Data Structure & Program Design

P. Pages : 3

Time : Three Hours

NIR/KW/18/3379

Max. Marks : 80

1313

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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.

1. a) What do you mean by Analysis of Algorithm? Explain different asymptotic notations used for analysis of Algorithm. **6**

   b) Apply Quick sort method for the following data & show step by step tracing. Specify its time complexity. **7**
   21, 06, 56, 61, 44, 07, 09, 76, 75, 32

OR

2. a) Write a program to implement Binary Search Algorithm using recursion. State the time complexity. **7**

   b) Write a C program to sort the elements of matrix column wise. Assume that the matrix is represented by two dimensional Array. **6**

3. a) Write an algorithm for addition of two polynomials. **5**

   b) Write a C function to perform the following operation on singly linked list **9**
   i) insert a node at the beginning
   ii) search the elements
   iii) count the number of nodes.

OR

4. a) What is doubly linked list? Write an function to perform following operation on doubly linked list. **8**
   i) insert a node at the end
   ii) display the nodes

   b) Write a short note on : **6**
   i) Circular linked list
   ii) Dynamic memory allocation.

5. a) Write the procedure to perform push & pop operation on stack. **6**

b) Convert following infix expression to postfix form : **7**
   i) $(A+B)*C/D+E^F/G$
   ii) $(A-B)*X+Y/(F-C*E)+D$

OR

6. a) Write the difference between plain & circular queue. Write a C function to perform insert and delete operation on circular queue. **7**

b) Write a short notes on : **6**

   i) Multiple stack & queue

   ii) Priority queue

7. a) What is Binary Search tree? For the given sequence, create a binary search tree **6+1** 12, 11, 10, 16, 14, 18, 15, 13, 20, 19 **=7**

b) Explain the following terms with an example. **6**
   i) AVL Tree
   ii) Threaded Binary Tree

OR

**8.** a) Find preorder, postorder and inorder for the following. **6**
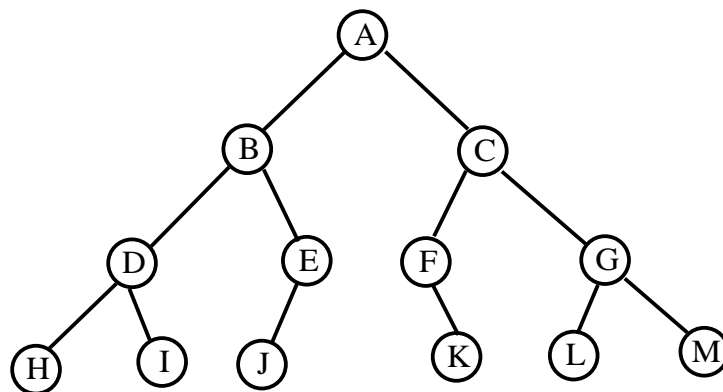
b) Given the following keys : **7** 10, 70, 60, 20, 110, 40, 80, 130, 100 construct a B Tree of order 5 from the above keys. Explain step by step.

9. a) Write an algorithm for depth first search and breadth first search. Also discuss its complexity. **8**

b) Define following terms with example **6**
   i) Topological sorting
   ii) Critical path

OR

10. a) What is the weight of a minimum spanning tree of the following graph? Show stages in establishing a MST. **9**
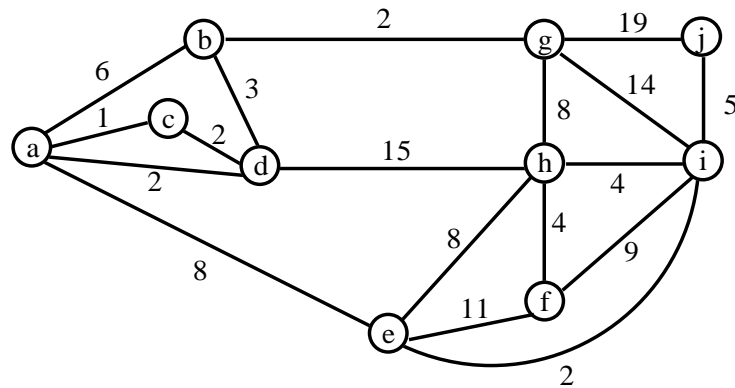
b) Write down adjacency matrix, adjacency list & adjacency multi list for the following graph. **5**
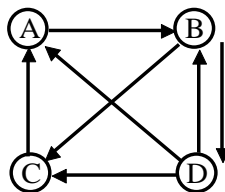
11. a) What is Hashing? Explain division method for hashing to store the values in Hash tables and size 11, 25, 45, 97, 101, 102, 162, 197, 202. **7**

b) Explain various hashing techniques with example. **6**

OR

12. Write a short notes on **any four.** **13**

i) Sorting with disk and tapes.

ii) Collision Handling Mechanism.

iii) Direct Access File.

iv) Files and records.

v) Indexed sequential files.

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