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Roll No:

C-152

**B. Tech Information Technology III Semester Examinations (Dec 2025)
Data Structures (BT-IT-203A)**

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all, selecting one question from each unit and Question 1 is compulsory. Each Question carries 12 marks.

Q.1 Attempt all parts. Each question carries 2 marks.

- (a) What is Time Complexity? State the time complexity of bubble sort in best and worst case.
- (b) Differentiate between Linear Search and Binary Search.
- (c) List any two real-life applications of Stack.
- (d) Write any two advantages of Circular Queue over Linear Queue.
- (e) Give two differences between Singly Linked List and Doubly Linked List.
- (f) Define a Binary Search Tree (BST). Write its two properties.

UNIT-I

- Q.2(a) What is an Abstract Data Type (ADT)? Explain its characteristics with a suitable example (6)
- Q.2(b) Discuss the various categories of Data Structures. Differentiate between linear and non-linear data structures with examples. (6)
- Q.3(a) Explain the different types of array representations. Demonstrate array traversal, insertion, and deletion using an example. (6)
- Q.3(b) Compare Linear Search and Binary Search techniques. Write their algorithms and State the best, worst, and average time complexities. (6)

UNIT-II

- Q.4(a) Explain the sequential implementation of a stack using arrays. Write algorithms for push, pop, and peek operations. (6)
- Q.4(b) Discuss the role of stacks in evaluating postfix expressions. Convert the expression $(A+B*C)-(D/E)(A + B * C) - (D / E)(A+B*C)-(D/E)$ into postfix . (6)
- Q.5(a) What is a linear queue? Describe its array representation and explain the enqueue and dequeue operations with an example. (6)
- Q.5(b) Explain the concept of circular queues. Describe its advantages over linear queues and write the algorithm for the enqueue operation in a circular queue. (6)

UNIT-III

- Q.6(a) What is a linked list? Explain the need for dynamic data structures and compare linked lists with arrays. (6)
- Q.6(b) Explain the different types of linked lists with diagrams. (6)
- Q.7(a) Write algorithms for insertion at the front and at the end in a singly linked list. Provide an example for each case. (6)

- Q.7(b) Explain insertion and deletion operations in a circular linked list at: (6)
i) Front
ii) After a given node

UNIT-IV

- Q.8(a) Explain the different types of binary tree traversals with suitable examples. (6)
Q.8(b) Describe Binary Search Tree (BST). Construct a BST using the following values and show the insertion process step-by-step: 45, 25, 65, 20, 30, 60, 75 (6)
Q.9(a) What is a graph? Explain adjacency matrix and adjacency list representations of a graph with diagrams. (6)
Q.9(b) Perform Breadth First Search (BFS) and Depth First Search (DFS) on the graph below, starting from vertex A, and show the traversal order: (6)
A, B, C, D, E, F
Edges: A–B, A–C, B–D, B–E, C–F

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**B. Tech Information Technology III Semester Examinations (Dec 2025)
Object Oriented Programming (BT-IT-205A)**

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all, selecting one question from each unit and Question 1 is compulsory. Each Question carries 12 marks.

	Marks
Q.1	
(a) Illustrate package. Demonstrate the significance of class path variable.	2
(b) Define JAR file. Demonstrate how it is used?	2
(c) Explain static & default methods in JAVA.	2
(d) Differentiate between the collection interface & the collection class in JAVA.	2
(e) Describe byte stream and character stream in JAVA I/O.	2
(f) Differentiate between exception & errors in JAVA.	2
UNIT-I	
Q.2(a) Explain type casting in JAVA & demonstrate this by a JAVA program.	6
Q.2(b) How JAVA is machine independent. Using proper diagram define & explain the compilation & execution of JAVA program.	6
Q.3(a) Write a program to input using scanner class from a 3X3 matrix.	6
Q.3(b) Explain method overloading. Is it possible to overload a constructor. Demonstrate with an example.	6
UNIT-II	
Q.4 Develop an abstract class media (id, description). Derive Classes Book (pagecount) & CD (playtime). Define parameterized constructor create one object of book and CD each and display the details	12
Q.5(a) Define package. How do you create a package? Explain about the access protection in package.	6
Q.5(b) With a JAVA program demonstrate the use of string Builder & string Buffer classes.	6
UNIT-III	
Q.6(a) Discuss the role of throw & throws keywords in exception handling by a JAVA program.	6
Q.6(b) Demonstrate how can you read data from a file using byte stream in JAVA provide example of reading a text file using file Input stream & Buffered Input stream.	6
Q.7(a) Discuss checked & unchecked exception using an example. Also discuss the role of try catch finally blocks in your example	6
Q.7(b) Create a user defined exception class Invalid Password Exception. Throw if	6

the password is < 8 characters.

UNIT-IV

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|--------|---|---|
| Q.8(a) | Compare & contrast ArrayList, LinkedList & Vector in JAVA with examples. | 6 |
| Q.8(b) | Explain how does the TraceMap class differ from HashMap & linked HashMap. | 6 |
| Q.9(a) | Demonstrate the role of the set interface in JAVA & how does it differ from the collection type. | 6 |
| Q.9(b) | Explain comparable interface. How it is used from sorting objects in JAVA. Demonstrate it by example. | 6 |

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B. Tech Information Technology III Semester Examinations (Dec 2025)

R Programming (BT-IT-251A)

Time- 3hrs

Max.Marks-60

Attempt 5 questions in all, selecting one question from each unit and Question 1 is compulsory. Each Question carries 12 marks.

Q.1	Marks
(a) Define RStudio. Mention its main interface components.	2
(b) List any four arithmetic operators in R.	2
(c) How are comments written in R scripts?	2
(d) Differentiate between for and while loops in R.	2
(e) Explain the role of read.table() and write.table() functions.	2
(f) What is the use of the subset() function?	2
UNIT-I	
Q.2(a) Describe the steps to install R and RStudio on a computer system.	6
Q.2(b) Explain the role of the working directory and workspace in R.	6
Q.3(a) Differentiate between script mode and interactive mode in R.	5
Q.3(b) Discuss R data objects and their conversions with examples.	7
UNIT-II	
Q.4(a) Explain array operations and indexing techniques in R.	6
Q.4(b) Discuss the use of data frames for handling heterogeneous data.	6
Q.5(a) Write short notes on conditional and looping statements in R with syntax.	5
Q.5(b) Write an R program to find the sum of elements in a vector using a loop.	7
UNIT-III	
Q.6(a) Explain how user-defined and anonymous functions are created in R.	6
Q.6(b) Illustrate data import from Excel and CSV files with suitable R commands.	6
Q.7(a) What are built-in functions in R? Explain with examples.	6
Q.7(b) Write short notes on debugging and error handling in R.	6
UNIT-IV	
Q.8(a) Explain scatter plots, line plots, and bar charts in R with syntax.	6
Q.8(b) Discuss the role of correlation and regression in data analytics using R.	6
Q.9(a) Describe how R supports statistical analysis and hypothesis testing.	6
Q.9(b) Explain the use of ggplot2 for advanced visualization with a sample program.	6

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