M.Tech. (DS/CFIS) SEMESTER II EXAMINATION 2023

ADVANCED ALGORITHMS

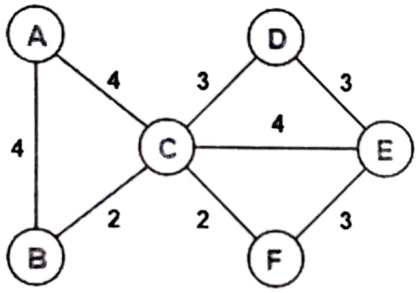
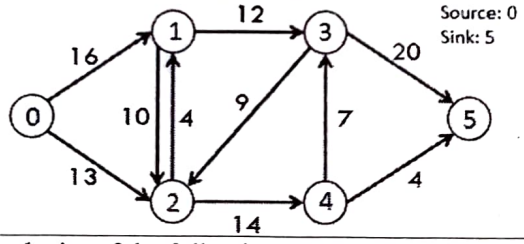
PAPER CODE: MTCFIS 201/MTDS 201

TIME: 2 ½ HRS

MM: 60

SECTION A

Note: Attempt All Questions from this Section 5 X 4 = 20

Q.No.	Questions	Marks	CO	BL
1	There is a Farmer who wishes to cross a river but he is not alone. He also has a Goat, a Tiger and a Cabbage along with him. There is only one boat available that can support the farmer and either of the Goat, Tiger or a Cabbage. So, at a time the boat can have only two objects (the farmer and one other). But the problem is, if the Goat and Tiger are left alone (either in the boat or onshore), the Tiger will eat the Goat. Similarly, if the Goat and Cabbage are left alone, then Goat will eat the Cabbage. **How many minimum trips are required for the farmer to get everything on the other side** (without any harm)? Crossing the river counts as one trip.	4	CO-2	BL-4
2	Find the minimum spanning tree of the following graph using Prim's Algorithm. 	4	CO-3	BL-3
3	Explain 8 Queen's Problem. Also show one example of placement of 8 queens on a 8X8 board.	4	CO-1	BL-1
4	Find the maximum flow of the graph given below. 	4	C0-2	BL-4

5	Find the complexity of the following code snippet.
	1. int fun (**int** arr[], **int** n, **int** x)
	2. { int a, b;
	3. **for** (int i = 0; i < n; i++)
	4. {
	for (int j= 0;j<n;j++)
	{
	for (int k=0;k<n;k++)
	{ a = i+j+k;
	}}}
	return a;
	return -1; }
		4	CO-4	BL-5 and BL-6

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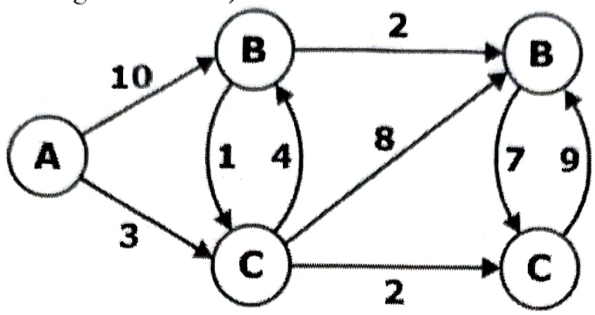
SECTION B

Note: Attempt any FOUR (04) Questions **4 X 10 = 40**

1	With the help of any example, explain the Kosaraju Algorithm.	10	CO-5	BL-5 and BL-6
2	Find the shortest path using Dijkstra's Algorithm for the graph given below. (Starting Node is "A")  	10	CO-3	BL-1
3	Identify the maximum non-conflicting activities from the set of the following activities. **A B C D E F G H I J** **(1, 2), (3, 5), (4, 6), (5, 7), (2, 7), (7, 9), (6, 10), (8, 11), (8, 12), (2, 13)** The fist number is the "start time" and the "second number" signifies finish time.	10	CO-2	BL-2
4	Convert the following as stated. 1. $(63)_{10}$ to $(\ )_5$ 2. $(54)_{10}$ to Binary 3. $(81)_{10}$ to Octal **OR** Write short notes on P, NP and NP-Hard Problems with the help of an example.	10	CO-2	BL-1 and BL-3
5	Write any 2 applications of Longest common sub-sequence? Find the Longest Common Sub-Sequence for the following. **A: H P S P B Z A** **B: B H H S B A**	10	CO-1	BL-3 and BL-5
6	Write the Huffman codes for the following. Show all steps **A = { a, b, c, d, e, f, g }** **F = { 2 4 5 3 9 2 3}**	10	CO-2	BL-2