

17330

**21819**

**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.
  - (5) Use of Non-programmable Electronic Pocket Calculator is permissible.

**Marks**

**1. (A) Attempt any SIX of the following :**

**12**

- (a) Define searching. Give its type.
- (b) Define a complete binary tree.
- (c) Define following w.r.t. tree :
  - (i) tree
  - (ii) leaf node
- (d) Give classification of data structure.
- (e) Define following w.r.t. tree :
  - (i) node
  - (ii) arcs
- (f) Write polish notations.
- (g) Explain space complexity with example.
- (h) Write Linear search algorithm.

[1 of 4]

**P.T.O.**

**(B) Attempt any TWO :****8**

- (a) Explain 'Queue Full' and 'Queue Empty' condition with suitable example.
- (b) State the need of data structure. Write the operations performed using data structure.
- (c) Describe binary search algorithm. Give example to search an element using binary search.

**2. Attempt any FOUR :****16**

- (a) What is collision resolution techniques ? State its types.
- (b) Draw tree structure for following expression :  
$$[3A + 7B] - [(6D - 4E)^6 + C]$$
- (c) Draw binary search tree using following elements :  
53, 40, 7, 15, 25, 3, 35, 100, 10, 82, 70, 28
- (d) Describe following operations on single linked list :
  - (i) Inserting a new node in a linked list
  - (ii) Deleting a new node from a linked list
- (e) Write any four applications of Queue.
- (f) Describe PUSH and POP operation on stack.

**3. Attempt any FOUR :****16**

- (a) Sort following elements by Radix sort algorithm :  
87, 3, 234, 729, 359, 45, 8, 379, 320, 422
- (b) Write program to search an element in an array. Display position of element.

- (c) Explain Queue as an abstract data type.
- (d) Explain Binary tree traversal. Write algorithm for following :
  - (i) In-order traversal
  - (ii) Pre-order traversal
  - (iii) Post-order traversal
- (e) Write an algorithm to search an element from single linked list.
- (f) Find out prefix equivalent of following expressions :
  - (i)  $[(A + B) + C] * D$
  - (ii)  $A + [(B * C) + D]$

**4. Attempt any FOUR :****16**

- (a) Explain different approaches for designing an algorithm.
- (b) Write a program to find factorial of a number using recursion.
- (c) Define queue. Write an algorithm to delete an element from a queue.
- (d) Write an algorithm to insert and delete element from circular linked list.
- (e) Explain linked list as an abstract data structure.
- (f) Describe general tree and binary tree.

**5. Attempt any TWO :****16**

- (a) Write an algorithm for insertion sort and arrange given numbers in ascending order using insertion sort :  
9, 15, 5, 20, 10
- (b) Convert given infix expression to postfix expression using stack  
 $(A + B) * D + E / (F + A * D) + C$
- (c) Explain BFS with suitable example.

**P.T.O.**

**6. Attempt any TWO :****16**

- (a) Describe the process of pre-order traversal and post-order traversal of a binary tree with suitable example.
- (b) Explain sequential and linked representation of graph with suitable example.
- (c) State principle of stack and evaluate following post-fix expression using stack.

6, 2, 3, +, -, 3, 8, 2, 1, +, \*, 2 φ3, +

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