TCS–410

B. TECH. (ECE)

(FOURTH SEMESTER)

END SEMESTER

EXAMINATION, June/July, 2022

DATA STRUCTURES USING 'C'

Time : Three Hours

Maximum Marks : 100

Note : (i) All questions are compulsory.

(ii) Answer any *two* sub-questions among (a), (b) and (c) in each main question.

(iii) Total marks in each main question are **twenty**.

(iv) Each sub-question carries 10 marks.

1. (a) Illustrate Sparse matrix with the help of a C program. (CO1)

(b) What are the merits and demerits of array ? Given two arrays of integers in ascending order, develop an algorithm to merge these arrays to form a third array sorted in ascending order.   (CO1)

(c) Discuss array and linked representation of queue data structure. What is dequeue ?

(CO1)

2. (a) Write algorithm for Push and Pop operations in stack. Transform the following expression into its equivalent postfix expression using stack :   (CO2)

$$A + (B / C - (D / E) - F * G) * H$$

(b) Define Recursion. What are the different types of recursion ? Explain. Write the recursive solution for tower of Hanoi problem.   (CO2)

(c) What is doubly linked list ? What are its applications ? Explain how an element can be deleted from doubly linked list using C program.   (CO2)

3. (a) How is binary search different from linear search ? Apply binary search to find item 77 in the sorted array :

9, 20, 34, 39, 40, 44, 55, 60, 66, 77, 80, 88, 99.

Also discuss the complexity of binary search.   (CO3)

(b) Describe all rotation in AVL Tree. Construct AVL tree from the following nodes :   (CO3)

B, C, G, E, F, D, A

(c) Why is quick sort named as quick ? Write a program in C language for the same.

(CO3)

4. (a) Define a B-tree. What is the application of B-tree ? Explain with example. Generate a B-tree of order 4 with the alphabets (letters) arrive in the sequence as follows :
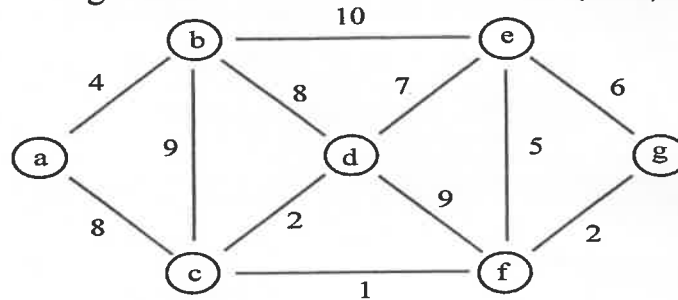
(CO4)

a g f b k d h m j e s i r x c l n t u p

(b) Find the minimum spanning tree in the following graph using Kruskal's algorithm :   (CO4)

(c) Can you find a unique tree when any two traversals are given ? Using the following traversals, construct the corresponding binary tree :   (CO4)

INORDER   :   H K D B I L E A F C M J G

PREORDER :   A B D H K E I L C F G J M

5. (a) Describe the Dijkstra's algorithm to find the shortest path. Find the shortest path in the following graph with vertex "S" as source vertex :   (CO5)
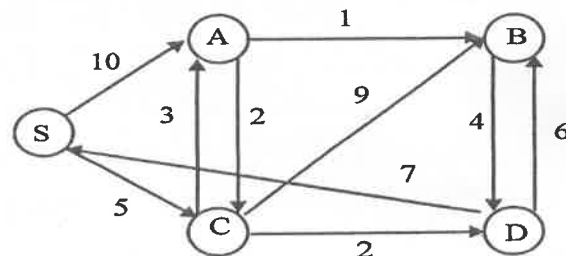
(b) Explain the different file organization concepts using proper examples.   (CO5)

(c) What is Hashing ? Give the characteristics of hash function. Explain collision resolution technique in hashing.   (CO5)