CBCS SCHEME

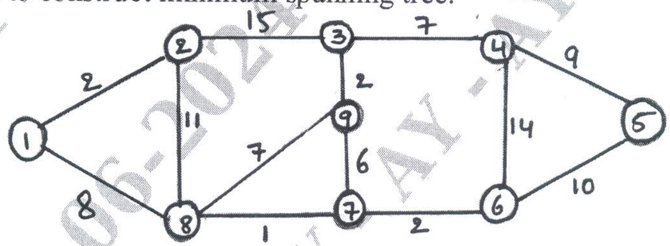
USN | | | | | | | | | |

22MCA15

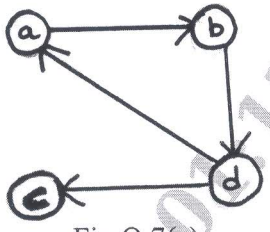
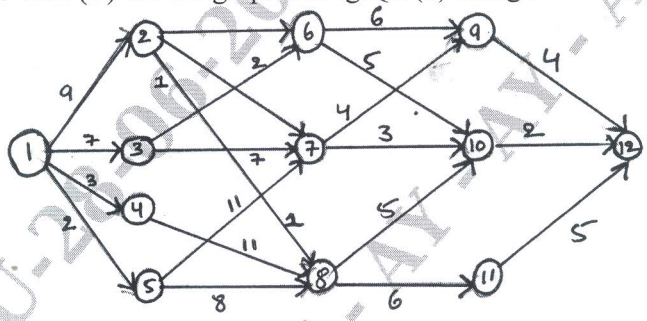
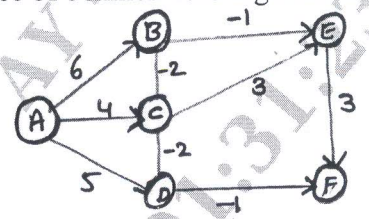
First Semester MCA Degree Examination, Dec.2023/Jan.2024
Design and Analysis of Algorithm

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Explain the mathematical analysis of recursive algorithm with an example of finding the factorial of 'n' number.	**10**	**L2**	**CO1**
	b.	Explain asymptotic notation with example.	**10**	**L2**	**CO1**
		OR			
Q.2	**a.**	What is an algorithm? Explain algorithm specification and analysis frame work with example.	**10**	**L2**	**CO1**
	b.	Explain the mathematical analysis of non recursive algorithm with an example.	**10**	**L2**	**CO1**
		Module – 2			
Q.3	**a.**	Write an algorithm for merge sort, find the time complexity of merge sort.	**10**	**L2**	**CO1**
	b.	Explain divide and conquer, explain maximum and minimum using divide and conquer technique.	**10**	**L2**	**CO1**
		OR			
Q.4	**a.**	Write an algorithm for quick sort and analyze it efficiency.	**10**	**L2**	**CO1**
	b.	Write an algorithm for heap sort with example.	**10**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	Write the Prim's algorithm, apply this algorithm to following graph in Fig.Q.5(a) to construct minimum spanning tree.  Fig.Q.5(a)	**10**	**L2**	**CO1**
	b.	Explain Dijkstra's algorithm with example.	**10**	**L2**	**CO1**
		OR			
Q.6	**a.**	Explain knapsack problem by greedy method with example.	**10**	**L2**	**CO1**
	b.	Find the Huffman code for the following data by obtaining Huffman tree.	**10**	**L2**	**CO1**

Character	A	B	C	D	E
Probability	0.11	0.40	0.16	0.09	0.24

		Module – 4			
Q.7	**a.**	Write an algorithm to complete transitive closure for the given graph, and obtain the transitive closure for the given graph show in Fig.Q.7(a) using Warshall's algorithm.  Fig.Q.7(a)	**10**	**L2**	**CO2**
	b.	Define multistage graph problem, determine the minimum cost path form source (s) to sink (T) for the graph in Fig.Q.7(b) using forward approach.  Fig.Q.7(b)	**10**	**L2**	**CO1**
		OR			
Q.8	**a.**	Solve the below instance of bellmen-ford algorithm.  Fig.Q.8(a)	**10**	**L2**	**CO1**
	b.	Explain travelling sales person problem with example.	**10**	**L2**	**CO1**
		Module – 5			
Q.9	**a.**	Explain N-Queue problem using back-tracking method.	**10**	**L2**	**CO3**
	b.	Define the following: i) Class P ii) Class NP.	**10**	**L2**	**CO3**
		OR			
Q.10	**a.**	Apply back tracking technique to solve the below instance of the subset sum problem. S = {1, 3, 4, 6} d = 7.	**10**	**L2**	**CO3**
	b.	Define the following: i) NP complete problem ii) NP hard problem.	**10**	**L2**	**CO3**

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