Reg. No										

AY 24

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR
(GIET UNIVERSITY)

M.C.A (Second Semester) Regular Examinations, May – 2025

MCA23201 – Design and Analysis of Algorithms

(MCA)

Time: 3hrs | Maximum: 60 Marks

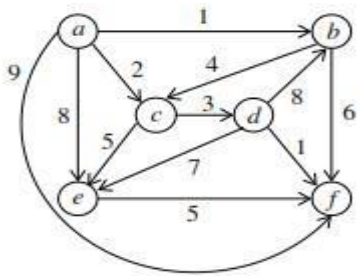
(The figures in the right hand margin indicate marks)

PART – A **(2 x 5 = 10 Marks)**

Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Prove that n! = $o(n^n)$	CO1	K1
b. Write the recurrence relation for binary search	CO2	K1
c. How BFS is different from DFS?	CO3	K1
d. Define Minimum Spanning Tree. Write any two applications of MST	CO4	K1
e. What are the differences between 'Backtracking' and 'Branch & Bound' algorithm techniques?	CO5	K1

PART – B **(10 x5=50 Marks)**

Answer ***ALL*** questions	Marks	CO #	Blooms Level
2. a. Show that $f_1(n) + f_2(n) = O(\max(g_1(n), g_2(n))$ where $f_1(n) = O(g_1(n))$ and $f_2(n) = O(g_2(n))$.	5	CO1	K2
b. Solve the recurrences using Master Theorem $T(n) = 3T(n/4) + n \log n$	5	CO1	K2
(OR)			
c. Solve the following recurrence relation using iteration method. $T(n) = 8T(n/2) + n^2$. Here $T(1) = 1$.	5	CO1	K2
d. What is asymptotic notation? Why asymptotic notation is used? Explain different asymptotic notations briefly.	5	CO1	K2
3.a. Write algorithm of Chain matrix multiplication using Dynamic programming. 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.	10	CO2	K3
(OR)			
b. Write an algorithm for quick sort with one example	5	CO2	K2
c. Find the longest common subsequence of the strings “LONGEST” and “STONE”,	5	CO2	K3
4.a. Write the Kruskal algorithm with one example.	5	CO3	K2

b.	Use Dijkstra's single-source-shortest-path algorithm to find the shortest distance from the source a, of the following graph. 	5	CO3	K3
	(OR)			
c.	Write Huffman code algorithm and Generate Huffman code for the string "DAA"	5	CO3	K3
d.	Consider the following instance of the Fractional knapsack problem, n = 3 capacity of Knapsack W=50, w=(10,20,40) and v=(60,80,100) find the optimal profit using greedy approach	5	CO3	K3
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	K2
b.	Given a set S = {5, 10, 12, 13, 15, 18} and Sum=30, find the subset sum using backtracking approach.	5	CO4	K3
	(OR)			
c.	Write the KMP algorithm with one example.	10	CO4	K3
6.a.	Solve the assignment problem	5	CO5	K3

	J1	J2	J3	J4
A	11	4	9	10
B	8	6	5	9
C	7	10	3	10
D	9	8	11	6

b.	Define P, NP, NP complete and NP-Hard problems. Give examples of each.	5	CO5	K3
	(OR)			
c.	Solve the traveling salesman problem	5	CO5	K3

	A	B	C	D
A	∞	10	15	20
B	5	∞	9	10
C	6	13	∞	9
D	8	8	12	∞

d.	Explain use of branch and bound technique for solving assignment problem	5	CO5	K2

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