QP Code: R252B068 | Reg. No | | | | | | | | | | | AY 24

GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

M. Tech. (Second Semester) Regular Examinations, July – 2025

24MCSPE12001 – Advanced Algorithms

(CSE)

Time: 3 hrs | Maximum: 60 Marks

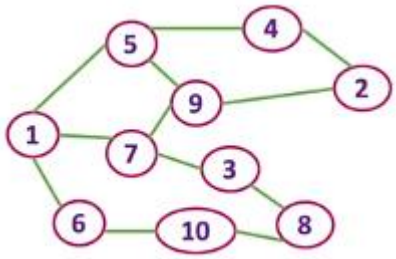
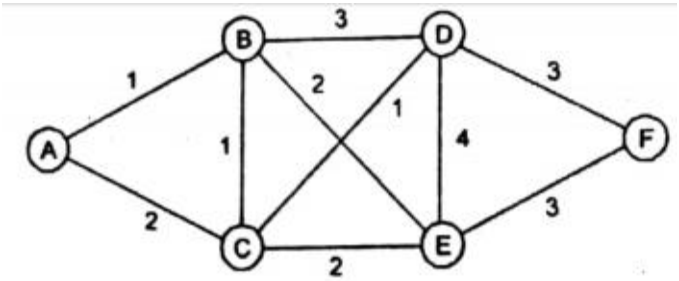
Answer ALL questions

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

PART – A **(2 x 5 = 10 Marks)**

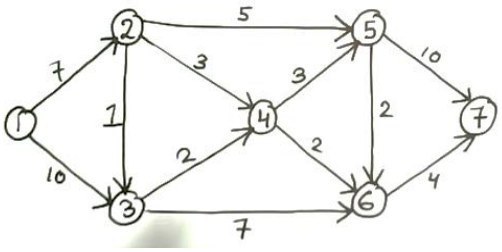
Q.1. Answer ***ALL*** questions	CO #	Blooms Level
a. Explain the methods to compute maximum flow.	CO2	K1
b. Exemplify a strongly connected graph?	CO1	K1
c. What are the applications of MST?	CO2	K2
d. Where do we use Fourier transform in algorithm design?	CO1	K1
e. Define amortized analysis. Explain the amortized complexity for 4-bit binary incrementor. From 0 to 12.	CO2	K2

PART – B **(10 x 5 = 50 Marks)**

Answer ***ALL*** the questions	Marks	CO #	Blooms Level
2. a. Define a matroid. Explain the properties of a matroid with suitable examples. Show how the concept of independence in matroids generalizes linear independence in vector spaces and forests in graphs.	5	CO1	K1
b. Explain BFS procedure for the following graph with its time complexity. 	5	CO1	K2
(OR)			
c. Write down the quick sort procedure for the following data: 45,56,23,13,24,89,90,67,26,38	5	CO1	K3
d. Discuss the significance of Cook's Theorem in the theory of NP-Completeness. State and explain the theorem with its implications.	5	CO1	K1
3.a. Find the shortest path from the node a using Dijkstra algorithm 	5	CO2	K3
b. Discuss matching in a general graph using Edmond's Blossom algorithm.	5	CO2	K1

(OR)

c.	Define master theorem, Solve T(n)=4T(2n)+n for the same.	5	CO2	K3
d.	Discuss the use of searching algorithms in solving the latest problems,	5	CO2	K1
4.a.	Explain Edmond-Karp maximum flow algorithm for the following example.	5	CO3	K3



b.	Write Short notes on: (i)Greedy Paradigm (ii)Dynamic Paradigm		CO3	K1

(OR)

c.	Explain an efficient polynomial multiplication process with neat diagram.	5	CO2	K1
d.	Find the optimal parenthesizing for the given sequence of matrix <50, 40,30,20,10>	5	CO2	K2
5.a.	Explain Strassen's Algorithm with an example.	5	CO3	K1
b.	Define Chinese remainder theorem and explain how it is used in algorithm design?	5	CO3	K2

(OR)

c.	Explain how insertion sort is different from bubble sort? Explain with an example and its time complexity	5	CO2	K3
d.	Prove that the inverse of an invertible upper triangular matrix of order 3 is invertible and upper triangular.	5	CO2	K1
6.a.	Explain Randomized Algorithm with suitable example.		CO2	K2
b.	Explain the cutting Rod problem. Given a table of prices pi determine the maximum revenue obtainable by cutting the rod.	5	CO3	K3

Length	0	1	2	3	4	5
Price	0	3	5	10	12	14

(OR)

c.	Give extended Euclid algorithm to find GCD of integers and apply the algorithm for (75,87).	5	CO3	K3
d.	Explain the Simplex algorithm in detail.	5	CO3	K1

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