313301

3 Hours / 70 Marks

Seat No.

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.

(5) Assume suitable data, if necessary.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. **Attempt any FIVE of the following :** 10

   a) List any four applications of data structure.

   b) State the LIFo Principle of stack.

   c) Define heap data structure.

   d) List any four applications of stack data structure.

   e) Define the term binary tree and binary search tree.

   f) Define searching. State the two methods of searching.

   g) List types of Queue data structure.

Marks

2. **Attempt any THREE of the following :** **12**

a) Sort the following array in ascending order using insertion sort

30, 10, 40, 50, 20, 45

b) Write 'C' program to sort an array of strings using the bubble sort algorithm.

c) With neat diagram describe any two terms from the following:

Node, Null Pointer, Empty list with respect to singly linked list

d) Describe following terms with respect to tree data structure

i) Leaf node of a tree

ii) Sibling

iii) Degree of a tree

iv) Depth of a tree

3. **Attempt any THREE of the following :** **12**

a) Write an algorithm to insert an element at the beginning of singly linked list.

b) Write down step-by-step conversion of the following infix expression to postfix expression using stack

((A + B) * C) ∧ (D − E)

c) Write 'C' program for deletion of an element from an array.

d) Write an algorithm for in order and post order traversal of binary tree.

Marks

4. **Attempt any <u>THREE</u> of the following :** 12

a) In an array find the position of element 30 using binary search method.

b) Construct a binary search tree for the given numbers :

50, 33, 44, 22, 77, 35, 60, 40

Present each step of construction of BST diagrammatically.

c) Write a C program to implement singly linked list with operation

i) insert at end

ii) Display the list

d) Describe stack over flow and stack underflow condition with the help of example.

e) Show the effect of insert and delete operations on to the linear queue of size 10. The linear queue sequentially contain 11, 22, 33, 44 and 55 where 11 is at front of queue.
Show diagrammatically the effect of

i) INSERT (60)

ii) INSERT (70)

iii) Delete

iv) INSERT (80)

5. **Attempt any <u>TWO</u> of the following :** 12

a) Write 'C' program to insert into and delete the element into from linear queue.

b) Differentiate between singly linked list and doubly linked list (minimum six points)

c) Draw the expression tree of the following expressions

i) $(2a + 5b)^3 * (x - 7y)^4$

ii) $(a - 3b) * (2x - y)^3$

Marks

6. **Attempt any TWO of the following :** **12**

a) Describe the working of linear search with example.

b) Evaluate the following post fix expression with suitable diagram using stack

10, 2, * 15, 3, /, +, 12, 3, +, +

c) Describe circular linked list with suitable diagram. Also state the advantages of circular linked list over linear linked list.

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