[5925]-215

S.E. (E & TC/Electronics)
DATA STRUCTURES
(2019 Pattern) (Semester - III) (204184)

Time : 2½ Hours]   *[Max. Marks : 70*

Instructions to the candidates:

1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.*

2) *Neat diagrams must be drawn wherever necessary.*

3) *Figures to the right side indicate full marks.*

4) *Assume suitable data, if necessary.*

Q1) a) What is ADT? Explain stack as an ADT. **[4]**

b) Write a structure for stack using array. Write PUSH and POP function for stack using array. **[8]**

c) Evaluate following postfix expression with the help of stack. **[6]**

5 3 + 6 2/*3 5*+

OR

Q2) a) What is Queue? Explain insertion and deletion operation in Queue with suitable diagram. **[6]**

b) Explain with example: **[6]**

i) Linear Queue

ii) Circular Queue

c) Write C functions for : **[6]**

i) Enqueue in Linear Queue

ii) Dequeue in Circular Queue

Q3) a) Write structure definition for single Linked list. Differentiate between static memory and dynamic memory allocation. **[6]**

b) Write following C functions in SLL: **[6]**

i) Insert a node at the beginning

ii) Delete a node at the end

c) State the limitations of single linked list. Represent following polynomial using linked list. **[5]**

$$20x^9 + 15x^7 + 10x^5 + 5x + 50$$

OR

Q4) a) Write structure definition for double Linked list. Differentiate between array and linked list. **[6]**

b) State the limitations of array. Draw and explain double linked list. **[5]**

c) Write following C functions in circular in SLL. **[6]**

    i) Insert a node at the end

    ii) Delete all nodes in the list

Q5) a) Define binary tree. Explain following terms with suitable examples: **[7]**

    i) Root node

    ii) Left and right sub tree

    iii) Depth of tree

b) Construct the Binary Search Tree (BST) from the following data: **[5]**

CAR, BAG, MAN, ADD, SAD, FAN, TAN

c) Write recursive function for in-order, pre-order and post-order traversal of Binary tree. **[6]**

OR

Q6) a) Define the following terms with suitable example with respect to Binary tree: **[6]**

    i) Strictly Binary Tree

    ii) Completely Binary Tree

    iii) Binary Search Tree

b) Construct the binary search tree (BST) from the following elements: **[6]**

45, 20, 80, 40, 10, 90, 70

Also, show pre-order and post-order traversal for the same.

c) What is AVL tree? Explain all the rotations in AVL tree. Construct AVL tree for the following data: **[6]**

1, 2, 3, 4, 5, 6

Q7) a) What do you mean by adjacency matrix and adjacency list? Give the adjacency matrix and adjacency list for the graph shown below: **[6]**
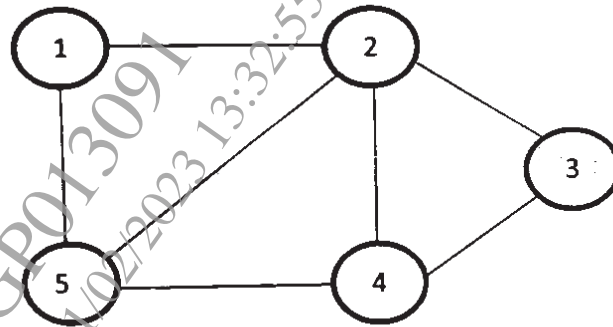

Fig. 1

b) Explain with suitable example, DFS and BFS traversal of a graph. **[5]**

c) Define with an example: **[6]**

   i) Undirected Graph

   ii) Directed Graph

   iii) Weighted Graph

OR

Q8) a) Define indegree and outdegree of a vertex in graph. Find the indegree and outdegree of following graph. **[6]**
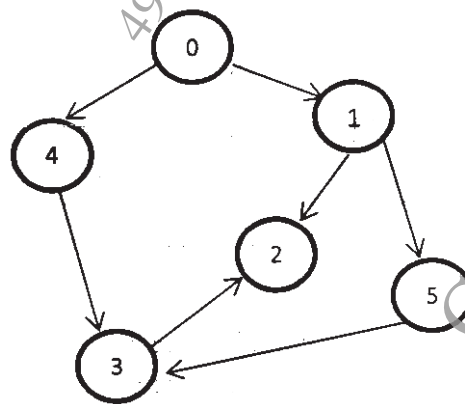

Fig 2

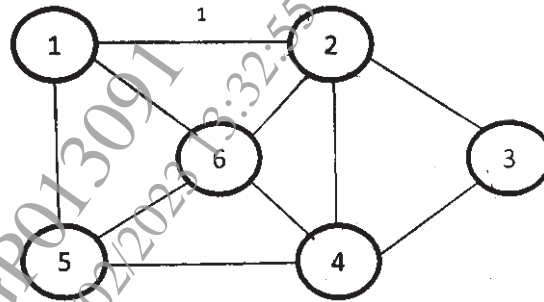b) Find out Minimum Spanning Tree of the following graph (figure 3) using Kruskal's algorithm. **[6]**

Fig 3

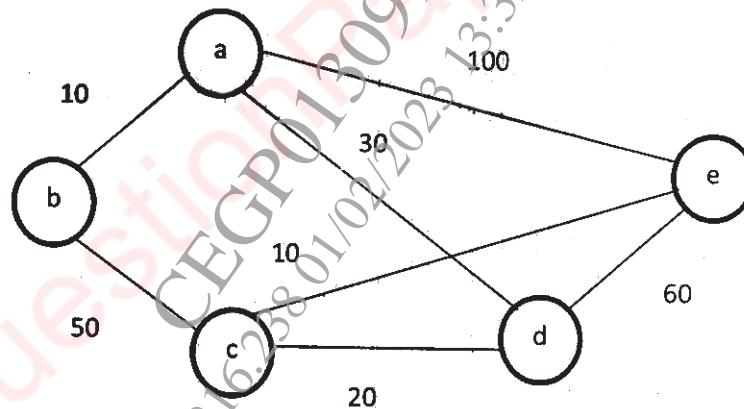c) Find the shortest path from node 'a' to all nodes in the graph shown in fig.4 using Dijkstra's algorithm. **[6]**

Fig 4

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