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

Autonomous Institute Affiliated to VTU

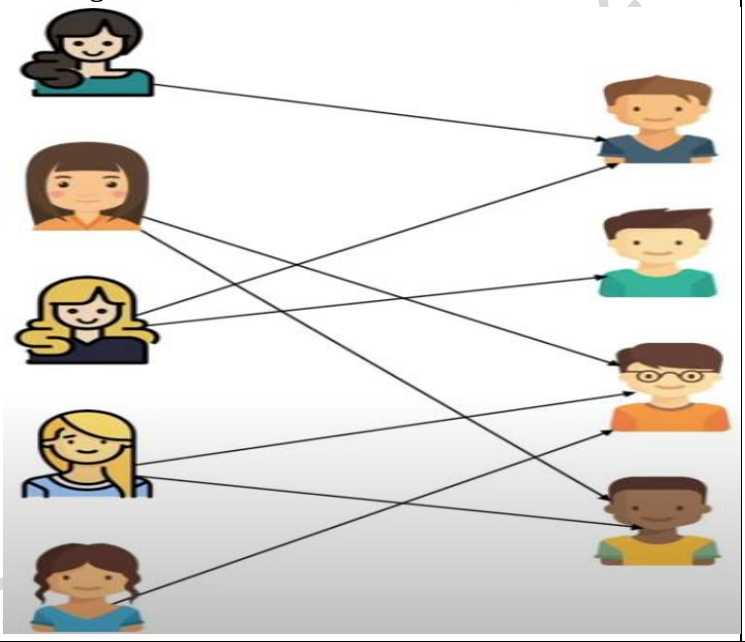
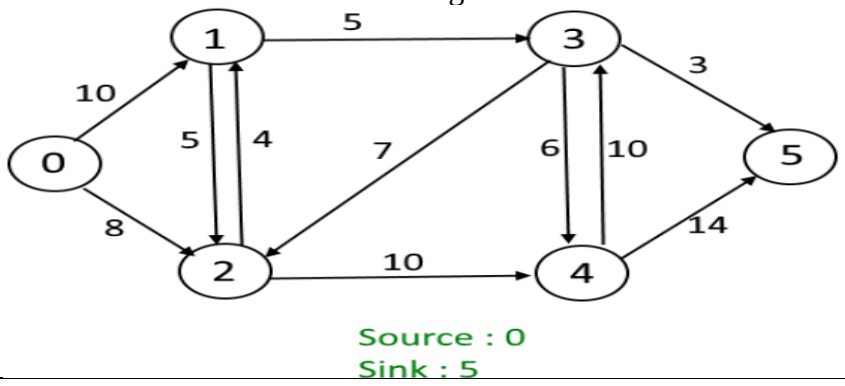
January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 20CS5PEAAG **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)	Apply Dynamic Programming technique to find solution to rod cutting problem for the following instance: Rod length=5 Length i: 1 2 3 4 5 Price Pi: 2 5 7 8 9	CO1	PO1	06
	b)	Justify how Matrix-Chain Multiplication using Dynamic Programming technique reduces number of multiplications required compare to Naïve method for the following data: A_1 of order 5X6 A_2 of order 6X4 A_3 of order 4X2 $A_4$of order 2X3	CO2,3	PO2,3	08
	c)	Apply Dynamic Programming technique to find Longest Common Subsequence for the following sequences. Highlight the path in finding Longest Common Subsequence in the table. X=A C A D B Y= C B D A	CO1	PO1	06
		OR			

	2	a)	Design a Dynamic programming-based algorithm to find longest increasing subsequence. Apply the same to solve the below problem. 6,5,4,2,7,3,8,	***CO1,3***	***PO1,3***	**10**
		b)	Design a Dynamic programming-based algorithm to solve egg dropping puzzle. Apply the same to solve the below problem. No. of floors=6 No. of eggs=3	***CO1,3***	***PO1,3***	**10**
			UNIT - II			
	3	a)	Design an algorithm for Multithreaded Fibonacci number generation and calculate the performance metrics: Work, Span and Parallelism for n=4.	*CO3*	***PO3***	**06**
		b)	Differentiate between the Spawn and Sync parallelism keywords used in Multithreaded programming with an example.	*CO2*	***PO2***	**06**
		c)	Find Maximum Bipartite Matching for the below scenario using Maximum Flow Ford-Fulkerson method. Show the steps clearly. Also write an algorithm for the same. 	*CO2*	*PO2*	**08**
			OR			
	4	a)	Apply Ford Fulkerson method to find maximum flow in the below flow network. Also write an algorithm for the same.  	***CO1,3***	***PO1,3***	**10**
		b)	Design the Multithreaded algorithm for sorting a given number set of numbers: {13,02,55,33,11,09} using Merge sort technique and	***CO1,2, 3***	***PO1,2, 3***	**10**

			compute the Work, Span and Parallelism achieved. Justify how it is efficient compare to running on uniprocessor system.			
			UNIT - III			
	5	a)	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 Knuth-Morris-Pratt pattern matching. TEXT: "bacbababababacaca" PATTERN "ababaca"	*CO1*	*PO1*	**10**
		b)	Justify how Horspool pattern matching is better than Naïve pattern matching algorithm with an example. Also write an algorithm for Horspool pattern matching.	*CO2*	*PO2*	**10**
			OR			
	6	a)	Apply Rabin Karp string matching approach to search for pattern P=31415 in the text T=23590231415267399 considering modulus as 13. Also write an algorithm and find the time complexity.	*CO1,2*	*PO1,2*	**10**
		b)	Write the pseudocode for Finite Automata-based pattern matching.	*CO3*	*PO3*	**06**
		c)	Differentiate between Knuth-Morris-Pratt pattern matching algorithm and Naïve Pattern matching algorithm with an example.	*CO2*	*PO2*	**04**
			UNIT - IV			
	7	a)	Explain any 2 applications of linear programming.	*CO1*	*PO1*	**06**
		b)	Convert the below LPP to Standard form: minimize $-2x_1 + 3x_2$ subject to $x_1 + x_2 = 7$ $x_1 - 2x_2 \leq 4$ $x_1 \geq 0$,	*CO3*	*PO3*	**10**
		c)	Write the steps to solve LPP using Simplex method.	*CO1*	*PO1*	**04**
			OR			
	8	a)	Design an algorithm to solve LPP by Simplex method.	*CO3*	*PO3*	**10**
		b)	Apply Simplex method to solve the below problem. Maximize Z= 40x1 +50x2 Subject to x1 +2x2 <=40 4x1 +3x2 <=120 x1,x1>=0	*CO1*	*PO1*	**10**

			UNIT - V			
	9	a)	Justify how Sweeping technique helps in determining whether any two-line segments in a set of segments intersect or not. Design an algorithm to check whether two-line segments in the set of segments intersect or not.	*CO2*	*PO2*	**08**
		b)	Illustrate with an example the working of the Graham Scan algorithm for finding Convex Hull.	*CO1*	*PO1*	**06**
		c)	Demonstrate how to determine whether consecutive segments p_0p_1 and p_1p_2 turn left or right at point p_1 using cross product.	*CO1*	*PO1*	**06**
			OR			
	10	a)	Design an algorithm to check whether a pair of line segments intersect or not. Apply the same to check segment AB intersects with CD. A=(0,0) B=(20,20) C= (0,10) D=(10,0)	*CO1,3*	*PO1,3*	**10**
		b)	Explain Jarvis march algorithm to find convex hull with an example.	*CO1*	*PO1*	**10**

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