U.S.N.										

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

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

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

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

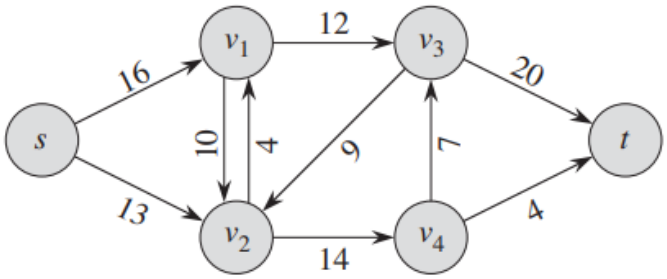
Course Code: 23CS5PEAAM / 22CS5PEAAM **Max Marks: 100**

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.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

		UNIT - I	CO	PO	Marks
1	a)	Design dynamic programming (top down) based algorithm for solving rod cut problem. Apply the same on the below instance and find solution for rod of length=5. Length i: 1 2 3 4 5 6 7 8 9 10 Price Pi: 1 5 8 9 10 17 17 20 24 30	CO1	PO1	**10**
	b)	Design a dynamic programming-based algorithm to find longest common subsequence (LCS). Apply the same on the below strings to find LCS. S1=BDCB S2=BACDB	CO1	PO1	**10**
		OR			
2	a)	Design a Dynamic programming-based algorithm to find order in which matrices are to be multiplied to minimize the number of multiplications. Also apply the same to solve below instance. A1 *A2*A3*A4*A5*A6 matrix: A_1 A_2 A_3 A_4 A_5 A_6 dimension: 30×35 35×15 15×5 5×10 10×20 20×25	CO1	PO1	10
	b)	Design a dynamic programming-based algorithm to find longest increasing subsequence (LIS). Apply the same on the below to find LIS. 8,1,9,8,3,4,6,1,2	CO1	PO1	**10**
		UNIT - II			
3	a)	Apply Ford-Fulkerson algorithm to find maximum flow in the below network. Also write Ford-Fulkerson algorithm.	CO1	PO1	**8**

						
	b)	What is race condition in multi-threaded algorithm? Explain with an example.	*CO1*	*PO1*	**6**
	c)	Describe how Ford Fulkerson algorithm can be applied for solving multi source and multi sink problem.	*CO1*	*PO1*	**6**
		OR			
4	a)	Design a multi-threaded algorithm for merging two sorted arrays.	*CO1*	*PO1*	**8**
	b)	Explain the use of keywords “spawn” and “sync” in multithreaded programming with an example.	*CO1*	*PO1*	**6**
	c)	How Ford-Fulkerson algorithm can be used to solve maximum bipartite problem? Explain with an example.	*CO1*	*PO1*	**6**
		UNIT - III			
5	a)	Design pseudocode for Rabin Karp string matching. Apply Rabin Karp algorithm to find P=”215” in T=”33456732156”. Use mod 11 and also find number of spurious hits.	*CO1*	*PO1*	**10**
	b)	Write KMP string matching algorithm. Apply the same for finding P=abaab in T=ababbaaabbab	*CO1*	*PO1*	**10**
		OR			
6	a)	Design an algorithm based on finite automata for searching for a pattern P in a given text T. Apply the same for P=abaab and T=ababbaaabaabab	*CO1*	*PO1*	**10**
	b)	Design Naive string-matching algorithm. Compare time complexity of Naive string matching with Rabin karp algorithm.	*CO2*	*PO2*	**10**
		UNIT - IV			
7	a)	Solve below LPP using simplex method. Maximize Z=40x1+30x2 Subject to x1 + x2<=12 2x1+x2 <=16 x1, x2 >=0	*CO1*	*PO1*	**10**
	b)	Convert below LPP to standard form Minimize X1+X2	*CO1*	*PO1*	**4**

			Subject to X1-X2=5 X1+X2<=7 X1, X2 >=0			
		c)	Define the following i. Feasible solution ii. Infeasible solution iii. Optimal solution	*CO1*	*PO1*	**6**
			OR			
	8	a)	Design an algorithm to solve LPP using simplex method.	*CO1*	*PO1*	**10**
		b)	Formulate max flow problem as LPP.	*CO1*	*PO1*	**5**
		c)	Convert below LPP to slack form. Minimize X1+X2 Subject to X1-X2<=5 X1+X2<=7 X1, X2>=0	*CO1*	*PO1*	**5**
			UNIT - V			
	9	a)	Design an algorithm to check whether a pair of line segments intersect or not. Apply the same to check line segment (P1,P2) intersects with(P3,P4). P1=(10,10) P2=(10,30), P3=(30,30) and p4=(40,40)	*CO1*	*PO1*	**10**
		b)	Explain the working of Jarvis's March algorithm for finding convex hull with an example.	*CO1*	*PO1*	**10**
			OR			
	10	a)	Check whether p0p1 is clock wise or counter clock wise with respect to p0p2. p0=(0,0) p1=(10,30) p2=(30,20)	*CO1*	*PO1*	**5**
		b)	Check whether the points p1, p2 and p3 are colinear or not. P1=(10,10) p2=(25,25) and p3(50,50)	*CO1*	*PO1*	**5**
		c)	Write Graham Scan algorithm for finding convex hull. Also illustrate its working with an example.	*CO1*	*PO1*	**10**

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