Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– III(NEW) EXAMINATION – WINTER 2022

Subject Code:3130702 Date:22-02-2023

Subject Name:Data Structures

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1 **(a)** Differentiate primitive and non-primitive data structures **03**

(b) Define time complexity? Explain worst case and best case complexity with examples. **04**

(c) Convert following infix expression into postfix expression using stack. **07**
(A-B)/C*D^(E/F)^(G+H)

Q.2 **(a)** What is Sparse matrix? Write efficient vector representation of following Sparse matrix. **03**

1	0	0
0	2	0
0	0	3

(b) What is the worst case complexity of binary search? Write an algorithm for binary search. **04**

(c) Create Binary Search Tree for following Data and write pre-order traversal, in-order traversal and post-order traversal of the constructed tree. **07**
10 15 28 09 39 31 30 14 07 08

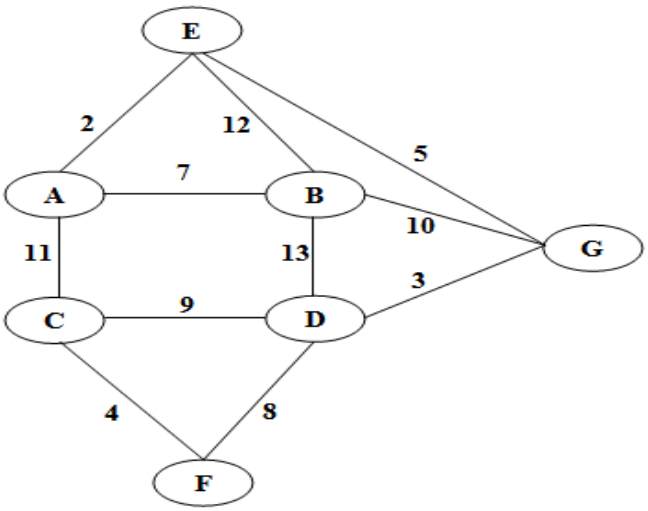
OR

(c) Create AVL tree for following Data and write pre-order traversal of the constructed tree. **07**
10 15 28 09 39 31 30 14 07 08

Q.3 **(a)** Write c program for bubble sort. **03**

(b) Write algorithm to insert into simple queue and mention the limitation of simple queue? **04**

(c) Find the minimum spanning tree of following graph using Kruskal's method. **07**

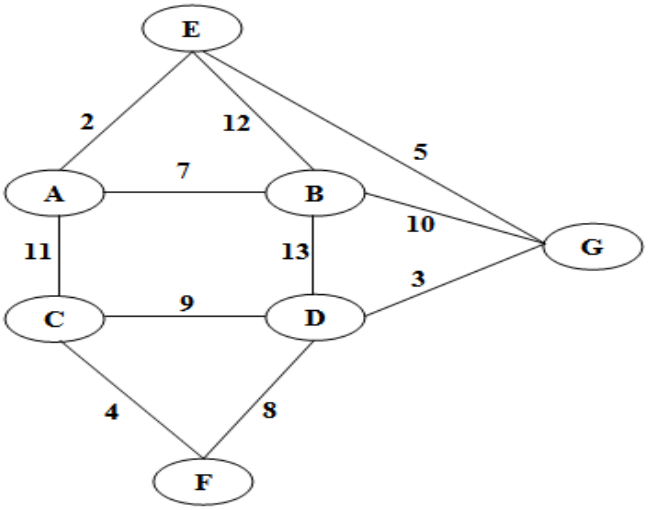


OR

Q.3 **(a)** Write c program for selection sort. **03**

(b) Write algorithm to delete from circular queue and mention the advantage of circular queue over simple queue? **04**

(c) Find the minimum spanning tree of the following graph using prim's method. **07**



Q.4 **(a)** What is priority queue? Is simple queue is anyhow priority queue? Explain your answer. **03**

(b) Write C program to find the Fibonacci sequence of n terms using recursion. **04**

(c) Explain DFS and BFS with appropriate example. **07**

OR

Q.4 **(a)** What is linked list? States the advantages of linked list over array. Also list various types of the linked list. **03**

(b) Write recursive solution for tower of Hanoi. How many moves require for transferring three discs? **04**

(c) Explain Dijkstra's shortest path algorithm with appropriate example **07**

Q.5 **(a)** Define following terms **03**

1) Balance factor
2) Hash function
3) Cyclic graph

(b) Sort following data using merge sort. **04**

10 15 28 09 39 31 30 14 07 08

(c) Define hash collision? Explain collision various resolution techniques. **07**

OR

Q.5 **(a)** Define following terms **03**

1) Hash table
2) Graph
3) Complete binary tree

(b) Sort following data using quick sort. **04**

10 15 28 09 39 31 30 14 07 08

(c) What is file? Explain various types of file organization. **07**