



# 17330

11718

3 Hours / 100 Marks

Seat No.

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- Instructions :*
- (1) All questions are **compulsory**.
  - (2) Illustrate your answers with **neat sketches wherever necessary**.
  - (3) Figures to the **right indicate full marks**.
  - (4) Assume suitable data, if **necessary**.

**Marks**

1. A) Attempt **any six** of the following :

**12**

- a) List any four operations performed on data structure.
- b) Define the term algorithm. Also list approaches to design an algorithm.
- c) State any two differences between linear search and binary search.
- d) Define the terms pointer and NULL pointer.
- e) Define tree. State its two types.
- f) Give complexity of following methods :
  - i) Bubble sort
  - ii) Radix sort
  - iii) Linear search
  - iv) Binary search.
- g) State any two applications of graph.
- h) Define following terms :
  - i) Height of tree
  - ii) Degree of a node.

B) Attempt **any two** of the following :

**8**

- a) Describe with example, time complexity and space complexity of an algorithm.
- b) Perform radix sort on the following list to arrange all array elements in ascending order :  
18, 253, 1000, 2, 80, 75, 58

**P.T.O.**



c) Define following terms :

- 1) Priority Queue
- 2) Dequeues
- 3) Queue as an Abstract Data Type
- 4) Empty Queue.

2. Attempt **any four** of the following :

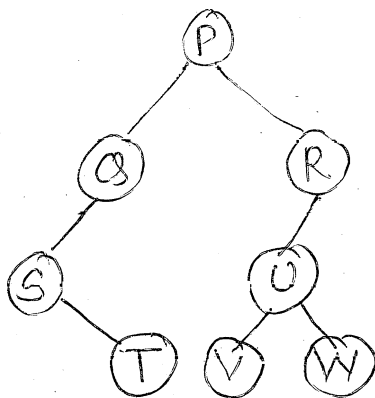
16

- a) Describe working of selection sort method with suitable example.
- b) Write a 'C' program to display Fibonacci series using recursive function.
- c) Describe with example advantage of doubly linked list over linear linked list.
- d) With suitable example, describe preorder traversal of tree. Also write algorithm for preorder traversal.
- e) Write a 'C' program to insert an element in a queue.
- f) Write a 'C' program to perform bubble sort on array of size N.

3. Attempt **any four** of the following :

16

- a) Describe stack as an abstract data type.
- b) Define circular queue. Also describe advantage of circular queue over linear queue.
- c) Describe how to delete a node from linear linked list.
- d) Differentiate between general tree and binary tree (Any four points).
- e) Define binary tree. Traverse the following tree in inorder, preorder and postorder.



- f) Describe concept of hashing with example. Also describe problem of collision in hashing.



[3]

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Marks

4. Attempt **any four** of the following :

16

- a) Describe classification of data structure with example of each.
- b) Describe following terms with suitable diagram :
  - i) Stack overflow
  - ii) Stack underflow.
- c) Describe working of dequeue with suitable example.
- d) With example, describe how circular linked list works when a node is deleted from beginning of list.
- e) Write a 'C' program to insert new node at the end of linear linked list.
- f) Draw an expression tree for following expression :

$$(a^3 + b^2 + c + de)^7 / (5f - 3h)^2 \cdot$$

5. Attempt **any two** of the following :

16

- a) Describe working of binary search method. Give stepwise procedure to search 65 in the following list :  
List : 23, 12, 5, 29, 10, 65, 55, 70
- b) Convert following infix expression into a postfix expression. Show all steps.  
 $(P + (Q * R - (S/T \uparrow U) * V) * W)$
- c) Describe Depth First Search traversal of graph with example.

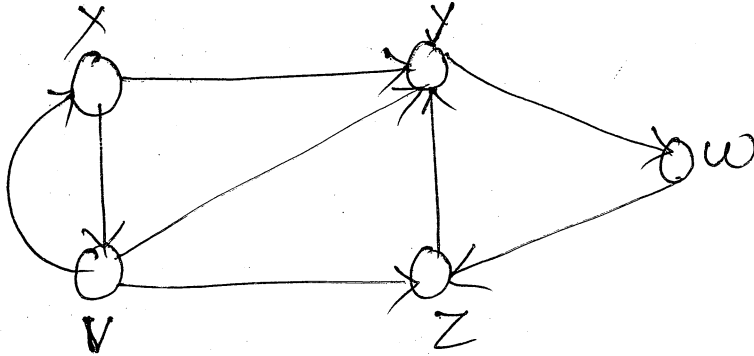
6. Attempt **any two** of the following :

16

- a) Describe push and pop operations on stack. Also write algorithm for push and pop operations.
- b)
  - i) Create a binary search tree using following elements :  
25, 11, 95, 45, 65, 20, 22, 78, 5, 10, 98, 76.
  - ii) Write an algorithm to insert a node in a binary search tree.



c) Consider the graph 'G' in following figure :



- i) Find all simple path from X to Z.
  - ii) Find indegree and outdegree of nodes Y and Z.
  - iii) Find adjacency matrix A for the above graph.
  - iv) Give adjacency list representation of above graph.
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