Syllabus

Semester -1
MCA-2101: OBJECT ORIENTED PROGRAMMING WITH JAVA
Max. Marks: 80
Time: 3 Hrs.
Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit. Each question shall carry equal marks.
Learning Objectives:
1. The main objective of subject is to make the clear the fundamentals concept of java programming.
2. After studying this subject the student will be able to know install process of the software in system as well as he/ she will able to design the application using this technology.

Unit – I
Introduction: Object-Oriented Languages, History of Java, Creation of Java, Java for the Internet, Byte-code, Features, Object-Oriented Programming in Java. Java Program Structure and Java Class Library, Data Types, Variables, and Operators, Operator Precedence. Selection Statements, Scope of Variable, Iterative Statement. Defining Classes & Methods, Constructors, Creating Objects of a Class,
Assigning Object Reference Variables, Variable this, Defining and Using a Class, Automatic Garbage Collection.
Arrays and Strings: Arrays, Arrays of Characters, String Handling Using String Class, Operations on String Handling Using, String Buffer Class.

Unit – II
Extending Classes and Inheritance: Using Existing Classes, Inheritance, Choosing Base Class, Access Attributes, Polymorphism, Abstraction through Abstract Classes, Final Modifier, Universal Super class- Object Class
Packages & Interfaces: Define Package, type of package, class path, standard packages, Access Protection in Packages, Concept of Interface.
Exception Handling: Concept of Exceptions, Types of Exceptions, Dealing with Exceptions, Exception Objects, Defining your own

Exceptions.
Multithreading Programming: Java Thread Model, Define Threads, Main Thread, Creating a new Thread, Creating Multiple Threads, Thread Priorities, Synchronization, Deadlocks Inter thread communication, Deadlocks

Unit – III
Input/output in Java: I/O Basic, Byte and Character Structures, I/O Classes, Reading Console Input Writing Console Output, Reading and Writing on Files, Random Access Files, Storing and Retrieving Objects from File, Stream Benefits.
Creating Applets in Java: Applet Basics, Architecture, Life Cycle, Display Methods, Requesting Repainting, Status Window, The HTML APPLET Tag Passing Parameters to Applets.

Working with Windows: AWT Classes, Window Fundamentals, Working with Frame, Creating Frame Window in an Applet, Displaying Information within a Window.
Working with Graphics and Texts: Working with Graphics, Color and Font, Paint Mode Setting, Managing Text Output using Font Metrics, Exploring Text and Graphics. Working with AWT Controls, Layout Managers and Menus.

Unit – IV
Introduction to Servelets: Lifecycle of a Serverlet, JSDK, Servelet API, javax.servelet Package, Reading Servelet parameters, Initialization parameters. javax.servelet HTTP package, Handling Http Request & Responses, Using Cookies- Session Tracking, Security Issues.
Introduction to JSP, Problem with Servelet, Anatomy of JSP page, JSP Processing, JSP Application Design with MVC, Setting Up and JSP Environment:, Installing the Java Software Development Kit, Tomcat Server & Testing Tomcat.

Course Outcomes:
CO1: Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.
CO2: Read and make elementary modifications to Java programs that solve real-world problems.
CO3: Validate input in a Java program.
CO4: Identify and fix defects and common security issues in code.
CO5: Develop reusable programs using the concepts of inheritance,

polymorphism, interfaces and packages.
CO6: Apply the concepts of Multithreading and Exception handling to develop efficient and error free codes.

MCA-2201: DATA STRUCTURES & ALGORITHMS
Max. Marks: 80
Time: 3 Hrs.
Note: There shall be nine questions in all. Question no. 1 shall be compulsory, consisting of eight short answer type questions covering the entire syllabus. Two questions will be asked from each unit. Student will have to attempt one question from each unit.
Each question shall carry equal marks.

Learning Objectives:
1. The main objective of subject understands about algorithms writing and the fundamental approach of data structures to solving problems.
2. It helps to understand concepts about searching and sorting techniques as well as other data structure technique which are used to
solve the particular problem using the basic concepts such as stacks, queues, lists, trees and graphs.

Unit – I
Definition, Classification of data structures, Operations on data structures, Design and analysis of algorithm, Top down and bottom up
approaches to Algorithm design, Frequency count, Complexity, Arrays: Address calculation using column and row major ordering, Various operations on Arrays, Vectors, Application of arrays: Matrix multiplication, sparse polynomial representation and addition.

Unit – II
Stacks and Queues: Introduction, Operations, Representation using arrays and linked-list, Circular queues, Priority Queue and DeQueue. Applications of stacks: Conversion from infix to postfix and prefix expressions, Evaluation of postfix expression using stacks. Linked list: Singly linked list; operations on list, Linked stacks and queues. Polynomial representation and manipulation using linked lists. Circular linked lists, doubly linked lists.

Unit-III
Binary tree traversal methods: Preorder, In-order, Post-ordered. Recursive Algorithms, Traversal methods, Binary tree representation of a
general tree, Conversion of forest into tree, Threaded binary trees. Binary search tree: Height balanced (AVL) tree, B-trees. Sorting: Selection sort, Insertion sort, Bubble sort, Quick sort, merge sort, Heap sort, Radix sort and their complexities.

Unit-IV
Searching, sorting and complexity, Hashing Schemes. Comparison of time complexity. Graph representation: Adjacency matrix, Adjacency lists, Depth first search, Breadth first search. Spanning tree: Definition, Minimal spanning tree algorithms. Shortest Path algorithms (Prim's and Kruskal's). File Structures: File Organization, Sequential Files, Indexing and Hashing, Primary indices, Secondary indices, B+ Tree index Files, B Tree index Files, Indexing and Hashing Comparisons.**Course**

Outcomes:
CO1: Ability to analyze algorithms and algorithm correctness.
CO2: Ability to summarize searching and sorting techniques.
CO3: Ability to describe stack, queue and linked list operation.
CO4: Ability to have knowledge of tree and graphs concepts.
CO5: Describe the hash function and concepts of collision and its resolution methods
CO6: Solve problem involving graphs, trees and heaps.