Reg. N[redacted]

Name

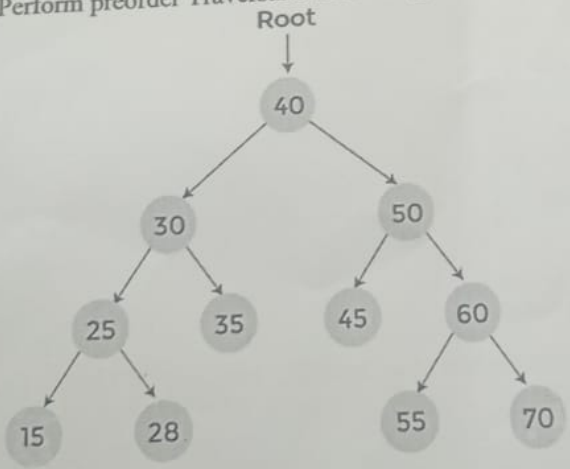
VIT BHOPAL
www.vitbhopal.ac.in

TERM END EXAMINATIONS - August 2024

Programme	:	B.Tech	Semester	:	Fall Semester 2024-2025
Course Title	:	Data Structures and Analysis of Algorithms	Course Code	:	CSD3009
Date/Session	:	27 Aug 2024/Session-I	Slot	:	B11+E11+B12+E12+B13
Time	:	3 Hrs.	Max. Marks	:	100

Answer ALL the Questions

Q. No.		Question Description	Marks
		PART A – (60 Marks)	
1	(a)	Describe the criteria for choosing the right data structure. Describe some common Data Structures along with their practical applicability.	6+6
		OR	
	(b)	Describe Abstract Data Types and their implementation in data structure? Discuss their advantages and disadvantages.	6+6
2	(a)	Convert the following Infix expression into Postfix expression using Stack: **a+b*(c^d-e)^(f+g*h)-i** What are the advantages of Postfix expression over Infix notation?	6+6
		OR	
	(b)	Write an algorithm to insert any element in a Linear Queue. Why was the concept of Circular Queue introduced? What are the characteristics of Priority Queue? Describe its various types and its applications.	4+4+4
3	(a)	Perform preorder Traversal of following tree:	12



Show the Traversal stepwise graphically and write the final output sequence of nodes after completion of preorder traversal.

OR

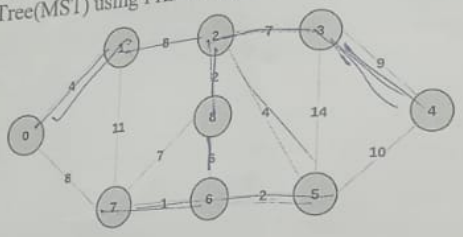
(b) Describe the concept of Threaded Binary Tree? What are its various types? Write their advantages and disadvantages. Write applications of Threaded Binary Tree. 6+6

4 (a) Explain Hash Function? Describe different types of Hash Functions? Explain the different techniques used to resolve collisions during Hashing? Describe some applications of Hashing? Write advantages and limitations of Hashing. 6+6

OR

(b) Describe Bucket Sort algorithm. Assume the input array is: 12
623, 2, 71, 3047, 39, 9138, 1
Sort above sequence using bucket sort and show each step clearly.

5 (a) Consider the following Graph as an example for which find the Minimum Spanning Tree(MST) using Prim's Algorithm: 12

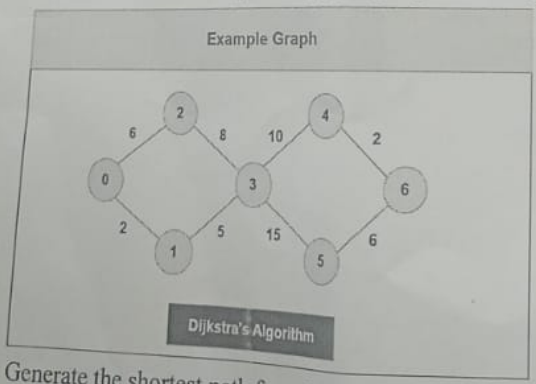


Example of a Graph

Describe stepwise and draw final structure of MST and calculate weight of the edges of the MST.

OR

(b) Consider the below Graph for applying Dijkstra's Algorithm: 12



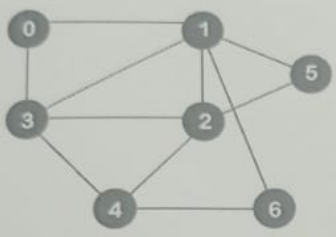
Generate the shortest path from **Node 0** to all the other nodes in the Graph. Explain stepwise.

PART B – (40 Marks)

6 Provide a visual step-by-step explanation of how recursion can be implemented using a stack. Use a specific recursive function (e.g., factorial calculation or Fibonacci series) to demonstrate how the stack grows and shrinks during the function's execution 8

7 Explain with diagram advantages of Circular Queue over Linear Queue. What are the types of Double-Ended Queue (Deque). Explain **'Insertion at the front end'** operation stepwise with diagram in Deque. 4+4

8 Perform Breadth First Search (BFS) traversal algorithm in following graph (show each step): 8

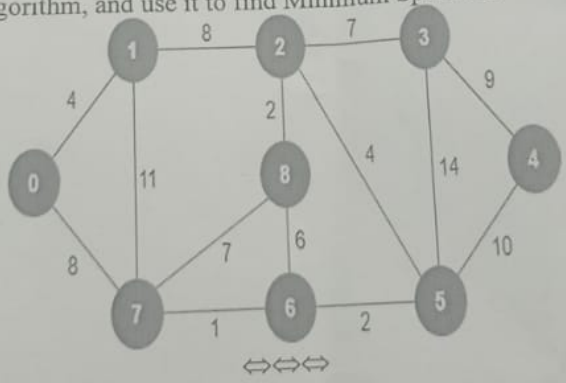


9 Explain the working of following sorting algorithms with suitable example and diagram: 4+4

(i.) Quick Sort
For it, elements of array are: **24,9,29,14,19,27**

(ii.) Selection Sort
For it, elements of Array are: **12,29,25,8,32,17,40**
Write step by step procedure.

10 Explain Kruskal's algorithm, and use it to find Minimum Spanning Tree of following Graph: 8



⇔⇔⇔