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B.E. (Computer Science Engineering) Fourth Semester (C.B.S.)

Data Structure & Program Design

P. Pages : 2 **NRJ/KW/17/4434**

Time : Three Hours * 0 2 0 5 * Max. Marks : 80

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.
9. Assume suitable data whenever necessary.

1. a) What are the parameters & their roles considered for Analysis of an algorithm? Explain asymptotic notations used for analysis of algorithms. **8**

b) Discuss bubble sort & insertion sort with their time complexities. **6**

OR

2. a) Write a C program to implement binary search. **5**

b) Write a detailed note on Abstract data type. **4**

c) Explain various symbols used in a flowchart and draw a flowchart to add 10 numbers using iterative construct. **5**

3. a) Given a singly linked test L, formulate separate routines / algorithms to **8**
a) Insert an element X after a position P in the list.
b) Delete the first occurrence of an element Y from the list.

b) Explain dynamic memory allocation with example. **5**

OR

4. a) Write an algorithm to add two polynomials using a linked list. **6**

b) Explain with an algorithm and diagrammatic illustrations how insertions and deletions can be performed on a doubly linked list. **7**

5. a) Write and explain algorithm to convert an infix expression to a prefix expression. Using stack. **8**

b) Explain the concept of circular queue with suitable example. **5**

OR

6. a) Implement a stack and its operations using a linked list. **9**

b) Write a note on: **4**
i) Priority queue ii) Multiple stacks.

7. a) What is a binary search tree? Construct a BST for the following sequence: **8**
M, Z, C, X, Y, O, K, I, E, H, N
Also traverse the tree with all three approaches.

b) What is Expression tree? Draw an expression tree for $A+(B+C*D+E)+F/G$. **5**

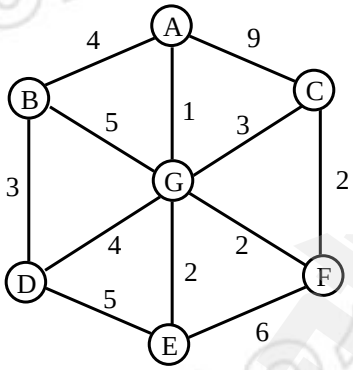
OR

8. a) Explain Binary tree and its types with suitable example. **8**

b) Write a note on threaded binary tree. **5**

9. a) What is a graph and what are its applications? Discuss various ways of representation of a graph. **8**

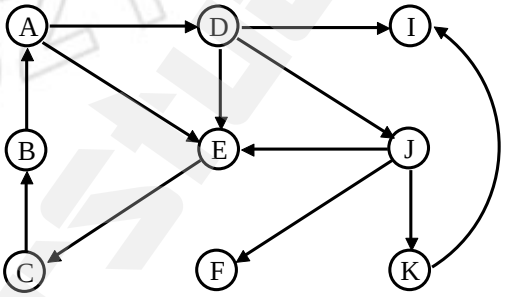
b) Construct a minimum cost spanning tree (MST) for the given graph using Kruskal's algorithm. **6**



OR

10. a) Write and explain the algorithm for DFS graph traversal with example. **7**

b) For the following graph: **7**



Write:

i) Indegree and outdegree for each vertex. ii) Adjacency matrix.

iii) Adjacency list. iv) Adjacency multi list.

11. a) Explain two techniques to overcome hash collision. **8**

b) Differentiate between static and dynamic hash tables. **5**

OR

12. a) What is hashing? Explain division method of hashing to store the following values in hash table 25, 45, 96, 101, 102, 162, 197, 201, 84 Use suitable collision handling mechanism. **7**

b) What is symbol table? What is the use of symbol table? Describe the implementation of symbol table? **6**

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Itâ€™s hard to beat a person who never gives up.

~ Babe Ruth