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- 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. Assume suitable data whenever necessary.
 9. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Write recursive function in C for 8
i) Computation of a factorial of a number
ii) Finding sum – of – digits of a n – digit number.

- b) Define algorithm. Explain about the essential characteristics of an algorithm. 5

OR

2. a) Define data, data type and data structure. Elaborate on the classification of data structure. 7

- b) What are asymptotic notations? Also explain the following. 6
i) Big – oh notation
ii) Theta notation
iii) Big omega notation

3. a) Write an algorithm for evaluation of postfix expression. 5

- b) Write an algorithm for the following with respect to stack: 8
i) Push
ii) Pop
iii) Display
Also explain the concept of stack with example.

OR

4. a) Explain the concept of linear queue with example. Also write algorithm for the following with respect to linear queue: 7

- i) Insert
- ii) Delete
- iii) Display

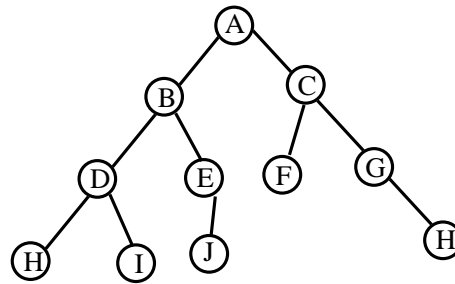
- b) Write an algorithm to convert infix to prefix expression. Also convert the following infix expression into prefix form using stack. 6
 $A + B * D - E / H$

5. a) Write a C – program to create a linked list. The user inputs the number of nodes in the list and values for information content of each node. You must also show the contents of the singly linked list. **10**
- b) Write a ‘C’ function to compute the length of a singly linked list. **4**

OR

6. a) Explain sparse matrix with suitable example. **6**
- b) Write a short note on following **8**
- i) Circular linked list. ii) Doubly linked list

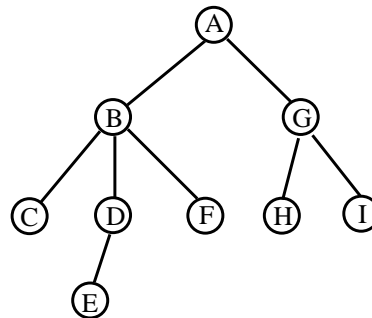
7. a) Find preorder, postorder and in order traversing sequence for the following binary tree. **6**



- b) Write short note on : **8**
- i) Threaded binary tree ii) AVL tree
- iii) B+ tree iv) 2 – 3 multiway tree

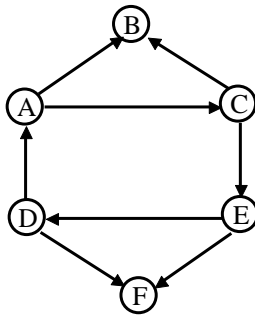
OR

8. a) Convert the given general tree into equivalent binary tree. **6**



- b) With suitable example define the following: **8**
- i) A tree ii) A forest
- iii) Degree of node iv) Depth of tree

9. a) Write down breadth first and depth first search traversal order starting of A for the given graph. Also draw DFS and BFS sequence tree. 9

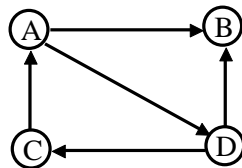


- b) Define: 4
- Spanning tree
 - A cycle
 - Indegree and outdegree of a vertex

OR

10. a) Write algorithm to find single source shortest path using Dijkstra's algorithm. Explain it with suitable example. 9

- b) Draw adjacency matrix adjacency list for following graph: 4



11. a) Explain Hashing techniques and collision handling mechanism. 8

- b) Sort the given list using bubble sort in ascending order 5
List = {5, 6, 11, 1, 15, 10, 0}

OR

12. a) Using division remainder method of hashing for table of size 11, store the following numbers in hash table:
25, 42, 96, 101, 102, 162, 197, 201 use chaining linear, quadratic probing method for collision handling. 7

- b) Explain merge sort algorithm with suitable example. 6



~ Walt Disney

