

CLASS: B. Sc (Information technology)		Semester – IV	
COURSE: Java and Data Structures			
Periods per week 1 Period is 50 minutes	Lecture	5	
	TW/Tutorial/Practical	3	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	TW/Tutorial/Practical	--	50

Unit-I	Core Java: Features of Java, JVM, Data Types, Variables, and Arrays, Operators, Control Statements, type-casting, Classes, Objects and Methods, Constructor, method overriding, finalize methods.
Unit-II	Derived concepts: Inheritance, Packages and Interfaces, Exception Handling, String handling, Multithreaded Programming
Unit-III	The Java I/O Classes and Interfaces: File, Directories, Using FilenameFilter, The listFiles() Alternative, Creating Directories, The Stream Classes, The Byte Streams, InputStream, OutputStream, FileInputStream, FileOutputStream, ByteArrayInputStream, ByteArrayOutputStream, Filtered Byte Streams, Buffered Byte Streams, SequenceInputStream, PrintStream, RandomAccessFile, The Character Streams, Reader, Writer, FileReader , FileWriter, CharArrayReader, CharArrayWriter, BufferedReader, BufferedWriter, PushbackReader, PrintWriter
Unit-IV	Data Structures: Complexity and analysis of algorithms – algorithm, time and space complexity, asymptotic notations, Types of data structures, Arrays - Properties of Arrays, Duplicating an Array, sequential search algorithm, binary search algorithm, Stacks- Stack Operations, indexed Implementation, Linked Implementation, , Applications - recursion, Queue - Queue Operations, indexed Implementation, Applications, Circular Queue – insertion , deletion
Unit-V	Linked Lists – representation of linked list, traversing, searching, insertion, deletion and doubly linked list. Hash table methods – hashing functions , collision-resolution techniques

	Trees- Binary Trees, traversing binary tree, traversing algorithm using stacks, header nodes, threads, binary search trees (insertion and deletion), AVL trees , B trees
Unit-VI	Heaps – insertion and deletion Sorting – selection, bubble, merge, tree , radix , insertion Graphs – graph theory, sequential representation, adjacency matrix, path matrix, Warshall's algorithm, linked representations, operations, traversing.

Books:

Core Java for Beginners, Sharanam Shah and V Shah, The X Team SPD

Java 2 Complete Reference, 5th Edition , Osborne , Tata-McGrawhill

Data Structures, S Lipschutz, Tata-McGrawhill

Reference:

An introduction to data structures with applications, second edition, Jean-Paul Tremblay, P Sorenson, Tata-McGrawhill

Data Structures with Java, 2nd edition, J Hubbard, Tata-McGrawhill

Term Work:

*Assignments: **Should contain at least 6 assignments (one per unit) covering the Syllabus.***

Practical List:

1 Implement the following

- a. Design a java program for type casting different types of variables.
- b. Design a Calculator class in java, and implement all the methods required by calculator operations.
- c. Design a java class for method overloading and method overriding.

2 Implement the following

- a. Design a java program for different types of inheritance.

- b. Design a java class for the use of interface.
- c. Design a java class performing string operations.

3 Implement the following

- a. Design a class in java to add two complex numbers using constructors.
- b. Design a java class for performing all the matrix operations i.e addition, multiplication, transpose etc.
- c. Design a java class for implementing the packages.

4 Implement the following

- a. Design a java class for implementing the concept of threading and multithreading.
- b. Design a java class for performing all the file-operations.
- c. Design a java class for operating the random access files using

5 Implement the following

- a. Design a class for sorting the names or numbers in ascending and descending order.
- b. Design a java class for implementing the operations of stack.

6. Implement the following

- a. Design a class in java for implementing the operations of queue.(insert, delete, display, exit)
- b. Design a class in java for implementing the operations of circular queue.

7. Implement the following

- a. Design a class to implement the operations of singly link-list. (insertion , deletion, sorting, display)
- b. Design a class to implement the operations of doubly-linked list.

8. Implement the following

- a. Implement the concept of hashing technique and also show its collision avoidance.
- b. Design a class to create a tree and also implement the binary search tree.

9. Show the implementation

- a. Design a class in java for creating the heap and also show heap sort for it.
- b. Design a class in java for implementing selection and insertion sort.

10. Show the implementation for the following

- a. Design a class in java for bubble and merge sort.
- b. Design a class in java for implementing the graph