



- Notes :
1. All questions carry marks as indicated.
  2. Solve Question 1 OR Questions No. 2.
  3. Solve Question 3 OR Questions No. 4.
  4. Solve Question 5 OR Questions No. 6.
  5. Solve Question 7 OR Questions No. 8.
  6. Solve Question 9 OR Questions No. 10.
  7. Solve Question 11 OR Questions No. 12.
  8. Due credit will be given to neatness and adequate dimensions.

1. a) Write the binary search algorithm. 5
- b) Write down the algorithm for quick sort and simulate the sequence. 8  
43, 23, 75, 12, 67, 58, 93, 38, 99, 87, 71. Also discuss the time complexity.

**OR**

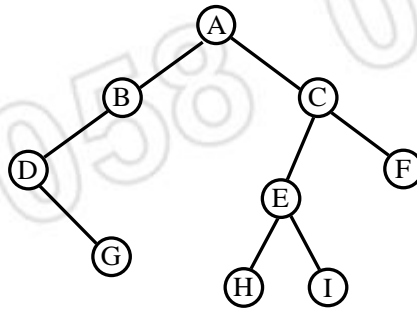
2. a) What do you mean by analysis of algorithm. Explain different asymptotic notation used for analysis of algorithm. 6
- b) Write a program to implement merge sort. Also discuss its complexity. 7
3. a) Write algorithm for PUSH and POP operation in stack. 4
- b) Write short notes on: 9  
i) Multiple stacks.  
ii) Circular queue.  
iii) Priority queue

**OR**

4. a) What is doubly linked list? Write down the algorithm for inserting a node to the beginning and deleting a node from a doubly linked list. 10
- b) Convert given infix expression to post fix expression by using stack  $A + B \uparrow C$ . 3
5. a) Write "C" functions to perform following operations on singly linked list: 8  
i) Insert node at beginning.  
ii) Insert node at end.  
iii) Traverse the linked list
- b) Give suitable representation for polynomials and write on algorithm to add two polynomials. 6

**OR**

6. a) Explain different dynamic memory allocation functions. 8  
 b) Write an algorithm to search an element in singly linked list. 6
7. a) Explain various kinds of traversals in a binary tree and illustrate the same for following example. 9

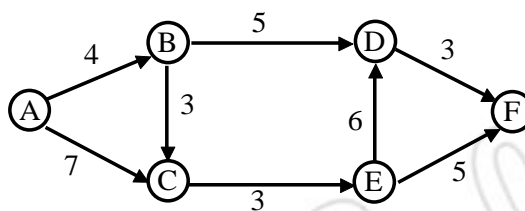


- b) Write non-recursive procedures for preorders traversal of binary tree. 5

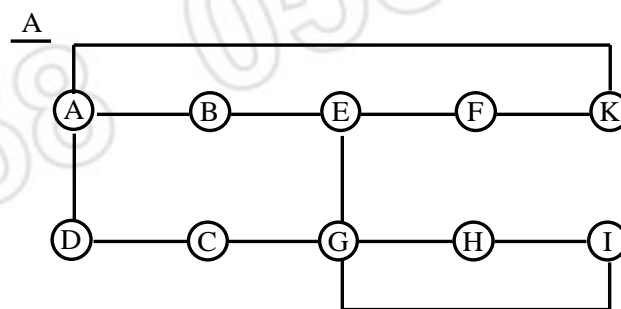
**OR**

8. Define and explain with example. 14
- i) Tree
  - ii) Binary search tree
  - iii) Complete binary tree
  - iv) AVL Tree
  - v) Threaded binary tree
  - vi) Binary tree
  - vii) Full binary tree

9. a) Find the minimum spanning tree for the following graph. 6

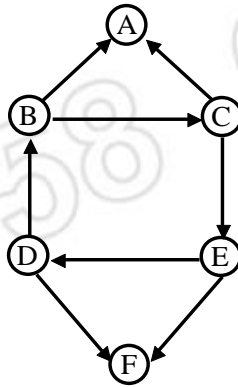


- b) Describe DFS algorithm find out DFS traversal of the following graph starting at node. 7

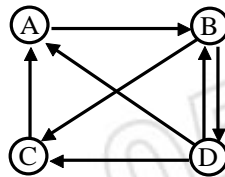


**OR**

10. a) For the following graph write.
- In degree and out degree of each vertex.
  - Adjacency matrix
  - Adjacency multi list representation.



- b) Write down adjacency matrix, adjacency list and adjacency multi list for the following graph. 6



11. a) What is hashing? Explain division method of hashing to store the following values in hash table.  
25, 45, 97, 101, 102, 162, 197, 202 7
- b) Discuss sorting with disks and tapes. 6

**OR**

12. Write short note on following **any four**. 13

- Direct access file.
- Storage structure on tapes and disks.
- Indexed sequential file.
- Random access
- Distinguish between files and records.

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