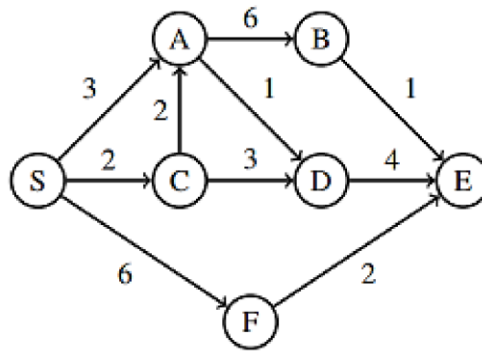


GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-III(NEW) EXAMINATION – SUMMER 2023****Subject Code:3134201****Date:26-07-2023****Subject Name:Data Structures and Algorithms****Time:02:30 PM TO 05:00 PM****Total Marks:70****Instructions:**

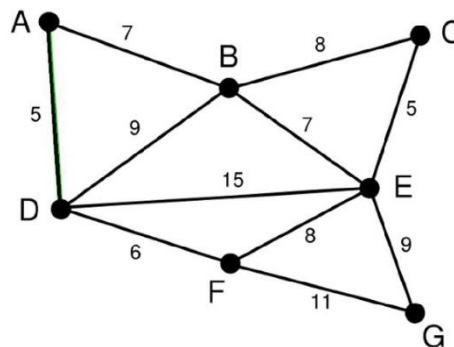
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) What is an algorithm? Give characteristics of any algorithm in brief.	03
	(b) Differentiate between arrays and linked lists.	04
	(c) Write down the precondition and algorithm of the binary search method.	07
Q.2	(a) What is Collision in Hashing? List the qualities of a Good Hash function.	03
	(b) Give the recursive algorithm to find the Fibonacci sequence. Comment on the complexity of the algorithm.	04
	(c) 1. Discuss various asymptotic notations.	07
	2. Discuss best case, worst case and average case time complexity with an example of any algorithm.	
	OR	
	(c) Convert the following infix expression into prefix format showing stack status after every step in tabular form. (A + B) * C – D ^ E ^ (F * G)	07
Q.3	(a) What are the different types of Queues? Discuss in brief.	03
	(b) Write a pseudo-code for PUSH and POP operations of stack.	04
	(c) Apply the merge sort algorithm for the following data and show the steps. 66, 33, 40, 22, 55, 88, 11, 80, 20, 50, 44, 77	07
	OR	
Q.3	(a) Discuss three steps for Divide and Conquer approach using proper example.	03
	(b) Write an algorithm which performs an insertion at the end of a linked linear list.	04
	(c) Explain how multiplication of large integers can be done efficiently by using divide and conquer technique? Also, multiply 2345 with 678 using the same approach.	07
Q.4	(a) Define following with reference to the Tree data structure. - Degree of a node - Siblings of a node - Height of a tree	03
	(b) Discuss and differentiate BFS and DFS.	04
	(c) What is a binary search tree? Create a binary search tree for the following data. 14, 10, 17, 12, 10, 11, 20, 12, 18, 25, 20, 8, 22, 11, 23. Explain deleting node 20 in the resultant binary search tree.	07
	OR	
Q.4	(a) Discuss binary tree traversals with example.	03
	(b) Write a short note on AVL Tree.	04

- (c) Discuss various Graph representation techniques. Represent the following graph with Adjacency list representation and Adjacency matrix representation. 07



- Q.5** (a) What is Knapsack problem? Differentiate Fractional knapsack and 0/1 knapsack problem. 03
- (b) Solve a Making Change problem using Dynamic Programming. Give your answer for making change of Rs. 9. (Denominations: d1=1, d2=4, d3=6). 04
- (c) Find a Minimum Spanning Tree for the given graph using Kruskal's approach. 07



OR

- Q.5** (a) What is Traveling Salesman Problem? 03
- (b) Discuss four queen problem and its solution using backtracking approach. 04
- (c) For the given set of matrices, find out optimal sequence for matrix multiplication using Dynamic Programming approach. 07
- A1 – 5x4, A2 – 4x6, A3 – 6x2, A4 – 2x7
