QP Code: RM22BTECH181 | Reg. No | | | | | | | | | | | AY 22

GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Fourth Semester Regular) Examinations, May – 2024

22BCSPC24002 / 22BCMPC24002/22BCDPC24002

Design and Analysis of Algorithms

(CSE/AIML/DS)

Time: 3 hrs | Maximum: 70 Marks

(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

		CO #	Blooms Level
Q.1.	Answer ***ALL*** questions		
a.	Arrange the following functions from the lowest asymptotic order to the highest. 3^n, 7n, $n^2 \log n$, $\sqrt{n}$, n^3, 10log n, $15n^2$	CO1	K1
b.	Differentiate between Bellman Ford and Dijkstra Algorithm.	CO3	K2
c.	Define Spanning tree. Find the number of spanning tree possible for a complete graph of N vertices.	CO1	K2
d.	Differentiate between BFS and DFS.	CO3	K3
e.	Write the relaxation function for Bellman ford algorithm. What are the number of times the relaxation done for a graph of N number of vertices.	CO3	K1

PART – B **(15 x 4 = 60 Marks)**

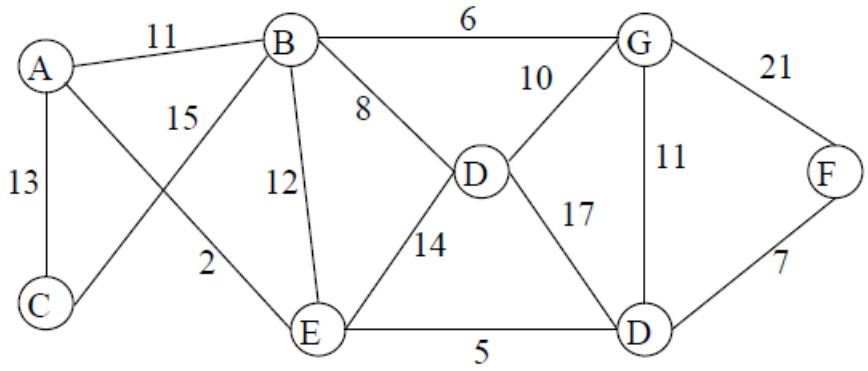
		Marks	CO #	Blooms Level
	Answer ***ALL*** questions			
2. a.	Solve the following recurrence relation for n>1 (a)T (n) = 9T (n/3) + n^2logn (b)T (n) = 8T (n/2) + n^3logn	8	CO1	K3
b.	Discuss the importance of the various asymptotic efficiency classes? Explain Big O, Big Omega and Big Theta asymptotic notations with suitable example.	7	CO1	K1
	(OR)			
c.	Design an algorithm to search an element in an array using sequential search. Discuss the Best case worst case and average case efficiency of this algorithm.	8	CO1	K3
d.	Solve the following recurrence relation using recurrence tree method. T(n) = T(n/2) + n. Here T(1) = 1.	7	CO1	K4
3.a.	Write the Merge sort algorithm and analyse the best-case and worst-case time complexity.	8	CO2	K1
b.	Generate Huffman code for the string "GANDHI", where the different types of character and their frequency are given as follow.	7	CO2	K1

Character	A	B	C	D	E	G	H	I	N
Frequency	15	10	6	8	12	14	4	6	20

(OR)

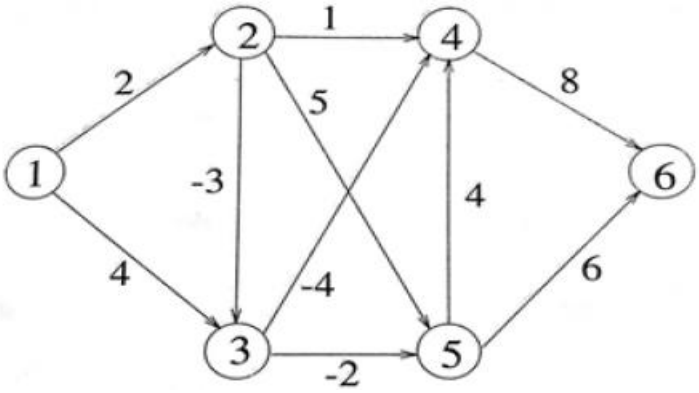
c.	Write the Maxheapify algorithms. Explain with Suitable example.	7	CO2	K2

d.	Apply quick sort algorithm to sort the list E, X, A, M, I, N, A, T, I, O, N in alphabetical order. Draw the tree of recursive calls made	8	CO2	K3
4.a.	Write and explain the Dijkstra algorithm for finding single source shortest path for a weighted directed graph.	7	CO3	K2
b.	Compute the Minimum-cost Spanning Tree for the Graph given below using Kruskal's Algorithm.	8	CO3	K3



(OR)

c.	Find the shortest path from node 1 to every other node in the given graph using Bellman-Ford algorithm	8	CO3	K4



d.	Write and explain the Floyd-Warshall algorithm for finding all pair shortest path for a weighted directed graph.	7	CO3	K2
5.a.	Define Backtracking approach. Write the state space tree to solve 4-queen Problem. Using Back Tracking.	7	CO4	K1
b.	Write and explain Rabin Karp Pattern matching algorithms with an example.	8	CO4	K2

(OR)

c.	Define P, NP, NP complete and NP-Hard problems. Give examples of each.	8	CO4	K2
d.	For KMP-Matcher compute the prefix function π and solve for the Text T= "ababbabbabbababbabb" when the pattern is P = {a, b, b}.	7	CO4	K3

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