S.No. : 94

NCS 4302/4305

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Following Paper ID and Roll No. to be filled in your Answer Book.

**PAPER ID : 43205** Roll No.

# B. Tech. Examination, 2024-25

## (Odd Semester)

## DATA STRUCTURE USING 'C'

*Time : Three Hours]* *[Maximum Marks : 60*

*Note :–* Attempt all questions.

## SECTION–A

1. Attempt all parts of the following : 8×1=8

   (a) What is a data structure?

   (b) Define an array.

   (c) Define a pointer in C.

   (d) What is stack overflow?

   (e) What is the main difference between a stack and a queue?

*[P. T. O.*

(f) Define a singly linked list.

(g) Define the root node.

(h) Define the degree of a node in a graph.

## SECTION – B

2. Attempt any two parts of the following : 2×6=12

(a) Write a 'C' program to insert an element into the queue and delete the element from the queue.

(b) Define the term three traversal. Construct the binary search tree of following :

85, 90, 45, 60, 25, 35, 10, 20, 75, 95

And traverse the above BST in postorder.

(c) Write a 'C' program to implement quick-sort and define best, average and worst-case complexities.

(d) Describe depth first search (DFS) for traversing graph. Illustrate the working of DFS algorithm with a suitable example.

## SECTION – C

**Note :–** Attempt all questions. Attempt any two parts from each questions. 8×5=40

3. (a) Explain the difference between linear and binary search algorithms.

   (b) Write a C program that perform push, pop and display operations on the stack.

   (c) Describe how a priority queue can be implemented using array and write the corresponding 'c' code.

4. (a) Describe the inorder, preorder and post-order tree traversal methods.

   (b) Write a 'C' program to perform binary search on a sorted array and give its time complexity.

   (c) Describe chaining and linear probing collision resolution techniques in hashing.

5. (a) Explain the Tower of Hanoi problem. Write a 'C' program to solve the problem using recursion.

   (b) Write a 'C' program to find the shortest path between nodes in a weighted graph.

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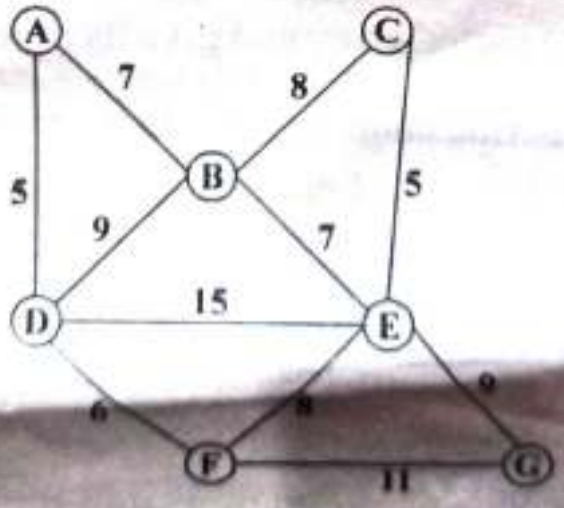
(c) Define balanced binary tree and why it is important. Describe AVL tree as an example of balanced binary tree.

6. (a) Explain the difference between singly linked list and doubly linked list.

(b) Construct a tree for a given inorder and postorder traversal :

Inorder : D H B E A F C I G J
postorder : H D E B F I J G C A

(c) Compute the minimum spanning tree and its costs for the following graph using Prim's algorithm. Indicate each steps :




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1,250