11718

3 Hours / 100 Marks   Seat No.

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.

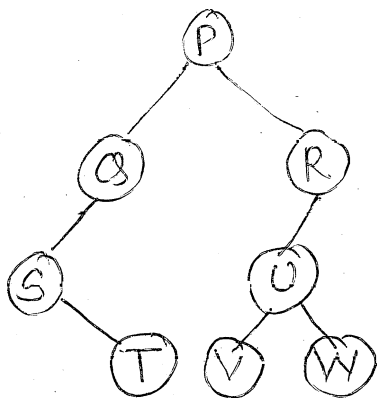**2.** Attempt **any four** of the following :   **16**

  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.

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 :

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

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 :
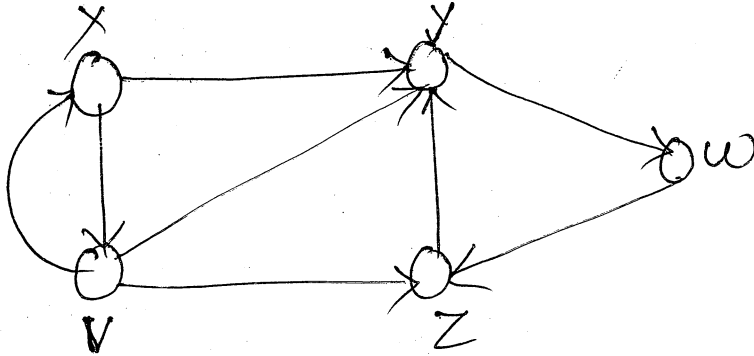
   i) Find all simple path from X to Z.

  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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