

**Web Development:** Introduction to client/server architecture, servers, browsers, WWW, HTTP, FTP, client side and server side programming languages, web development using PHP and its frameworks, introduction to Node.js, benefits of using Node.js, traditional web server model, Node.js process model.

**Node.js:** Installing and setting up a Node.js environment, Installing packages globally using npm, exporting and importing modules, creating HTTP web server, handling http requests using GET and POST method. File system module: reading directories, files and streams. Debugging Node.js application using nodemon. Creating and handling JSON file formats in Node.js.

## **UNIT- II**

**Express framework:** Introduction to Express framework to set up a web server, Using template engines:twig, pug, ejs, jade; developing applications using ejs, implementing API routing, middleware, and URL parameters, static files, error handling, debugging.

**Working with MongoDB:** Setting up a MongoDB database and connecting it to a Node.js server. Using Mongoose to model database schema and interact with MongoDB databases, creating database and collection, inserting documents into a collection, finding documents, sorting results, updating documents, deleting and dropping documents/collection.

### **Textbooks:**

1. Beginning Node.js, Basarat Ali Syed, Publisher: Apress

### **References:**

1. Node.JS in Action, Alex Young and Bradley Meck, Publisher: Manning Publications

## Teaching Plan

<b>Week-I</b>	Web Development: Introduction to client/server architecture, servers, browsers, WWW, HTTP, FTP, client side and server side programming languages
<b>Week-II</b>	Web development using PHP and its frameworks
<b>Week-III</b>	Introduction to Node.js, benefits of using Node.js, traditional web server model, Node.js process model.
<b>Week-IV</b>	Installing and setting up a Node.js environment, Installing packages globally using npm, exporting and importing modules
<b>Week-V</b>	Creating HTTP web server, handling http requests using GET and POST method, File system module: reading directories, files and streams
<b>Week-VI</b>	Debugging Node.js application using nodemon. Creating and handling JSON file formats in Node.js.
<b>Week-VII</b>	Express framework: Introduction to Express framework to set up a web server, Using template engines:twig, pug, ejs, jade
<b>Week-VIII</b>	Developing applications using ejs, implementing API routing, middleware, and URL parameters, static files, error handling, debugging.
<b>Week-IX</b>	<b>Working with MongoDB:</b> Setting up a MongoDB database and connecting it to a Node.js server. Using Mongoose to model database schema and interact with MongoDB databases,
<b>Week-X</b>	Creating database and collection, inserting documents into a collection, finding documents.
<b>Week-XI</b>	Sorting results, updating documents, deleting and dropping documents/collection.
<b>Week-XII</b>	Revision of Syllabus

## MCA-234C3 Web Development using Python

**Maximum Marks: 100**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55**

### **Course Objective:**

The objective of the course is to enable the students to understand and build web applications quickly and efficiently with the help of Python.

### **Course Outcomes:**

**CO1:** Create basic web applications with Django/Flask.

**CO2:** Build an HTTP server using the core modules in Django/Flask

**CO3:** Interface to a PostgreSQL/MySQL/SQLite database and a web service.

### **A) Instructions for paper-setter**

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

### **B) Instructions for candidates**

1. Candidates are required to attempt two questions each from unit I and II . Unit III is compulsory.
2. Use of scientific calculator is allowed.

## **UNIT- I**

**Web Development:** Introduction to client/server architecture, servers, browsers, WWW, HTTP, FTP, client side and server side programming languages. Introduction with Django and Flask frameworks, understanding basics of Django, Django Features, benefits of using Django and Flask, traditional web server model, Django process model. Installing and setting up Django environment, Installing packages globally using pip, exporting and importing modules.

**Python 3.x:** Python basics and programming constructs. Python data structures: list, dictionary, tuple, set. python functions, OOPs, models in Python, python for web modules.

## **UNIT- II**

**Django framework:** Creating a Django project, creating and deploy Django apps. Django project layout and MVC architecture: model, views and templates. redirecting URLs, handling get and post requests, creating and handling JSON file formats, user authentication using auth, working with sessions, working with AJAX, implementing API routing, deploying application.

**Database Queries:** Understand basic Structured Query Language (SQL), introduction to compatible database models PostgreSQL, SQLite, MySQL. setting up database connectivity, working with Django ORM.

### **Textbooks:**

1. Mastering Django ,Nigel George, December 2016, Packt Publishing,ISBN: 9781787281141

### **References:**

1. Learning Django Web Development, Sanjeev Jaiswal and Ratan Kumar, Packt Publishing Limited, ISBN: 9781783984404

## Teaching Plan

<b>Week-I</b>	Web Development: Introduction to client/server architecture, servers, browsers, WWW, HTTP, FTP, client side and server side programming languages
<b>Week-II</b>	Introduction with Django and Flask frameworks, understanding basics of Django, Django Features, benefits of using Django and Flask
<b>Week-III</b>	Django process model. Installing and setting up Django environment, Installing packages globally using pip, exporting and importing modules
<b>Week-IV</b>	Python basics and programming constructs
<b>Week-V</b>	Python data structures:list,dictionary, tuple, set. python functions, OOPs, models in Python, python for web modules.
<b>Week-VI</b>	Creating a Django project, creating and deploy Django apps. Django project layout and MVC architecture: model, views and templates.
<b>Week-VII</b>	Redirecting URLs, handling get and post requests.
<b>Week-VIII</b>	Creating and handling JSON file formats, user authentication using auth, working with sessions, working with AJAX,
<b>Week-IX</b>	implementing API routing, deploying application.
<b>Week-X</b>	Understand basic Structured Query Language (SQL), introduction to compatible database models PostGreSQL, SQLite, MySQL.
<b>Week-XI</b>	Setting up database connectivity, working with Django ORM
<b>Week-XII</b>	Revision of Syllabus

## MCA-234C4 Web Development using ASP.NET

**Maximum Marks: 100**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55**

### **Course Objective:**

The course objective is to understand the .Net Framework and to develop web application with ASP.Net and database applications using ADO.Net.

### **Course Outcomes:**

CO1: Successful Students will be able to create Web forms with server controls.

CO2: Separate page code from content by using code-behind pages, page controls, and components.

### **A) Instructions for paper-setter**

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

### **B) Instructions for candidates**

- i. Candidates are required to attempt two questions each from unit I and II . Unit III is compulsory.
- ii. Use of scientific calculator is allowed.

### **UNIT-I**

**Introduction to Microsoft ASP.NET**, .Net Framework, An overview of .NET including the Common Language Interface, the Common Type System, the Common Language Runtime, and .NET Framework and class libraries. The ASP.NET execution model, **ASP.NET Web Application User Interface**: Creating an ASP.NET Web application user interface, Implementing event handlers by using code-behind files, Validating Data, Navigating Between Forms. **Implementing Master Pages and User Controls**: Creating Master Pages, Adding User Controls to an ASP.NET Web Form.

**Managing State**: The Various Means to Manage State, Request object, Application object, Cache object, Session object, Server-side state management, XML Web Services: Need of XML Web services, Understanding the Web Service Model, Creating an ASP.NET Web Service, Creating & Consuming Web Services with Visual Studio .NET.

### **UNIT-II**

**Storing and Retrieving Data with ADO.NET**: ADO.NET Overview, Connecting to Data, Executing SQL with Commands, Accessing Data with ADO.NET, Fast Data Access with Data Readers, Data Set Basics, Filling Data Sets with Data Adapters, Binding: Bind Data to the UI. **Security**: Authenticating and Authorizing Users, Using Windows Authentication, Using Forms Authentication. **Ajax**: Introduction to AJAX, AJAX Toolkit, Partial page update using AJAX, Extending an ASP.NET Web Forms Application by Using the Ajax Control Toolkit. **Reporting**: Introduction to various reporting tools in .net. **Configuring, Deploying and Debugging Web Application**: Configuration Files, Configuration Settings, Debugging Applications, Deploying an ASP.NET Web Application.

### **Text Book:**

1. ASP.NET: The Complete Reference, Matthew MacDonald, McGraw-Hill/ Osborne.

### **References:**

1. Jesse Liberty, Dan Hurwitz: Programming ASP.NET, O'Reilly.
2. Stephen Walther: ASP.NET 3.5 Unleashed, SAMS.
3. Infosys Campus Connect Foundation Program Volume 1 – 3, Education & Research Department, Infosys Technologies Ltd, Bangalore.
4. Liberty, Programming ASP.NET 3.5, Shroff/O'Reilly.



## Teaching Plan

<b>Week-I</b>	Introduction to Microsoft ASP.NET, .Net Framework, An overview of .NET including the Common Language Interface, the Common Type System, the Common Language Runtime, and .NET Framework and class libraries.
<b>Week-II</b>	The ASP.NET execution model, ASP.NET Web Application User Interface: Creating an ASP.NET Web application user interface.
<b>Week-III</b>	Implementing event handlers by using code-behind files, Validating Data, Navigating Between Forms.
<b>Week-IV</b>	Implementing Master Pages and User Controls: Creating Master Pages, Adding User Controls to an ASP.NET Web Form.
<b>Week-V</b>	Managing State: The Various Means to Manage State, Request object, Application object, Cache object, Session object, Server-side state management,
<b>Week-VI</b>	XML Web Services: Need of XML Web services, Understanding the Web Service Model, Creating an ASP.NET Web Service, Creating & Consuming Web Services with Visual Studio .NET
<b>Week-VII</b>	Storing and Retrieving Data with ADO.NET: ADO.NET Overview, Connecting to Data, Executing SQL with Commands, Accessing Data with ADO.NET,
<b>Week-VIII</b>	Fast Data Access with DataReaders, DataSet Basics, Filling Data Sets with Data Adapters, Binding: Bind Data to the UI.
<b>Week-IX</b>	Security: Authenticating and Authorizing Users, Using Windows Authentication, Using Forms Authentication.
<b>Week-X</b>	Ajax: Introduction to AJAX, AJAX Toolkit, Partial page update using AJAX, Extending an ASP.NET Web Forms Application by Using the Ajax Control Toolkit. Reporting: Introduction to various reporting tools in .net.
<b>Week-XI</b>	Configuring, Deploying and Debugging Web Application: Configuration Files, Configuration Settings, Debugging Applications, Deploying an ASP.NET Web Application.
<b>Week-XII</b>	Revision of Syllabus

# MCA-234C5 Mobile Application Development using Android

**Maximum Marks: 100**

**Maximum Time: 3 Hrs.**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Lectures to be delivered: 45-55**

## **Course Objectives:**

To facilitate students to understand android SDK and gain a basic understanding of Android application development in order to inculcate working knowledge of Android Studio.

## **Course Outcomes:**

CO1: Students will be able to create Android based Mobile applications like camera, telephony apps.

CO2: Students will learn to handle SQLite database using Android and will also be able to create and use web services for handling remote databases.

## **A) Instructions for paper-setter**

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

## **B) Instructions for candidates**

1. Candidates are required to attempt two questions each from unit I and II . Unit III is compulsory.
2. Use of scientific calculator is allowed.

## **UNIT-I**

**Working with IDE:** Introduction to Android Studio

**Introduction To Mobile Application Development:** Different Kinds of Mobile Applications, Android Versions, Architecture of Android and IOS, Comparison of Android and IOS, Overview of Android Stack

**Activity handling:** Activity lifecycle, Communicating data among activities, The manifest file

**Intents:** Implicit and Explicit intents

**Building UI:** Views, layouts: Absolute layout, relative layout, linear layout, table layout

**Advanced UI:** Selection components (GridView, ListView), Adapters, Custom Adapters, Images and Media, Time and Date, Menus: Context menu and option menu

**Notifications:** Toast, Dialogs, Status bar Notifications

**Styles And Themes:** Creating and Applying simple Style

**Multimedia in Android:** Playing Video & Audio

**Camera:** Taking pictures, Media Recorder

## **UNIT-II**

**Telephony Services:** Making calls, alarms, Sending messages

**Networking:** WiFi Connectivity, Bluetooth, GPS

**Receiving System Broadcast:** Understanding Broadcast action, category and data, Registering Broadcast receiver through code and through XML, Receiving Broadcast

**Services:** Overview of services in Android, Implementing a Service, Service lifecycle.

**Data Storage:** Shared Preferences, Internal storage, External storage

**SQLite:** Introducing SQLite, creating a database, Opening and closing a database, Working with Inserts, updates & deletes.

**Content Provider:** Introduction to content providers, accessing built in content providers.

## **Textbooks:**

1. Android in Action 3<sup>rd</sup> Edition by W.FrankAbleson .Manning Publications.
2. Application Development By Reto Meier ,Wrox Publications.

## **References:**

1. Hello, Android. 3<sup>rd</sup> Edition. By Ed Burnette.PragemeticBookshell Publications.
2. IOS 8 App Development Essentials - Second Edition by Neil Smith.Kindle Edition

## Teaching Plan

<b>Week-I</b>	Working with IDE: Introduction to Android Studio Introduction To Mobile Application Development: Different Kinds of Mobile Applications , Android Versions.
<b>Week-II</b>	Architecture of Android and IOS, Comparison of Android and IOS, Overview of Android Stack
<b>Week-III</b>	Activity handling: Activity lifecycle, communicating data among activities, The manifest file Intents: Implicit and Explicit intents
<b>Week-IV</b>	Building UI: Views, layouts: Absolute layout, relative layout, linear layout, table layout Advanced UI: Selection components (GridView, ListView), Adapters, Custom Adapters, Images and Media, Time and Date.
<b>Week-V</b>	Notifications: Toast, Dialogs, Status bar Notifications Styles and Themes: Creating and Applying simple Style
<b>Week-VI</b>	Multimedia in Android: Playing Video & Audio Camera: Taking pictures, Media Recorder, Menus: Context menu and option menu
<b>Week-VII</b>	Telephony Services: Making calls, alarms, Sending messages Networking: WiFi Connectivity, Bluetooth, GPS
<b>Week-VIII</b>	Content Provider: introduction to content providers, accessing built in content providers
<b>Week-IX</b>	Receiving System Broadcast: Understanding Broadcast action, category and data, Registering Broadcast receiver through code and through XML, Receiving Broadcast
<b>Week-X</b>	Services: Overview of services in Android, Implementing a Service, Service lifecycle. Data Storage: Shared Preferences, Internal storage, External storage
<b>Week-XI</b>	SQLite: Introducing SQLite, creating a database, Opening and closing a database, Working with Inserts, updates & deletes.
<b>Week-XII</b>	Revision of Syllabus

## MCA-234C6 Programming in Advance Java

**Maximum Marks: 100**

**Maximum Time: 3 Hrs.**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Lectures to be delivered: 45-55**

### Course Objectives:

Develop error-free, well-documented Java programs; test Java servlets while developing Java programs which incorporate advanced graphic functions. Learn how to write, test, and debug advanced-level Object-Oriented programs using Java.

### Course Outcomes:

CO1: Students will be able to create Web applications in java after learning this course.

CO2: Students will learn to handle database using java.

CO3: Students are expected to become able to create Web Services using java.

### A) Instructions for paper-setter

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

### B) Instructions for candidates

1. Candidates are required to attempt two questions each from unit I and II. Unit III is compulsory.
2. Use of scientific calculator is allowed.

## UNIT-I

**Working with IDE:** Introduction to Netbeans IDE.

**Working with Servers:** Apache Tomcat, Glassfish Server.

**Core Java:** Collection framework and its benefits. JavaBeans:Getter and Setter in java beans .JDBC: JDBC architecture, making connection, JDBC-ODBC bridge driver, Prepared Statements.

**Introduction to Java EE:** The Need for Java EE, Overview on the Java EE Architecture, 1 tier, 2 tier, 3 tier, N tier, MVC Architecture.

**Servlets:** Servlet Overview, Life cycle of Servlet, GenericServlet, HttpServlet, working of servlets, Handling Client HTTP Request & Server HTTP Response.Servlet Collaboration: RequestDispatcher, sendRedirect.

Session Tracking: Cookies, Hidden Form Field, URL Rewriting, HttpSession.

## UNIT-II

**Filter:** Introduction to Filter, Authentication Filter.

**JSP:** Life cycle of JSP, JSP architecture. Scripting elements in jsp: scriptlet tag, expression tag, declaration tag. Implicit Objects in jsp-out, request, response, application, session, page.

Directive Elements in jsp: page directive, include directive, taglib directive. Action Elements in jsp jsp:forward , jsp:include, jsp:useBean, jsp:setProperty, jsp:getProperty

**JSTL** :Introduction to Custom Tag, Custom Tag API, Attributes.

**JavaMailAPI:** Sending Email, Sending email through Gmail server, Receiving Email.

**FRAMEWORKS- Struts:** Struts Architecture, Struts Components, Validation Framework, Error Handling, Data Base Connectivity.

**Hibernate:** Introduction to Hibernate, Hibernate Architecture and Configuration.

**Textbooks:**

1. The Complete reference java 7<sup>th</sup> Edition by Herbert Schildt..Mc Graw Hill
2. Introduction to java Programming:Comprehensive Version 8<sup>th</sup> Edition by Y.Daniel Liang. Pearson Publications

**References:**

1. Advanced java 2 Platform How to Program by Harvey M.Deitel.Prentice Hall Publications.
2. Java Server Pages. By Hans Bergsten. O'reilly& Associates Publications.

**Teaching Plan**

<b>Week-I</b>	Working with IDE: Introduction to Netbeans IDE.  Working with Servers: Apache Tomcat, Glassfish Server.
<b>Week-II</b>	Core Java: Collection framework and its benefits. JavaBeans:Getter and Setter in java beans. JDBC: JDBC architecture, making connection, JDBC-ODBC bridge driver, Prepared Statements.
<b>Week-III</b>	Introduction to JavaEE: The Need for JavaEE, Overview on the JavaEE Architecture, 1 tier, 2 tier, 3 tier, N tier, MVC Architecture.
<b>Week-IV</b>	Servlets: Servlet Overview, Life cycle of Servlet, GenericServlet, HttpServlet, working of servlets, Handling Client HTTP Request & Server HTTP Response.Servlet Collaboration: RequestDispatcher, sendRedirect.
<b>Week-V</b>	Session Tracking: Cookies, Hidden Form Field, URL Rewriting, HttpSession.
<b>Week-VI</b>	Filter: Introduction to Filter, Authentication Filter. JSP: Life cycle of JSP, JSP architecture. Scripting elements in jsp: scriptlet tag, expression tag, declaration tag.
<b>Week-VII</b>	Implicit Objects in jsp-out, request, response, application, session, page.
<b>Week-VIII</b>	Directive Elements in jsp: page directive, include directive, taglib directive. Action Elements in jsp jsp:forward , jsp:include, jsp:useBean, jsp:setProperty, jsp:getProperty
<b>Week-IX</b>	JSTL :Introduction to Custom Tag, Custom Tag API, Attributes.
<b>Week-X</b>	JavaMailAPI: Sending Email, Sending email through Gmail server, Receiving Email.
<b>Week-XI</b>	FRAMEWORKS- Struts: Struts Architecture, Struts Components, Validation Framework, Error Handling, Data Base Connectivity. Hibernate: Introduction to Hibernate, Hibernate Architecture and Configuration
<b>Week-XII</b>	Revision of Syllabus

# MCA-234C7 Mobile Application Development using iOS

**Maximum Marks: 100**

**Maximum Time: 3 Hrs.**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Lectures to be delivered: 45-55**

**Course Objectives:** The objective of the course is to enable to the student to build an iOS application using the standard Apple tool chain.

**Course Outcomes:** After completion of the course students will be able:

CO1: To create Mobile applications for iOS platform.

CO2: To handle SQLite database using objective C.

CO3: Learn to handle remote database using different parsing techniques.

## A) Instructions for paper-setter

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

## B) Instructions for candidates

1. Candidates are required to attempt two questions each from unit I and II . Unit III is compulsory.
2. Use of scientific calculator is allowed.

## UNIT-I

**Introduction To Mobile Application Development:** Different Kinds of Mobile Applications, Architecture of Android and IOS, Comparison of Android and IOS,

**iOS environment Setup:** iOS – Xcode Installation, Interface Builder , iOS Simulator. Basics of Objective- C: Interface and Implementation, Object Creation, Methods, Important Data Types in Objective C.

Printing Logs, Control Structures, Properties, Categories, functions, mutable arrays, immutable Arrays , mutable Dictionary, immutable Dictionary. Creating iOS applications: Introduction with iOS application, main.m, AppDelegate.h, AppDelegate.m,

**Interface Builders:** Main.storyboard. XIB.

**UIViewControllers classes:** NSObject, UIViewController, UIScrollView, UICollectionViewController, UITableViewController, UIWebViewController.

## UNIT-II

**Actions and Outlets:** Steps involved in creating actions, outlets Delegates, and data sources. UI Elements: Adding UI Elements, Text Fields, Buttons, Label, Toolbar, Status Bar, Navigation Bar, Tab Bar, Image View, Split View, Text View, View Transition, Pickers, Switches, Sliders, Alerts view.

**Camera Management:** Accessing camera for taking pictures and image views, Navigation Controller, File Handling: Reading and writing, removing, moving and copying files, SQLite and Core Data Database: working with DBManager. **Data Parsing:** JSON and XML parsing.

## Textbooks:

1. iOS 8 App Development Essentials - Second Edition by Neil Smith. Kindle Edition

## References:

1. iOS Programming with Swift by Michael Dippery.
2. Programming iOS 9 by Matt Neuburg.

## Teaching Plan

<b>Week-I</b>	Introduction To Mobile Application Development: Different Kinds of Mobile Applications, Architecture of Android and IOS, Comparison of Android and IOS, Creating iOS applications: Introduction with iOS application, main.m, AppDelegate.h, AppDelegate.m.
<b>Week-II</b>	iOS environment Setup: iOS – Xcode Installation, Interface Builder , iOS Simulator. Basics of Objective- C: Interface and Implementation, Object Creation, Methods, Important Data Types in Objective C.
<b>Week-III</b>	Printing Logs, Control Structures, Properties, Categories, functions, mutable arrays, immutable Arrays , mutable Dictionary, immutable Dictionary.
<b>Week-IV</b>	Interface Builders: Main.storyboard. XIB. UIViewController classes: NSObject, UIViewController, UIScrollView, UICollectionView, UITableViewController, UIWebViewController.
<b>Week-V</b>	Actions and Outlets: Steps involved in creating actions, outlets Delegates, and data sources.
<b>Week-VI</b>	UI Elements: Adding UI Elements, Text Fields, Buttons, Label, Toolbar, Status Bar, Navigation Bar, Tab Bar.
<b>Week-VII</b>	Image View, Split View, Text View, View Transition, Pickers, Switches, Sliders, Alerts view.
<b>Week-VIII</b>	Camera Management: Accessing camera for taking pictures and image views, Navigation Controller
<b>Week-IX</b>	File Handling: Reading and writing, removing, moving and copying files
<b>Week-X</b>	SQLite and Core Data Database: working with DBManager.
<b>Week-XI</b>	Data Parsing: JSON and XML parsing.
<b>Week-XII</b>	Revision of Syllabus

# MCA 235C1 Artificial Intelligence & Machine Learning

**Maximum Marks: 100**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**

**Lectures to be delivered: 45-55**

**Course Objective:** To introduce students to the basic concepts and techniques of Artificial Intelligence and Machine Learning.

**Course Outcomes:** Upon Completion of this course the student will be able to:

CO1: List the objectives and functions of modern Artificial Intelligence

CO2: Identify machine learning techniques suitable for a given problem.

CO2: Solve the problems using various machine learning techniques

## A) Instructions for paper-setter

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

## B) Instructions for candidates

1. Candidates are required to attempt two questions each from unit I and II . Unit III is compulsory.

2. Use of scientific calculator is allowed.

## UNIT-I

**Introduction to AI:** Definition, Nilsson's Onion Model explaining basic Elements of AI and AI application Areas.

**Introduction to Propositional Logic:** Syntax, Semantics, Inference methods in Propositional Logic.

**Introduction to Predicate Logic:** Syntax, Semantics of Predicate Logic, Clausal form, Resolution, Unification, Inference Mechanisms.

**Knowledge Representation:** Approaches to Knowledge representation, Issues in Knowledge representation, Knowledge representation using rules. Semantic Nets, Frames, Conceptual Dependencies.

## UNIT-II

**Machine Learning:** Meaning, definition and applications of machine learning, Building a machine learning model. Supervised and unsupervised learning.

**Supervised Learning(Regression/classification):** Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes. **Linear models:** Linear Regression, Logistic Regression, Generalized Linear Models Support Vector Machines.

**Unsupervised Learning (Clustering)** meaning and applications of clustering, requirements of a good clustering algorithm, K-means clustering technique. Generalization of performance of the learning system.

**Evaluating the performance of learning algorithms:** confusion matrix, sensitivity and specificity, accuracy, precision and recall, k-folds cross validation.



**Text Books:**

1. Neural Networks for Pattern Recognition by "Christopher M. Bishop".
2. Dan W. Patterson, "Introduction to Artificial Intelligence and Expert Systems", PHI.
3. Tom M. Mitchell, Machine Learning, McGraw Hill Education.

**References:**

1. E. Rich and K. Knight, "Artificial Intelligence", Tata McGraw Hill.
2. E. Charnaik and D. McDermott, "Introduction to Artificial Intelligence", Addison-Wesley Publishing Company.
3. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, Introducing Data Science - Big Data, Machine Learning and More Using Python Tools, Manning Publications Co.
4. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining Concepts and Techniques, Morgan Kaufmann.
5. Ethem Alpaydin, Introduction to Machine Learning, PHI.

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## Teaching Plan

<b>Week-I</b>	Introduction to AI: Definition, Nilsson's Onion Model explaining basic Elements of AI and AI application Areas.
<b>Week-II</b>	Introduction to Propositional Logic: Syntax, Semantics, Inference methods in Propositional Logic.
<b>Week-III</b>	Introduction to Predicate Logic: Syntax, Semantics of Predicate Logic, Clausal form, Resolution, Unification, Inference Mechanisms.
<b>Week-IV</b>	Knowledge Representation: Approaches to Knowledge representation, Issues in Knowledge representation
<b>Week-V</b>	Knowledge representation using rules. Semantic Nets, Frames, Conceptual Dependencies.
<b>Week-VI</b>	Machine Learning: Meaning, definition and applications of machine learning, Building a machine learning model. Supervised and unsupervised learning
<b>Week-VII</b>	Supervised Learning(Regression/classification): Distance-based methods, Nearest-Neighbours, Decision Trees, Naive Bayes
<b>Week-VIII</b>	Linear models: Linear Regression, Logistic Regression, Generalized Linear Models Support Vector Machines
<b>Week-IX</b>	Unsupervised Learning (Clustering) meaning and applications of clustering, requirements of a good clustering algorithm
<b>Week-X</b>	K-means clustering technique. Generalization of performance of the learning system.
<b>Week-XI</b>	Evaluating the performance of learning algorithms: confusion matrix, sensitivity and specificity, accuracy, precision and recall, k-folds cross validation.
<b>Week-XII</b>	Revision

## MCA-235C2 Big Data Analysis using HADOOP

Maximum Marks: 100

Maximum Time: 3 Hrs.

Internal Assessment: 50

External Examination: 50

Minimum Pass Marks: 40%

Lectures to be delivered: 45-55

**Course Objectives:** To enable the students to manage very large amount of data in a database effectively and learn how to store and retrieve data on distributed computers in a network.

### Course Outcomes:

CO1: Student will be able to understand the building blocks of Big Data.

CO2: Student will be able to understand the specialized aspects of big data with the help of different big data applications.

### A) Instructions for paper-setter

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

### B) Instructions for candidates

1. Candidates are required to attempt two questions each from unit I and II. Unit III is compulsory.
2. Use of scientific calculator is allowed

## UNIT-I

**Introduction to Big Data:** Rise of Big Data, Current vs Traditional Scenario, Why it is in a place, How to deal with it.

**Introduction to Hadoop:** What is Hadoop, Core components of Hadoop, Hadoop Master-Slave Architecture, Learning about NameNode, DataNode, Secondary Node, Understanding HDFS Architecture, Understanding MapReduce Architecture, JobTracker and TaskTracker

**Hadoop Configuration:** Installation of Hadoop, Hadoop Modes, Configuration of Hadoop Files, Architecture of Clusters, Cluster Configuration, Setup of Nodes, Hadoop Terminal Commands

**HDFS:** Introduction to HDFS, Configuration of HDFS, HDFS read/write operation, Replication to multiple nodes, HDFS Admin configuration

**MapReduce:** Introduction to MapReduce, Data Flow in MapReduce, Configuration of the MapReduce, Process of Job Tracker & Task Tracker, Anatomy of MapReduce Program, MapReduce internals, Understanding Input Format, Understanding Output Format, Mapper/Reducer Class, Driver code, Understand Combiner and Partitioner, Writing Map and Reduce in Java, Joining Multiple datasets in MapReduce

## UNIT-II

**Pig:** Introduction to Pig, PIG vs MapReduce, Installation & Configuration, PIG Architecture & Data types, PIG Latin Relational Operators, PIG Latin Join and CoGroup, Pig Data Types & Model

**Hive:** Introduction to Hive, Hive Installation & configuration, Hive Architecture & Components, Difference between Hive and RDBMS, Hive Data types & model, Hive QL, Create/Show Database, Create/Show/Drop Tables, Load Files & Insert Data, Select, Filter, Join, Group By, Data Manipulation and Queries

**Sqoop:** Intro to Sqoop, Installation & Configuration, How Sqoop works, Sqoop Architecture.

### Textbooks:

1. Michael Minelli, Michele Chambers, Ambiga Dhiraj, Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses, Wiley CIO Series.

### Reference Books:

1. R.N. Prasad, Fundamentals of Business Analytics, Wiley.
2. Anil Maheshwari, Data Analytics, McGraw Hill Education.
3. Tom White, Hadoop – the Definitive Guide, O'Reilly.

## Teaching Plan

<b>Week-I</b>	Introduction to Big Data: Rise of Big Data, Current vs Traditional Scenario, Why it is in a place, How to deal with it. Introduction to Hadoop: What is Hadoop, Core components of Hadoop, Hadoop Master-Slave Architecture.
<b>Week-II</b>	Learning about NameNode, DataNode, Secondary Node, Understanding HDFS Architecture, Understanding MapReduce Architecture, JobTracker and TaskTracker.
<b>Week-III</b>	Hadoop Configuration: Installation of Hadoop, Hadoop Modes, Configuration of Hadoop Files, Architecture of Clusters, Cluster Configuration, Setup of Nodes, Hadoop Terminal Commands
<b>Week-IV</b>	HDFS: Introduction to HDFS, Configuration of HDFS, HDFS read/write operation, Replication to multiple nodes, HDFS Admin configuration.
<b>Week-V</b>	MapReduce: Introduction to MapReduce, Data Flow in MapReduce, Configuration of the MapReduce, Process of Job Tracker & Task Tracker, Anatomy of MapReduce Program, MapReduce internals
<b>Week-VI</b>	Pig: Introduction to Pig, PIG vs MapReduce, Installation & Configuration, PIG Architecture & Data types, PIG Latin Relational Operators, PIG Latin Join and CoGroup, Pig Data Types & Model
<b>Week-VII</b>	Understanding Input Format, Understanding Output Format, Mapper/Reducer Class, Driver code
<b>Week-VIII</b>	Understand Combiner and Partitioner, Writing Map and Reduce in Java, Joining Multiple datasets in MapReduce
<b>Week-IX</b>	Hive: Introduction to Hive, Hive Installation & configuration ,Hive Architecture & Components, Difference between Hive and RDBMS, Hive Data types & model, Hive QL
<b>Week-X</b>	Create/Show Database, Create/Show/Drop Tables, Load Files & Insert Data, Select, Filter, Join, Group By,Data Manipulation and Queries
<b>Week-XI</b>	Sqoop: Intro to Sqoop, Installation & Configuration, How Sqoop works, Sqoop Architecture.
<b>Week-XII</b>	Revision of Syllabus

## MCA-235C3 Data Science

**Maximum Marks: 100**

**Maximum Time: 3 Hrs.**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Lectures to be delivered: 45-55**

### **Course Objective:**

To make students gain data scientist skill set by learning data science using analytical tools and also enables them to master analytical techniques like data exploration, data visualization and various predictive analytic techniques.

**Course Outcomes:** On completion of this course, the students will be able:

CO1: To analyze the need and usage of various facets of data and data science process.

CO2: To understand and apply various visualization techniques.

CO3: To perform exploratory data analysis.

CO4: To implement how to manage, manipulate, cleanse and analyze data.

### **A) Instructions for paper-setter**

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

### **B) Instructions for candidates**

1. Candidates are required to attempt two questions each from unit I and II. Unit III is compulsory.

2. Use of scientific calculator is allowed

### **UNIT-I**

**Introduction to Data Science:** Meaning of Data Science, Relationship between Big Data and Data Science, Benefits and uses of data science and big data. **Facets of data:** Structured versus Unstructured data, natural language, machine-generated data, graph-based data, audio, image and video data.

**Data Science Process:** Goal setting, retrieving data, data preparation, data cleansing and transformation, exploratory data analysis, data visualization, Model building and performance evaluation, presentation.

Data set and its features, **Meaning of the terms:** observations and variables, Discrete and continuous variables, quantitative and qualitative variables, dependent and independent variables.

**Variables classified on scale:** Nominal, Ordinal, Interval and Ratio variables.

**Data Munging and data munging tasks:** renaming variables, Data type conversion, encoding, decoding and recoding data. Merging datasets, transforming data, imputation, handling anomalous values, missing values and outliers.

**Exploratory Data Analysis:** Introduction and purpose of EDA, **Descriptive statistics:** measurements of location and variability, mean, median and mode, variance and measures of variance: standard deviation, range, skewness, correlation, correlation and causation.

### **UNIT-II**

**Data Visualization:** Purpose and techniques of data visualization: Histograms, Box Plots, Scatterplots.

**Normal Distribution:** meaning and its characteristics, concept of transformations, transformation functions: Power function, Exponential function, Polynomial function, Logarithmic function, Square root function. Model building and variable selection.

**Dimensionality reduction:** Principle of parsimony, **Feature selection methods:** forward selection and backward selection procedure, stepwise selection procedure. **Splitting the dataset:** training versus testing datasets, Concepts of overfitting and under-fitting.

**Text Books:**

1. Joel Grus, Data Science from Scratch, O'Reilly.

**References:**

1. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, Introducing Data Science - Big Data, Machine Learning and More Using Python Tools, Manning Publications Co.
2. Rachel Schutt & Cathy O'Neil, Doing Data Science, O'Reilly
3. Jiawei Han, Micheline Kamber, Jian Pei, Data Mining Concepts and Techniques, Morgan Kaufmann

**Teaching Plan**

<b>Week-I</b>	Introduction to Data Science: Meaning of Data Science, Relationship between Big Data and Data Science, Benefits and uses of data science and big data.,
<b>Week-II</b>	Facets of data: Structured versus Unstructured data, natural language, machine-generated data, graph-based data, audio, image and video data.
<b>Week-III</b>	Data Science Process: Goal setting, retrieving data, data preparation, data cleansing and transformation, exploratory data analysis, data visualization
<b>Week-IV</b>	Model building and performance evaluation, presentation, Data set and its features.
<b>Week-V</b>	Meaning of the terms: observations and variables, Discrete and continuous variables, quantitative and qualitative variables, dependent and independent variables. Variables classified on scale: Nominal, Ordinal, Interval and Ratio variables.
<b>Week-VI</b>	Data Munging and data munging tasks: renaming variables, Data type conversion, encoding, decoding and recoding data. Merging datasets, transforming data, imputation, handling anomalous values, missing values and outliers.
<b>Week-VII</b>	Exploratory Data Analysis: Introduction and purpose of EDA, Descriptive statistics: measurements of location and variability, mean, median and mode, variance and measures of variance: standard deviation, range, skewness, correlation, correlation and causation.
<b>Week-VIII</b>	Data Visualization: Purpose and techniques of data visualization: Histograms, Box Plots, Scatterplots.
<b>Week-IX</b>	Normal Distribution: meaning and its characteristics, concept of transformations, transformation functions: Power function, Exponential function, Polynomial function, Logarithmic function, Square root function. Model building and variable selection.
<b>Week-X</b>	Dimensionality reduction: Principle of parsimony, Feature selection methods: forward selection and backward selection procedure, stepwise selection procedure.
<b>Week-XI</b>	Splitting the dataset: training versus testing datasets, Concepts of overfitting and under-fitting.
<b>Week-XII</b>	Revision of Syllabus

## MCA-235C4 Cloud Computing

**Maximum Marks: 100**

**Maximum Time: 3 Hrs.**

**Internal Assessment: 50**

**External Examination: 50**

**Minimum Pass Marks: 40%**

**Lectures to be delivered: 45-55**

**Course Objectives:** The objective of this course is to provide students with the fundamentals and essentials of Cloud Computing and a sound foundation of the Cloud Computing so that they are able to start using and adopting Cloud Computing services and tools in their real life scenarios.

**Course Outcomes:** At the end of this course, students will be able to do the following:

CO1: Apply the fundamental concepts in data centers to understand the tradeoffs in power, efficiency and cost.

CO2: Analyze various cloud programming models and apply them to solve problems on the cloud.

### A) Instructions for paper-setter

The question paper will consist of three units I, II and III. Unit I and II will have four questions from each unit of the syllabus and will carry 10 marks each. Unit III will consist of questions from whole syllabus and will be of 2 marks each.

### B) Instructions for candidates

1. Candidates are required to attempt two questions each from unit I and II. Unit III is compulsory.
2. Use of scientific calculator is allowed.

## UNIT-I

**Introduction:** Definition of Cloud, Basics of Cloud Computing, Characteristics of Cloud, Benefits of Cloud, Driving factors towards the use of Cloud Computing, Comparing Cloud with Grid Computing Systems, Applications of Cloud Computing.

**Basic Concepts and Virtualization:** Cloud Computing Evolution, Big Data Concept, Elasticity and scalability, **Virtualization:** characteristics of virtualization, Benefits of virtualization, Forms of CPU virtualization, Hypervisors, VMWare, Multitenancy, SLA in Cloud Computing.

**Cloud Computing Service Delivery Models:** Cloud service delivery models, Cloud Reference Model, Infrastructure as a service (IaaS) architecture, details, examples and applications, Platform as a service (PaaS) architecture, details, examples and applications, Software as a service (SaaS) architecture, details, examples and applications, NIST architecture.

## UNIT-II

**Cloud Deployment Models:** Cloud deployment models, Private Clouds, Public Clouds, Hybrid Clouds, Community, Virtual private Clouds, Heterogeneous and Homogenous Clouds, Selection criteria for Cloud deployment.

**Cloud Security:** Cloud Security challenges and risks, Principal Characteristics of Cloud Computing security, Cloud Computing Security Reference Model, How security gets integrated, Principal security dangers to Cloud Computing, Internal security breaches, Data corruption or loss, User account and service hijacking, Steps to reduce Cloud Security breaches, Identity and access management.

**Text Books:**

1. Rajkumar Buyya, James Broberg, Andrzej M. Goscinski, Cloud Computing: Principles and Paradigms, Wiley.

**References:**

1. Barrie Sosinsky, Cloud Computing Bible, Wiley.
2. Michael Miller, Cloud Computing, QUE Publications.
3. Judith Hurwitz, Robin Bloor, Marcia Kaufman, Fern Halper, Cloud Computing for Dummies, Wiley.

## Teaching Plan

<b>Week-I</b>	Introduction: Definition of Cloud, Basics of Cloud Computing, Characteristics of Cloud, Benefits of Cloud, Driving factors towards the use of Cloud Computing, Comparing Cloud with Grid Computing Systems, Applications of Cloud Computing.
<b>Week-II</b>	Cloud Computing Service Delivery Models: Cloud service delivery models, Cloud Reference Model, Infrastructure as a service (IaaS) architecture, details, examples and applications.
<b>Week-III</b>	Platform as a service (PaaS) architecture, details, examples and applications, Software as a service (SaaS) architecture, details, examples and applications, NIST architecture. Basic Concepts and Virtualization: Cloud Computing Evolution, Big Data Concept, Elasticity and scalability
<b>Week-IV</b>	Virtualization: characteristics of virtualization, Benefits of virtualization, Forms of CPU virtualization
<b>Week-V</b>	Hypervisors, VMWare, Multitenancy, SLA in Cloud Computing
<b>Week-VI</b>	Cloud Deployment Models: Cloud deployment models, Private Clouds, Public Clouds, Hybrid Clouds, Community, Virtual private Clouds
<b>Week-VII</b>	Virtual private Clouds, Heterogeneous and Homogenous Clouds, Selection criteria for Cloud deployment.
<b>Week-VIII</b>	Cloud Security: Cloud Security challenges and risks, Principal Characteristics of Cloud Computing security, Cloud Computing Security Reference Model
<b>Week-IX</b>	How security gets integrated, Principal security dangers to Cloud Computing, Internal security breaches.
<b>Week-X</b>	Data corruption or loss, User account and service hijacking.
<b>Week-XI</b>	Steps to reduce Cloud Security breaches, Identity and access management
<b>Week-XII</b>	Revision of Syllabus



## **MCA-236C1 Programming Lab-V Based on MCA-234C1**

**Maximum Marks: 100**

**Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 40%**

**Practical units to be conducted: 45-55**

### **Course Objective:**

Students will be able to create Web applications and web sites after completing this course. They will also learn to handle Relational database using queries embedded in PHP functions.

### **Course Outcomes:**

CO1: Successful students will be able to build Dynamic web site using server side PHP Programming and Database connectivity.

CO2: Use web application development software tools i.e. Ajax, Wordpress in order to identify the environments currently available on the market to design web site

This laboratory course will mainly comprise of exercises on what is learnt under the paper **MCA-234C1: Web Development Using PHP.**

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment :60
- Maximum Marks for Semester Examination: 40

## **MCA-236C2 Programming Lab-V Based on MCA-234C2**

**Maximum Marks: 100**

**Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 40%**

**Practical units to be conducted: 45-55**

### **Course Objective:**

Students will be able to create Web applications and web sites after completing this course.

**Course Outcomes:** After completing the course, the students will learn:

CO1: Why server-side JavaScript is useful

CO2: Install Node.js

CO3: Create basic web applications with Node.js

This laboratory course will mainly comprise of exercises on what is learnt under the paper **MCA-234 C2: Web Development Using Node.JS.**

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment :60
- Maximum Marks for Semester Examination: 40

## **MCA-236C3 Programming Lab-V Based on MCA-234C3**

**Maximum Marks: 100 \***

**Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 40%**

**Practical units to be conducted: 45-55**

**Course Objective:** To acquire knowledge and skills for creation of web site considering both client and server-side programming using Python.

**Course Outcomes:** After completion of the course, students will be able to:

CO1: Build Dynamic web site using server-side Python Programming and Database connectivity.

CO2: Demonstrate web application using Python web Framework-Django

This laboratory course will mainly comprise of exercises on what is learnt under the paper  
**MCA-234C3: Web Development Using Python.**

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment: 60
- Maximum Marks for Semester Examination: 40

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## **MCA-236C4 Programming Lab-V Based on MCA-234C4**

**Maximum Marks: 100 \***

**Maximum Time: 3 Hrs.**

**Minimum Pass Marks: 40%**

**Practical units to be conducted:45-55**

### **Course Objective:**

The objective of the course is to develop web application with ASP.Net and database applications using ADO.Net

### **Course Outcomes:**

CO1: Successful Students will be able to create Web forms with server controls.

CO2: Separate page code from content by using code-behind pages, page controls, and components.

CO3: Display dynamic data from a data source by using Microsoft ADO.NET and data binding.

This laboratory course will mainly comprise of exercises on what is learnt under the paper **MCA-234C4: Web Development Using ASP.NET.**

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment: 60
- Maximum Marks for Semester Examination: 40

## **MCA-236C5 Programming Lab-V Based on MCA-234C5**

**Maximum Marks: 100\***  
**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**  
**Practical units to be conducted: 45-55**

**Course Objectives:** To facilitate students to understand android SDK and gain a basic understanding of Android application development in order to inculcate working knowledge of Android Studio.

**Course Outcomes:** At the end of the course students will be able:

CO1: To create Android based Mobile applications like camera, telephony apps.

CO2: Learn to handle SQLite database using Android and will also be able to create and use web services for handling remote databases

This laboratory course will mainly comprise of exercises on what is learnt under the paper **MCA-234C5 Mobile Application Development Using Android.**

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment: 60
- Maximum Marks for Semester Examination: 40

## **MCA-236C6 Programming Lab-V Based on MCA-234C6**

**Maximum Marks: 100\***  
**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**  
**Practical units to be conducted: 45-55**

**Course Objective:** Objective of this course is to provide the ability to design console based, GUI based and web-based applications. Students will also be able to understand integrated development environment to create, debug and run multi-tier and enterprise-level applications.

**Course Outcomes:** After the completion of the course, the students will be able  
CO1: To create Web applications in java after learning this course.  
CO2: To handle database using java and able to create Web Services using java.

This laboratory course will mainly comprise of exercises on what is learnt under the paper **MCA-234C6 Programming in Advance Java.**

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment: 60
- Maximum Marks for Semester Examination: 40

## **MCA-236C7 Programming Lab-V Based on MCA-234C7**

**Maximum Marks: 100\***  
**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**  
**Practical units to be conducted: 45-55**

**Course Objectives:** The objective of this lab is to describe those aspects of mobile programming that make it unique from programming for other platforms and utilize rapid prototyping techniques to design and develop sophisticated mobile applications.

**Course Outcomes:** At the end of the course students will be able to:

CO1: To create Mobile applications for iOS platform.

CO2: Learn to handle remote database using different parsing techniques.

This laboratory course will mainly comprise of exercises on what is learnt under the paper **MCA-234C7 Mobile Application Development Using iOS.**

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment : 60
- Maximum Marks for Semester Examination: 40

## **MCA-237C1 Programming Lab-VI Based on MCA-235C1**

**Maximum Marks: 100\***  
**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**  
**Practical units to be conducted: 45-55**

**Course Objectives:** The objective of this course is to provide students with the fundamental elements of artificial intelligence and machine learning and their applications.

**Course Outcomes:** At the end of the course students will be able to:

CO1: Demonstrate fundamental understanding of artificial intelligence.

CO2: Understand the features of machine learning to apply on real world problems.

CO3: Demonstrate proficiency in applying scientific method to models of machine learning.

This laboratory course will mainly comprise of exercises on what is learnt under the paper **MCA-235C1 Artificial Intelligence and Machine Learning**.

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment: 60
- Maximum Marks for Semester Examination: 40



## **MCA-237C2 Programming Lab-VI Based on MCA-235C2**

**Maximum Marks: 100\***  
**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**  
**Practical units to be conducted: 45-55**

**Course Objectives:** To introduce the basic knowledge of big data analytics; to learn the techniques and tools for big data analytics; to conduct applications to show the usage of big data analytics.

**Course Outcomes:** At the end of the course students will be able to:

**CO1:** To realistically assess the application of big data analytics technologies for different usage scenarios and start with their own experiments.

**CO2:** Identify Big Data and its Business Implications.

**CO3:** List the components of Hadoop.

This laboratory course will mainly comprise of exercises on what is learnt under the paper **MCA-235C2 Big Data Analysis Using HADOOP**.

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment: 60
- Maximum Marks for Semester Examination: 40

## **MCA-237C3 Programming Lab-VI Based on MCA-235C3**

**Maximum Marks: 100\***  
**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**  
**Practical units to be conducted: 45-55**

**Course Objectives:** The course enables students to get a strong foundation for data science and application areas related to it and understand the underlying core concepts and emerging technologies in data science.

**Course Outcomes:** At the end of the course students will be able to:

CO1: Learn the process of working with data on large scale.

CO2: Demonstrate proficiency with statistical analysis of data.

CO3: Build and assess data-based models.

This laboratory course will mainly comprise of exercises on what is learnt under the paper **MCA-235C3 Data Science**.

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment: 60
- Maximum Marks for Semester Examination: 40

## **MCA-237C4 Programming Lab-VI Based on MCA-235C4**

**Maximum Marks: 100\***  
**Minimum Pass Marks: 40%**

**Maximum Time: 3 Hrs.**  
**Practical units to be conducted: 45-55**

**Course Objectives:** The objective of this course is to give students an overview of the field of Cloud Computing, and an in-depth study into its enabling technologies and main building blocks. Students will gain hands-on experience solving relevant problems that will utilize existing public cloud tools.

**Course Outcomes:** At the end of the course students will be able to:

CO1: Understand the fundamental ideas behind Cloud Computing, the evolution of the paradigm, its applicability and benefits.

CO2: Learn the variety of programming models and develop working experience in several of them.

This laboratory course will mainly comprise of exercises on what is learnt under the paper **MCA-235C4 Cloud Computing**.

\*The splitting of marks is as under

- Maximum Marks for Continuous Assessment: 60
- Maximum Marks for Semester Examination: 40

**MATA GUJRI COLLEGE, SRI FATEHGARH SAHIB**  
(An Autonomous College)

**SYLLABUS**

**MASTER OF COMPUTER APPLICATIONS**  
**OUTLINE OF PAPERS AND TESTS**  
**MCA -II (FOURTH SEMESTER) EXAMINATIONS**  
**Batch 2023-24 & 2024-25**

CODE NO.	TITLE	Credits	Marks	
			Internal	External
MCA-241	Project	24	200	200

MCA-241      Project in a Computer Organisation/University Computer Centre/Dept. of Computer Science, etc., as decided by the Head of the Department .

To be carried out under the supervision of official of industry/company where he/she is doing the project. Evaluation and viva-voce is to be done on the completion of Project.

**Final Project Viva: 200 Marks**

1. The evaluation committee will distribute these marks for seminar/viva/project report and for any other activity, which the committee thinks to be proper.
2. Joint projects will be allowed (maximum two students) but student should submit separate project report that should highlight their contributions/module in the project.

**Committee for Evaluation of project report/work:**

- i. Head of the Department
- ii. Internal Guide (if any)
- iii. One or two nominee(s) of Dean, Academic Affairs
- iv. External Examiner

**Quorum will be of any three members.**