NTK/KW/15-7382

Fourth Semester B. E. (CSE) (C.B.S.)
Examination

DATA STRUCTURE AND PROGRAM DESIGN

Paper – 2

Time : Three Hours]　　　　　　　　　　[Max. Marks : 80

N. B. : (1) All questions carry marks as indicated.
    (2) Solve Six questions as follows
        Que. No. 1 OR Que. No. 2
        Que. No. 3 OR Que. No. 4
        Que. No. 5 OR Que. No. 6
        Que. No. 7 OR Que. No. 8
        Que. No. 9 OR Que. No. 10
        Que. No. 11 OR Que. No. 12
    (3) Due credit will be given to neatness and adequate dimensions.
    (4) Use of Non-programmable Calculator is permitted.
    (5) Assume suitable Data wherever necessary.

1. (a) Explain the various sorting techniques. Give its time complexities.   9

   (b) Write an algorithm of Bubble sort.   5

OR

2. (a) Write a program to implement Binary Search.   7

   (b) Explain the following terms :—

    (i) Sparse Matrix.

    (ii) Time Complexity.

    (iii) Space Complexity.

3. (a) Write a Menu Driven Program for various operation of singly linked list.

(b) Give suitable representation for polynomials and write an algorithm to add two polynomials. 6

OR

4. (a) Write a function to :—

    (i) Insert a node at end in doubly linked list.

    (ii) Delete a node from specific position from doubly linked list. 6

(b) What is static memory allocation and dynamic memory allocation ? What are the functions used for dynamic memory allocation in "C" ? Give examples. 7

5. (a) Write an algorithm which convert infix expression into postfix from using stack and give steps of each. 8

(b) Briefly explain :—

    (i) Deque.

    (ii) Priority Queues. 5

OR

6. (a) What do you mean by circular queues ? Give the array implementation of it and write an algorithm for insertion and deletion of elements from circular queues. 8

(b) Explain the terms :—

    (i) Polish Notations.

    (ii) Push and POP Algorithm. 5

7. (a) What is a Binary Search Tree (BST) ? Make a BST for the following sequence of numbers :
32, 68, 22, 95, 99, 26, 92, 84, 29, 36
Write Preorder, Inorder and Postorder Traversal of this Tree. 9

(b) Explain the AVL Tree and Complete Binary Tree.

4

OR

8. (a) A binary tree T has 9 nodes, the inorder and preorder traversal of T yields following sequences.
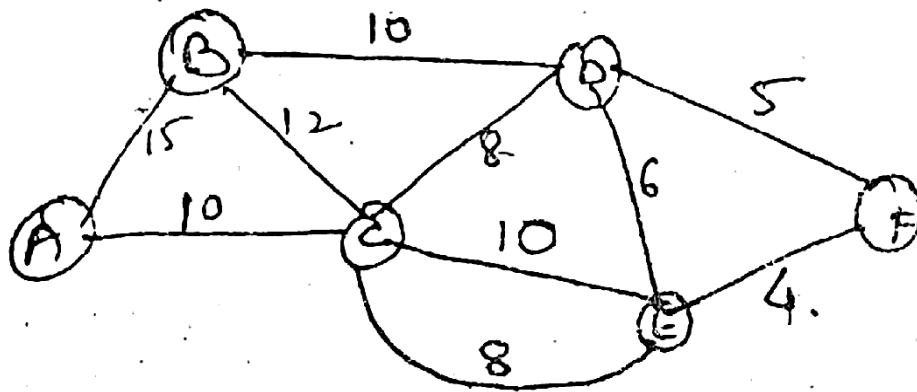
INORDER : EACKFHDBG

PREORDER : FAEKCDHGB

Draw the Tree T. 5

(b) What is threaded binary tree ? Give the data structure to represent node of threaded binary tree. Write a function for inorder traversal of threaded binary tree. 8

9. (a) Construct the Minimum cost Spanning Tree (MST) of the following graph using Prim's algorithm.

5

(b) Write an algorithm for following (Any One) : —

(i) BFS

(ii) DFS

Also discuss suitable example of it. 8

OR

10. (a) Define and explain following terminology of a graph as a data structure with example :--

    (i) Path and cycle.

    (ii) Parent and child.

    (iii) Strongly connected graph.

    (iv) Complete graph.

    (v) Degree of a graph.   5

  (b) Explain the following :—

    (i) Shortest Path Problem (single source all pair).

    (ii) Hamilton Path.

    (iii) Spanning Tree.   8

11. (a) What is collision in hashing ? How can it be avoided ? What are the different collision handling mechanisms ? Explain each with suitable example.
     7

  (b) Using division method of hashing, state the following values in hash table :
64, 98, 123, 200, 214, 193, 163, 201

    Use suitable method for handling collision.   7

OR

12. (a) What is symbol table ? What are different data structures used for symbol table ? Discuss.   6

  (b) Give the following list of elements
63, 92, 89, 12, 32, 90, 69, 96, 98, 91
and the hash function. (Index = kg %10). Show the hash table. Use collision resolution through linear probing.   8