U.S.N.										

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

Autonomous Institute Affiliated to VTU

April 2025 Semester End Make-Up Examinations

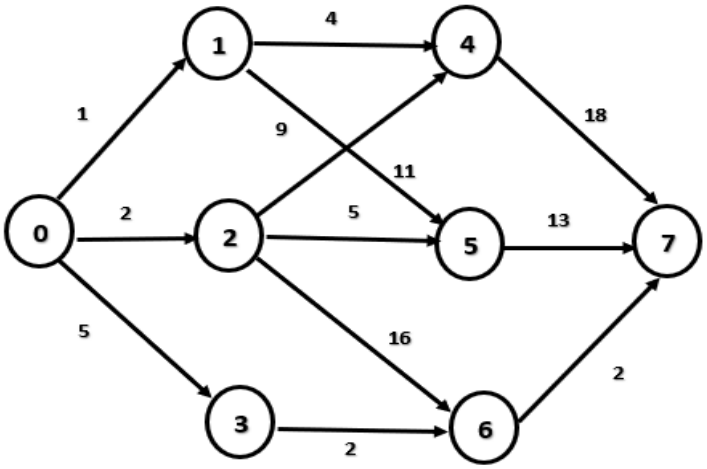
Programme: B.E. **Semester: V**

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

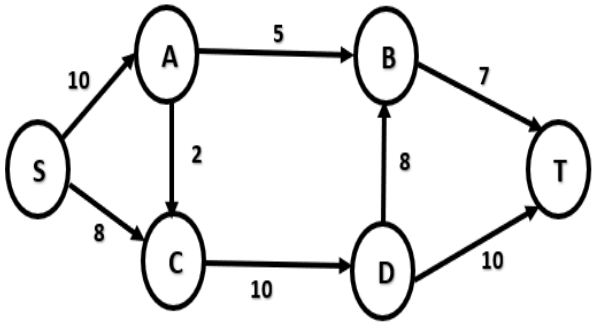
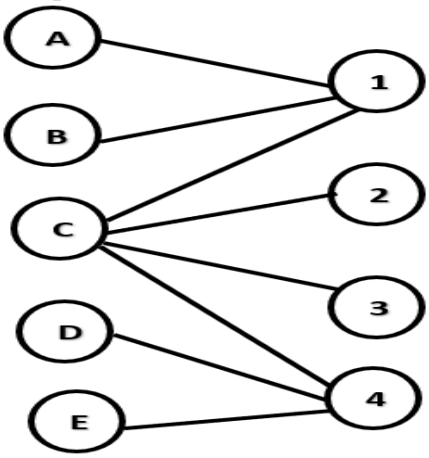
Course Code: 23CS5PEAAM / 22CS5PEAAM **Max Marks: 100**

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)	Apply Dynamic programming to find Longest Common Subsequence between two strings S1=ABCBDAB and S2=BDCABA.	*CO1*	*PO 1*	**6**
	b)	Find shortest path from source '0' to destination '7' in the Multistage graph given below using Dynamic programming with forward approach. Also write the algorithm for the same. 	*CO1*	*PO1*	**10**
	c)	Outline any 3 characteristics of Dynamic programming.	*CO1*	*PO1*	**4**
		OR			
2	a)	Design an algorithm to find solution to rod cutting problem using Dynamic programming. Also apply the same to solve below instance. Rod length=8	*CO1*	*PO1*	**8**

Length i	1	2	3	4	5	6	7	8
Price Pi	1	5	8	9	10	17	17	20

		b)	Apply Dynamic Programming technique to find Longest Increasing Subsequence for the following input sequence: T= { 0, 4, 12, 2, 10, 6, 9, 13}	*CO1*	*PO1*	**6**
		c)	Demonstrate with an example the advantage of Matrix Chain multiplication.	*CO2*	*PO2*	**6**
			UNIT - II			
	3	a)	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*	**8**
		b)	Design an algorithm for multithreaded matrix multiplication. Find speedup achieved.	*CO2*	*PO2*	**6**
		c)	Differentiate between Spawn and Sync in multithreaded programs with an example.	*CO2*	*PO2*	**6**
			OR			
	4	a)	Apply Ford-Fulkerson approach to solve Maximum Bipartite matching problem for the below scenario. Show the steps clearly. 	*CO1*	*PO1*	**8**
		b)	Write multithreaded code for finding n^{th} Fibonacci number. Show the graph and find work and span for n=4.	*CO1*	*PO1*	**6**
		c)	Define Maximum Flow problem. Outline the properties of the flow network.	*CO1*	*PO1*	**6**

			UNIT - III			
	5	a)	Compare time complexity of Naive string matching and Rabin Karp string matching. Analyze and specify which algorithm is good? Justify your answer.	*CO2*	*PO2*	**6**
		b)	Apply Knuth-Morris-Pratt pattern matching algorithm for the following text and pattern string and show how it is efficient compare to Naïve pattern matching algorithm. Also write an algorithm for the same. TEXT: "ABC ABCDAB ABCDABCDABDE" PATTERN "ABCDABD"	*CO1*	*PO1*	**10**
		c)	Demonstrate the term Spurious hits in Rabin Karp string matching approach with an example.	*CO2*	*PO2*	**4**
			OR			
	6	a)	Apply Rabin Karp string matching approach to search for pattern P= "26" in the text T= "31415926535" considering hash function as H=key mod 11. Identify number of spurious hits during pattern matching. Also write the algorithm and find the time complexity.	*CO1*	*PO1*	**10**
		b)	Apply Finite automata based string matching for searching BBCAB in ABAABABBCABAA. Also write an algorithm for the same.	*CO1*	*PO1*	**10**
			UNIT - IV			
	7	a)	Outline the requirements for the Standard form of Linear Programming problem.	*CO1*	*PO1*	**4**
		b)	Apply Simplex method to solve the below Linear Programming problem: Max Z=3x1+2x2 subject to the constraints $4x1+3x2 \leq 12$ $4x1+x2 \leq 8$ $4x1-x2 \leq 8$ $x1,x2 \geq 0$			**10**
		c)	Write an example of representing Linear Programming problem in Standard form and Slack form.	*CO1*	*PO1*	**6**
			OR			
	8	a)	Convert the below Linear Programming Problem to Standard form: Minimize 2a-3b Subject to a+b>=8 a-b<=5 a>=0	*CO1*	*PO1*	**6**
		b)	Differentiate between Standard form and Slack form ways of representing Linear Programming problems with an example.	*CO2*	*PO2*	**6**

		c)	Write Simplex algorithm to solve Linear Programming problem.	*CO1*	*PO1*	**8**
			UNIT - V			
	9	a)	Write an algorithm to check whether any pair of line segments intersect in the given N line segments.	*CO1*	*PO1*	**8**
		b)	Justify how cross product helps in determining whether two consecutive segments p_0p_1 and p_1p_2 turns left or right.	*CO2*	*PO2*	**6**
		c)	Explain Jarvis's algorithm for finding Convex Hull. Write an algorithm for the same.	*CO1*	*PO1*	**6**
			OR			
	10	a)	Design an algorithm to check whether two line segments intersect or not. Apply the same on to check whether AB intersects CD, A(0,0), B(20,20), C(50,100) and D(60, 60).	*CO1*	*PO1*	**10**
		b)	Write Graham scan algorithm for finding Convex Hull. Illustrate working of the same with an example.	*CO1*	*PO1*	**10**

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