

**Data Structures - (BCA-201)**

**Duration: 2 Hours**

**Total Marks: 50**

**Instructions:**

- 1) All Questions are **Compulsory**.
- 2) Figures to the right indicate Full Marks.
- 3) Write your **Seat number** in the space provided on the top of this page.
- 4) Start each new question on a fresh page

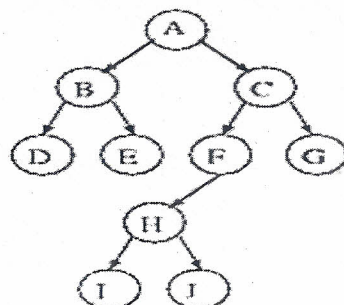
**Q1. A) Define the following in 1-2 lines.**

[5]

- a) Internal sorting & External Sorting.
- b) Singly linked list.
- c) Non-linear Data Structures
- d) Weighted graph
- e) Stack

**Q1. B) Answer the following given the tree structure as below.**

[5]



- a) Define depth of tree. State the depth of tree for the above given figure.
- b) Define Right subtree. Name the nodes of Right subtree.
- c) Define ascendant. Name the ascendant nodes of H.
- d) What do you mean by *level* in a tree. Give the level of node E.
- e) Name the descendant nodes of node C.

**Q2.) Answer the following.**

- i) When fixed large amount of data needs to be stored which data structure you will select & why? [2]
- ii) Write algorithm to delete an element from an array. [3]
- iii) Apply *insertion sort* algorithm to sort the given array in ascending order showing all required steps.

|    |    |    |    |    |
|----|----|----|----|----|
| 45 | 24 | 19 | 59 | 33 |
|----|----|----|----|----|

[5]

Q3.) Answer the following.

- i) Explain the concept of heap tree. [2]
- ii) Write the recursive algorithm of *Postorder* traversal of tree. [3]
- iii) Write an algorithm to implement *enqueue* & *dequeue* operations of queue. [5]

Q4.) Answer the following

- a) Transform the following in-fix expression to pre-fix expression showing all the steps.  
 $P / (Q - R) * S^2 + T$  [2]
- b) Write an algorithm to insert a node at the end of the linked list. [3]
- c) Consider the linked list given below and show how to do the following operations one after the other.  
Take resultant list of the previous operation as input to next the operation. [5]

- i. Insert node with key 59 before node with key 36
- ii. Insert node with key 63 at head
- iii. Insert node with key 88 at tail
- iv. Delete node with key 98
- v. Delete a node from head



Q5) Answer the following.

- i) What is a Spanning Tree of a Graph? If Node  $V_8$  is deleted from graph with its edges, what type of tree it changes to. Justify. [2]
- ii) Give the adjacency list for the graph in Fig i [3]
- iii) Explain Breadth -First Search traversal on the graph given below showing all steps. Consider  $V_1$  as the source node. [5]

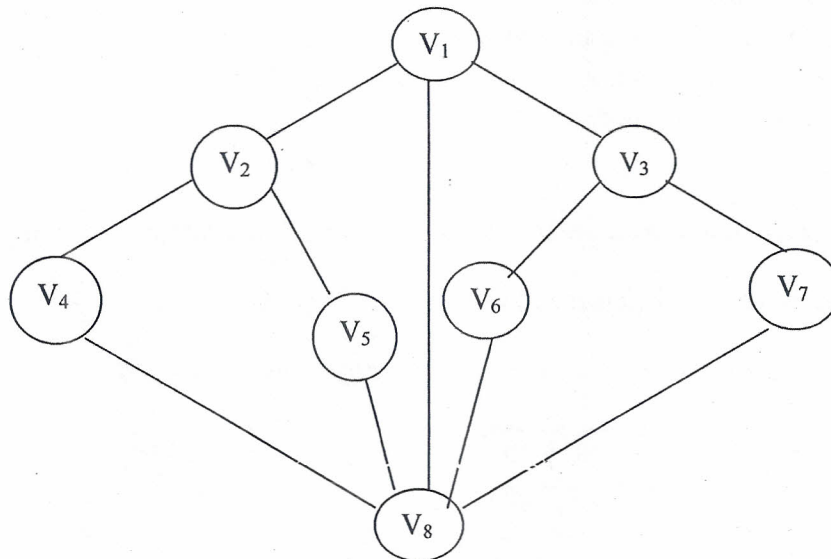


Fig i