Roll No:

Hi-Tech Institute of Engineering & Technology

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
MODEL TEST PAPER
DATA STRUCTURE

Time: 3 Hours   *Total Marks: 70*

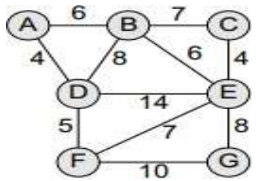**Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1.   **Attempt *all* questions in brief.**   **2 x 7 = 14**

a.	Describe the terms time and space complexity.
b.	What is Tail Recursion?
c.	Define Extended binary tree, full binary tree, strictly binary tree and complete binary tree.
d.	Write postfix notation of infix expression a*(b+c/d).
e.	Illustrate the data structure that follows LIFO order.
f.	What is time complexity of Heap sort?
g.	Write the time complexity of quicksort and bubble sorting algorithm

SECTION B

2.   **Attempt any *three* of the following:**   **7 x 3 = 21**

a.	**(a)** Following are the in-order and pre-order traversal of binary tree T. Construct the binary tree T. In-order: D B H E A I F J C G Pre-order: A B D E H C F I J G
b.	What is recursion? Write a recursive program to find sum of digits of the given number. Also, calculate the time complexity.
c.	Write an algorithm for PUSH and POP operations in stack. Transform the following expression into its equivalent postfix expression using stack: A+(B*C-(D/E^F)*G)*H.
d.	Write the Quicksort algorithm and illustrate the steps of the algorithm to sort the following data: 25, 143, 454, 75, 28, 148, 435, 566, 34.
e.	Apply prims algorithm to find the minimum cost spanning tree on the given graph.

SECTION C

3.   **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a)	What is a B-Tree? Generate a B-Tree of order 4 with the alphabets(letters) arrive in the sequence as follows: a g f b k d h i n j e s i r x c l n t u p.
(b)	Illustrate the structure of the circular linked list. Write an algorithm to add a new node at the beginning of the circular linked list.

4.   **Attempt any *one* part of the following:**   **7 x 1 = 7**

(a)	What is hashing? Give the characteristics of hash function. Explain collision resolution technique in hashing.

(b)	Explain how a circular queue can be implemented using arrays. Write all functions for circular queue operations.

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BTECH
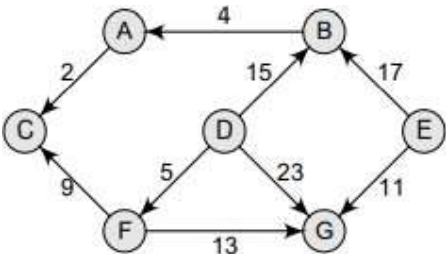**(SEM III) THEORY EXAMINATION 2021-22**
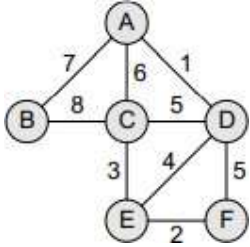**DATA STRUCTURES**

5. Attempt any *one* part of the following: **7 x 1 = 7**

(a)	Construct the binary tree using the following traversals In-Order Traversal : D B H E I A F J C G Post-Order Traversal: D H I E B J F G C A
(b)	Construct the Huffman tree using the following (node, Frequency) pairs A 7, B 9, C 11, D 14, E 18, F 21, G 27, H 29, I 35, J 40.

6. Attempt any *one* part of the following: **7 x 1 = 7**

(a)	Write the Dijkstra algorithm. Apply the algorithm on the following graph to find the single source shortest path. (Assume A as source).
(b)	Apply BFS and DFS Algorithms on the following graph.

7. Attempt any *one* part of the following: **7 x 1 = 7**

(a)	Describe the term AVL Tree. Illustrate step-by-step construction of AVL tree using the following data. 23,45,13,56,4,6,7,32,84,89,37,96
(b)	Write a program to implement merge sort algorithm.