

# 17330

**14115**

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

**Marks**

1. a) Attempt any **SIX** of the following: **12**
- (i) Define data structure and give it's classification.
  - (ii) Enlist various types of operation on data structure.
  - (iii) Define sorting. Enlist different sorting technique.
  - (iv) State applications of stack.
  - (v) Explain following tree terminology with the help of diagram.
    - 1) Siblings
    - 2) Height of Tree
  - (vi) Define directed edge of a tree.
  - (vii) Differentiate between the Radix sort and Shell sort methods.
  - (viii) Define hashing.

P.T.O.

b) Attempt any **TWO** of the following: **8**

- (i) Describe the different approach to design an algorithm.
- (ii) Write a program for sorting the array of 10 elements using the Bubble sort method.
- (iii) Describe the queue as abstract data type.

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

- a) Describe Binary search with an example.
- b) Find out infix equivalent of the following postfix expression.
  - (i)  $AB + C * D -$
  - (ii)  $ABC * + D -$
- c) Write an algorithm to insert a new node at the beginning of a singly linked list. Give example.
- d) Define the term related to Binary Tree: Root node, Leaf node, Level and Depth.
- e) Define circular queue. Explain insertion and deletion operation on circular queue.
- f) Describe merge sort algorithm with an example and state its time complexity.

3. Attempt any **FOUR** of the following: **16**

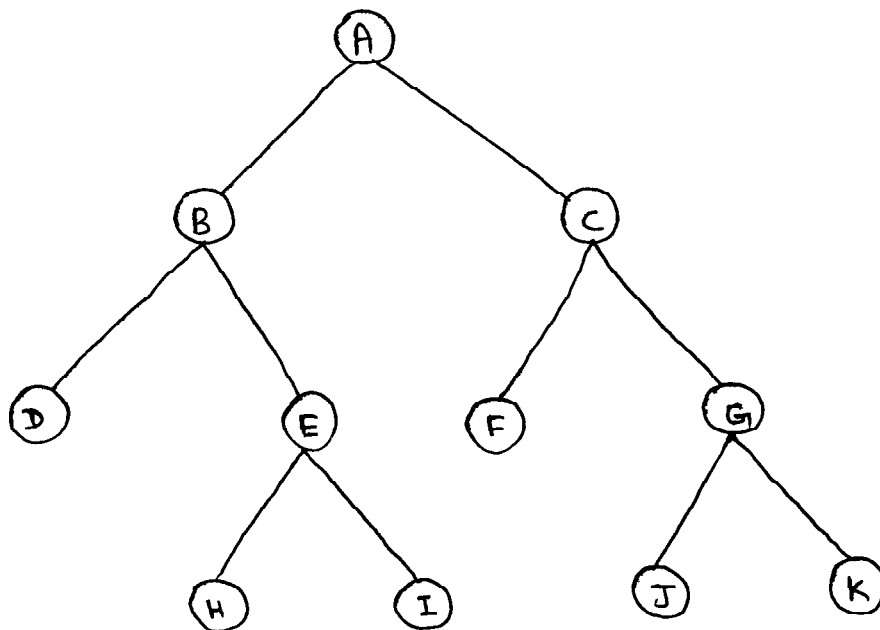
- a) Explain PUSH and POP operation on stack using Array representation.
- b) Describe priority queue with suitable example.
- c) Write an algorithm for 'search' operation in an unsorted linked list.

- d) Describe weight balanced tree and height balanced tree along with an example.
- e) Describe expression tree with an example.
- f) Explain the following term with respect to graph using suitable example.
  - (i) In-degree
  - (ii) Out-degree

4. Attempt any **FOUR** of the following:

16

- a) Describe algorithm analysis in term of time complexity and space complexity.
- b) Explain the term 'overflow' and 'underflow' with respect to stack use suitable data and diagram.
- c) Write a procedure for inserting an element in a queue.
- d) Describe doubly linked list with an example.
- e) Explain how to delete a node in linked list.
- f) Perform in-order, post-order and pre-order traversal of binary tree, Refer Figure No. 1.



**Fig. No. 1**

**5. Attempt any TWO of the following:****16**

- a) Describe insertion sort algorithm and give steps of insertion sort for sorting the following list in ascending order.

List : 2, 15, 42, 26, 39, 92, 20

also find total number of comparison made.

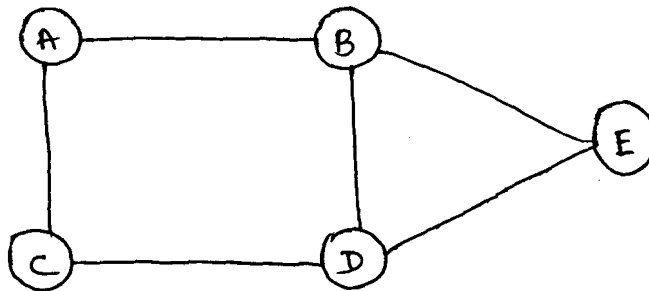
- b) Define recursion. Write a 'C' program to calculate the factorial of number using recursion.
- c) Describe the depth first search traversal of graph.

**6. Attempt any TWO of the following:****16**

- a) Convert the following infix expression into a postfix expression and show details of stack at each step of conversion.

Expression:  $((A + B) * D) ^ (E - F)$

- b) Write a program to count the number of node in a Binary Search Tree.
- c) Consider the graph shown in Figure No. 2.
- (i) Give adjacency matrix representation.
- (ii) Give adjacency list representation of the graph.



**Fig. No. 2**

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