

22317

**21222**

**3 Hours / 70 Marks**

Seat No.

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15 minutes extra for each hour

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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. Attempt any FIVE of the following :**

**10**

- (a) Define linear data structure and non-linear data structure.
- (b) Enlist operations on stack.
- (c) Define : (i) General tree (ii) Binary tree
- (d) Draw the diagram of circular queue with front and rear pointers.
- (e) Describe given two types of graphs : Directed and Undirected graph.
- (f) Define Abstract Data Type.
- (g) State any four applications of queue.

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

**12**

- (a) Describe the working of Bubble sort method with an example.
- (b) Write an algorithm to traverse a linked list.
- (c) Explain Queue overflow and underflow conditions with examples.
- (d) Explain the following terminologies with respect to graph :
  - (i) In degree
  - (ii) Out degree
  - (iii) Successor
  - (iv) Predecessor

[1 of 4]

**P.T.O.**

## 3. Attempt any THREE of the following :

12

(a) Describe time and space complexity with example of each.

(b) Evaluate the following postfix expression :

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

Show diagrammatically each step of evaluation using stack.

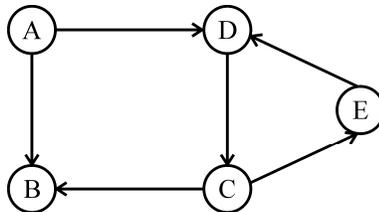
(c) Find the position of element 30 using Binary search method in array

A = {10, 5, 20, 25, 8, 30, 40}

(d) For the following graph :

(i) Give adjacency matrix representation

(ii) Give adjacency list representation



## 4. Attempt any THREE of the following :

12

(a) Describe the working of radix sort with example.

(b) Construct a binary search tree for following elements :

22, 27, 14, 31, 40, 43, 44, 10, 20, 35

Show each step of construction of BST.

(c) Write an algorithm to insert a new node at the beginning of a Singly linked list. Give example.

(d) Write a 'C' program to calculate the factorial of number using recursion.

(e) Describe circular linked list with suitable diagram. Also state advantage of circular linked list over linear linked list.

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

- (a) Write a program to implement a stack with push, pop and display operations.
- (b) Draw tree for given expression and find pre-order and post-order traversal.  
 $(2b + 5c)^2 (4d - 6e)^5$
- (c) Write an algorithm to search an element in linked list.

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

- (a) Describe the working of Selection Sort Method. Also sort given input list in ascending order using selection sort.  
Input list : 50, 24, 5, 12, 30
- (b) Convert the following Infix expression to its prefix form using stack. Show the details of stack at each step of conversion.  
Expression :  $P * Q \uparrow R - S / T + (U/V)$
- (c) Create a Singly linked list using data fields 70, 50, 30, 40, 90. Search a node 40 from the singly linked list & show procedure step-by-step with the help of diagram from start to end.
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