U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

June 2025 Semester End Main Examinations

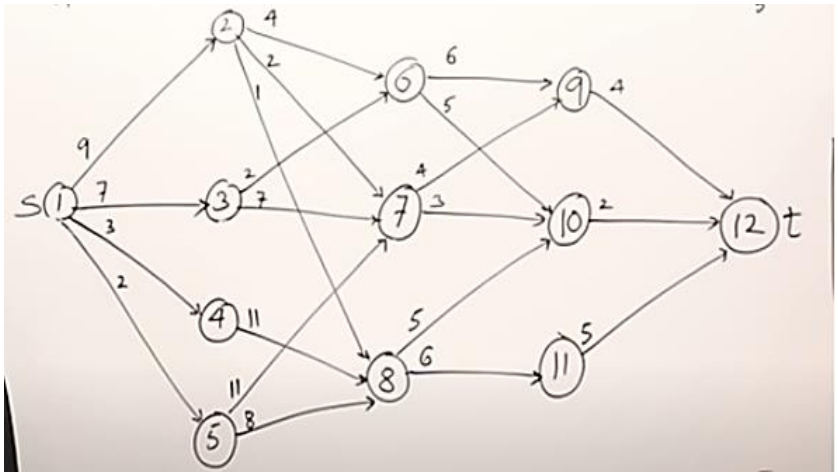
Programme: B.E. **Semester: V**

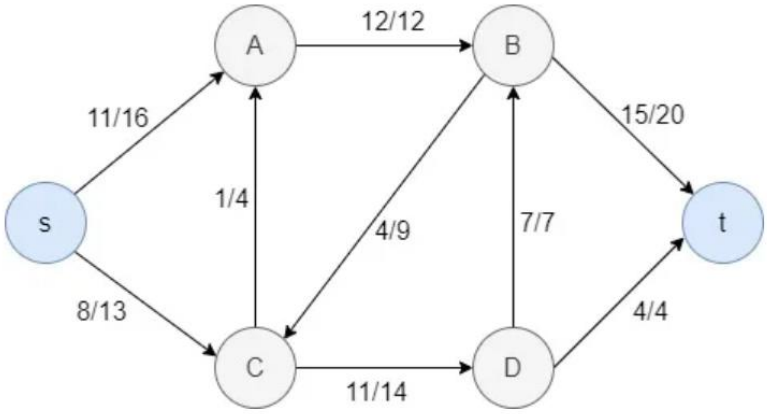
Branch: Computer Science and Engineering **Duration: 3 hrs.**

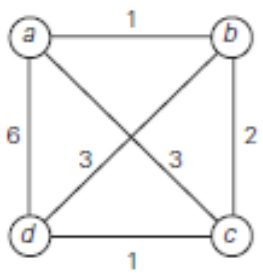
Course Code: 23CS5PEAAM / 22CS5PEAAM **Max Marks: 100**

Course: Advanced Algorithms

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

		UNIT - I	*CO*	*PO*	Marks
1	a)	Design an algorithm for optimal parenthesis for matrix chain multiplication. Solve the following instance using Dynamic Programming for the matrices with sizes 4*10, 10*3, 3*12, 12*20, 20*7	*CO1*	*PO1*	**10**
	b)	Suppose there is a building with 7 floors and you are given 3 crystal cubes. Determine the minimum number of experiments required to find the threshold floor from which you can drop a crystal cube without breaking. Write an algorithm for the same and find its time complexity.	*CO1*	*PO1*	**10**
		OR			
2	a)	Compute the Longest Common Subsequence for the following strings: TAGTCACG and AGACTGTC. Also write the algorithm for the same.	*CO1*	*PO1*	**10**
	b)	Find the minimum cost involved in reaching from node S to node T for the following multistage graph using forward approach. Design an algorithm for the same. 	*CO1*	*PO1*	**10**

			UNIT - II			
	3	a)	Write multithreaded code for finding nth Fibonacci number. Find work and span for n=4.	*CO1*	*PO1*	**06**
		b)	Apply Ford Fulkerson algorithm to find the maximum flow that can flow from source 's' to sink 't' for the following flow network. 	*CO1*	*PO1*	**10**
		c)	What do you mean by race condition in multithreaded programming? Explain with an example.	*CO1*	*PO1*	**04**
			OR			
	4	a)	Write the algorithm for multithreaded matrix multiplication. Show the steps for computation of work and span for multithreaded matrix multiplication.	*CO1*	*PO1*	**08**
		b)	What is bipartite matching? Explain with an example.	*CO1*	*PO1*	**05**
		c)	Derive and show the parallelism achieved for multithreaded merge sort.	*CO2*	*PO2*	**07**
			UNIT - III			
	5	a)	Write pseudocode for Rabin Karp string matching. Also apply the same for below strings. T=ABABCAABCBBCAB and P=BBCA use mod 13.	*CO1*	*PO1*	**10**
		b)	Write pseudocode for Finite Automata based string matching. Also apply the same for below strings. T=ABABABACABA and P=ABABACA	*CO1*	*PO1*	**10**
			OR			
	6	a)	Write pseudocode for KMP string matching. Apply the same on below strings T=ABABCAABCBBCAB and P=BBCA	*CO1*	*PO1*	**10**
		b)	Compare time complexity of Naive string matching and Rabin Karp string matching. Which algorithm is good? Justify.	*CO2*	*PO2*	**5**

		c)	What are spurious hits in Rabin Karp algorithm? How to eliminate the same?	*CO2*	*PO2*	**5**
			UNIT - IV			
	7	a)	Apply Simplex algorithm to solve the below LPP: Maximize: $z=4x_1+6x_2$ Subject to: $-x_1+x_2<=11$ $x_1+x_2<=27$ $2x_1+5x_2<=90$ $x_1, x_2>=0$	*CO1*	*PO1*	**12**
		b)	Convert the below to standard form: Minimize: x_1-x_2 Subject to : $x_1+x_2<=5$ $x_1-x_2>=13$	*CO1*	*PO1*	**08**
			OR			
	8	a)	Given a weighted, directed graph G (V; E) with weight function W : E -> R mapping edges to real-valued weights, a source vertex s, and destination vertex t. We need to compute the value dt, which is the weight of a shortest path from s to t. Formulate this as LPP.	*CO2*	*PO2*	**08**
		b)	Apply Simplex algorithm to solve the below LPP: Maximize: $z=40x_1+30x_2$ Subject to: $x_1+x_2<=12$ $2x_1+x_2<=16$ $x_1, x_2>=0$	*CO1*	*PO1*	**12**
			UNIT - V			
	9	a)	Design pseudocode for Graham Scan algorithm.	*CO1*	*PO1*	**08**
		b)	Design an approximation algorithm for the Traveling Salesman problem. Apply the same to solve the following instance: 	*CO1*	*PO1*	**12**
			OR			

	10	a)	Develop an algorithm to check whether two line segments intersect or not. Apply the same to check whether the line segment (p1,p2) intersects with (p3,p4). pl=(10,10), p2=(30,30), p3=(10,20), p4=(20,10)	*CO1*	*PO1*	**12**
		b)	Design an approximation algorithm for the subset sum problem. Show and justify the improvement in time complexity with respect to the exact algorithm.	*CO2*	*PO2*	**08**

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