UNIVERSITY OF MADRAS

B.Sc. DEGREE COURSE IN COMPUTER SCIENCE
SYLLABUS WITH EFFECT FROM 2020-2021

BCE-CSC05

CORE: JAVA AND DATA STRUCTURES

(Common paper to B.Sc.Software Applications,
B.Sc.Computer Science with Data Science and Computer Science with AI)

I/II YEAR
II/III SEM

OBJECTIVES:

- To enable the students to learn the basic concepts of Java programming
- To use class and objects to create applications
- To have an overview of interfaces, packages, multithreading and exceptions.
- To familiarize students with basic data structures and their use in algorithms.

OUTCOMES:

- Students will be able to develop Java Standalone applications and Applets.
- Choose the appropriate data structure for modeling a given problem.

UNIT - I

History and Evolution of Java - Features of Java - Object Oriented Concepts – Bytecode - Lexical Issues - Data Types – Variables- Type Conversion and Casting- Operators - Arithmetic Operators - Bitwise - Relational Operators - Assignment Operator - The conditional Operator - Operator Precedence- Control Statements – Arrays.

UNIT - II

Classes - Objects - Constructors - Overloading method - Static and fixed methods - Inner Classes - String Class- Overriding methods - Using super-Abstract class - this keyword – finalize() method – Garbage Collection.

UNIT - III

Packages - Access Protection - Importing Packages - Interfaces - Exception Handling - Throw and Throws-The Java Thread Model- Creating a Thread and Multiple Threads - Thread Priorities Synchronization-Inter thread Communication - Deadlock - Suspending, Resuming and stopping threads – Multithreading-I/O Streams - File Streams - Applets .

UNIT - IV

Abstract Data Types(ADTs)-List ADT-Array based implementation-linked list implementation-singly linked list-doubly linked list-circular linked list-Stack ADT operations-Applications-Evaluating arithmetic expressions-Conversion of infix to postfix expression-Queue ADT-operations-Applications of Queues.

UNIT - V

Trees-Binary Trees- representation - Operations on Binary Trees- Traversal of a Binary Tree -Binary Search Trees, Graphs-Representation of Graphs - Traversal in Graph -Dijkstra’s Algorithm, Depth-First vs Breadth-First Search.

TEXT BOOKS:

1. E.Balagurusamy," *Programming with Java: A Primer*", Tata McGraw Hill 2014, 5th Edition.
2. Mark Allen Weiss, "*Data Structures and Algorithms Analysis in C++*", Person Education 2014, 4th Edition.

REFERENCES:

1. Herbert Schildt, "*JAVA 2: The Complete Reference*", McGraw Hill 2018, 11th Edition.
2. Aho, Hopcroft and Ullman, "*Data Structures and Algorithms* ", Pearson Education 2003.
3. S. Sahni, "*Data Structures, Algorithms and Applications in JAVA*", Universities Press 2005, 2nd Edition

WEB REFERENCES:

- NPTEL & MOOC courses titled Java and Data Structures
- https://nptel.ac.in/courses/106106127/
- https://nptel.ac.in/courses/106105191/