GIET UNIVERSITY, GUNUPUR – 765022

M. C. A (Second Semester) Regular Examinations, August – 2023

MCA20201 - Design and Analysis of Algorithm

Time: 3 hrs   Maximum: 70 Marks

(The figures in the right hand margin indicate marks.)

	PART – A		(2 x 10 = 20 Marks)

|		CO #	Blooms Level
Q.1.	Answer *ALL* questions		
a.	Arrange the following functions from the lowest asymptotic order to the highest. 2^n, $10n$, $n \log n$, $4n^3$, $\log n$, $5n^2$	CO1	BL2
b.	Define time and space complexity.	CO1	BL2
c.	How fractional knapsack is different from 0/1 knapsack.	CO2	BL2
d.	.Justify the recurrence relation of binary search.	CO2	BL3
e.	How BFS is different from DFS.	CO3	BL2
f.	Write the algorithm to initialize to single source.	CO3	BL1
g.	What are the best case and worst case time complexity of Quick Sort?	CO4	BL2
h.	How greedy is different from dynamic programming?	CO4	BL2
i.	What is negative weight cycle?	CO3	BL1
j.	Define minimum spanning tree.	CO3	BL1

	PART – B		(10 x 5 = 50 Marks)

Answer *ANY FIVE* questions

		Marks	CO #	Blooms Level
2. a.	What is asymptotic notation? Explain different asymptotic notations briefly	5	CO1	BL2
b.	Solve the following Recurrence relation (i) $T(n) = 2T(2n/3) + n \log n$ (ii) $T(n) = 2T(n/2) + n \log n$	5	CO1	BL3
3.a.	Write and explain quick sort algorithm. Mention the recurrence relation in different case.	5	CO2	BL2
b.	Find out optimal sequence for multiplication: A1 [5 × 4], A2 [4 × 6], A3 [6 × 2], and A4 [2 × 7]. Also give the optimal parenthesis of matrices	5	CO2	BL3
4. a.	Using the Kruskal algorithm find the minimum spanning tree from the given graph.	5	CO3	BL3
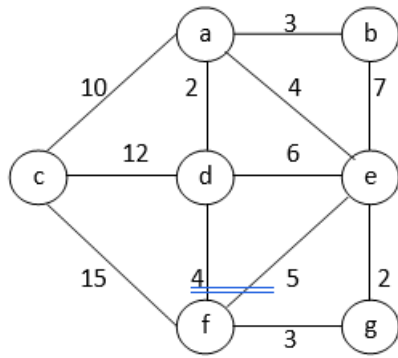
b.	Briefly explain Floyd-Warshall algorithm to find all pair shortest path	5	CO3	BL2
5.a.	Working modulo q = 11. How many spurious hits does the Rabin-Karp matcher encounter in the text T = 3141592653589793 when looking for the pattern P =26?	5	CO4	BL3
b.	Explain in brief characteristics of greedy algorithms. Compare Greedy Method with Dynamic Programming Method.	5	CO4	BL2
6. a.	Write and explain Heap sort algorithm Build a max heap taking the element 10, 20, 30,12,25	5	CO2	BL2
b.	Consider the following instance of the Fractional Kanpsack problem, n=4 capacity of Knapsack W=70, w= (10, 20, 30, 40) and v= (60, 80, 40,100) find the optimal profit using greedy approach.	5	CO2	BL3
7.a.	Using Dijkstra algorithm find out the shortest path from source vertex s from the given graph.	5	CO3	BL3
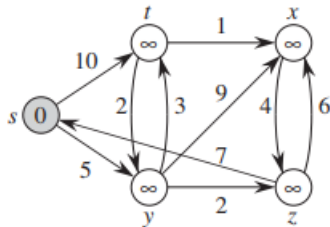
b.	Write and explain breadth first search algorithm	5	CO3	BL2
8. a.	Write short notes on	10	CO4	BL2

a) Strassen's Matrix multiplication

b) Elements of Greedy

c) Limit theorem

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