

17330

15116

3 Hours / 100 Marks

Seat No.

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Instructions : (1) All Questions are *compulsory*.

(2) Answer each next main Question on a new page.

(3) Illustrate your answers with neat sketches wherever necessary.

(4) Figures to the right indicate full marks.

Marks

1. (A) **Attempt any SIX :**

12

(a) Define time complexity and space complexity.

(b) Define data structure. Enlist any two types of non-linear data structure.

(c) Define searching. State two advantages of searching.

(d) Define push and pop operation of stack.

(e) Define the terms of tree-node, leaf, sibling, in-degree.

(f) Define tree traversal. List different types of tree traversal.

(g) What is sorting ? Enlist two categories of sorting.

(h) Define hashing.

(B) **Attempt any TWO :**

8

(a) Describe any four operations on data structure.

(b) Distinguish between linear search and binary search. (any 4 points)

(c) Define the terms FRONT and REAR of queue. Enlist any four operations of queue.

P.T.O.

2. Attempt any FOUR : **16**

- (a) Describe quick sort. State its advantages and disadvantages.
- (b) Convert infix string $((A + B) * (C - D)) / (E + F)$ into prefix string with stack. Show the content of stack in each step.
- (c) List and define operations of linked list.
- (d) Describe the process of pre-order traversal of binary tree. Give one example.
- (e) Write a 'C' program to implement a queue with insert and delete operation.
- (f) Write a program in 'C' language for selection sort. Write complexity of selection sort.

3. Attempt any FOUR : **16**

- (a) Write an algorithm to convert infix string to postfix (fully parenthesized).
- (b) Describe how queue works as an abstract data type.
- (c) Distinguish between singly linked list and doubly linked list. (4 points)
- (d) Define tree. Create a binary tree for following data : 12, 25, 14, 8, 3, 5.
- (e) Write a 'C' program to traverse the tree in in-order.
- (f) Define the following terminologies with respect to graph :
 - (i) direct graph
 - (ii) successor
 - (iii) predecessor
 - (iv) path

4. Attempt any FOUR : **16**

- (a) Describe Top-down and bottom-up approach by giving example.
- (b) Describe the representation of stack using arrays.
- (c) Write the procedure for inserting and deleting an element from queue.
- (d) Write an algorithm to traverse a singly linked list.
- (e) Write a 'C' program to insert a new node at the beginning into singly linked list.
- (f) Draw the tree structure for the following expression :

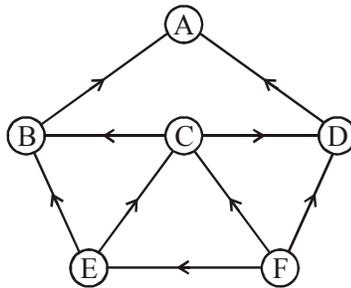
$$(5x + 7y) / (3x + 5y + 3z)^2$$

5. Attempt any TWO :**16**

- (a) Describe radix sort algorithm. Sort the following numbers in ascending order using radix sort.
12, 8, 25, 4, 66, 2, 98, 225.
- (b) Consider the following arithmetic expression written in postfix notation :
10, 2, *, 15, 3, /, +, 12, 3, 2, ↑, +, †. Evaluate this expression to find its value.
- (c) Describe the breadth first search technique with suitable example.

6. Attempt any TWO :**16**

- (a) Describe the term stack overflow and stack underflow with example. State any four applications of stack.
- (b) Compare between General Tree and Binary Tree (any 4 points).
- (c) Consider the graph given below :



- (i) Give adjacency matrix representation.
- (ii) Give adjacency list representation of graph.
