

S.No. : 181

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B. Tech. Examination 2021-22

(Even 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) List the applications of data structure.
- (b) Which data structure is used to perform recursion?
- (c) What is a postfix expression?
- (d) What are the advantages of linked list over an array?

[P. T. O.

- (e) What is the maximum number of nodes in a binary tree of height k ?
- (f) How will you check whether the given binary tree is binary search tree or not?
- (g) What do you understand by a spanning tree?
- (h) Which data structure are used in BFS and DFS algorithm?

SECTION – B

2. Attempt any two parts of the following : $2 \times 6 = 12$

- (a) Write a 'C' program to input 4×4 matrix and to determine :
 - (i) Summation of diagonal elements
 - (ii) Product of diagonal elements
- (b) Given the following arithmetic expression in infix notation as :

$$12 / (7 - 3) + 2 \times (3 + 8) - 7$$

Translate this expression into postfix notation and then evaluate it.

- (c) Discuss the binary search tree that results from inserting into an initially an empty tree records with key given below in order E, A, S, Y, Q, U, E, S, T, I, O, N and then deleting the key Q.
- (d) Which are the two standard ways of traversing a graph? Explain them with an example of each.

SECTION – C

Note :- Attempt all questions from this section.

10×4=40

3. Attempt any two parts of the following :

- (a) Define algorithm and data structure. Give the difference between linear and non-linear data structures with example.
- (b) Define the term array. How are two dimensional array represented in memory? Explain how address of an element is calculated in a two-dimensional array?
- (c) Define recursive function. What are the essential conditions to be satisfied by a recursive function?

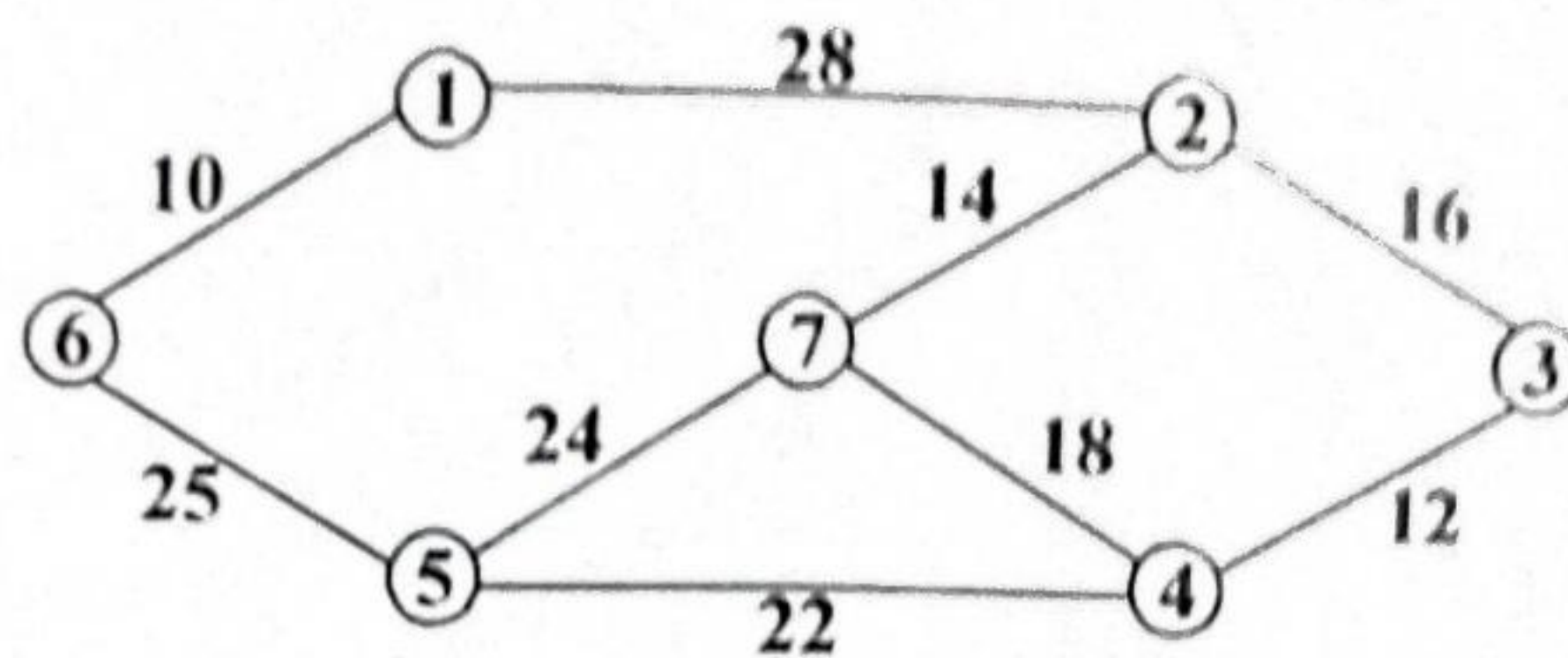
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4. Attempt any two parts of the following :
- (a) Write an algorithm for evaluating an expression in postfix form.
 - (b) What are circular queues? Write down 'C' functions for inserting and deleting elements from a circular queue implemented using arrays.
 - (c) Write short notes on the following :
 - (i) Garbage collection
 - (ii) Overflow and underflow
5. Attempt any two parts of the following :
- (a) What is a balance factor in AVL trees? Insert following values 50, 20, 60, 10, 8, 15, 32, 46, 11, 48 into an empty AVL tree.
 - (b) What is the output of selection sort after the second iteration given the following sequence :

16, 3, 46, 9, 28, 14
 - (c) Construct a B-tree of order 3 by inserting numbers from 1 to 10.

6. Attempt any two parts of the following :

- (a) How are graphs represented inside a computer's memory? Which method do you refer and why?
- (b) Construct the Minimum Spanning Tree (MST) for the given graph using prime algorithm :



- (c) Write Warshall algorithm to find shortest path between any two vertices of a graph. Explain the algorithm briefly.
