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

Autonomous Institute Affiliated to VTU

July 2024 Semester End Main Examinations

Programme: B.E. **Semester: V**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 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.

				CO	PO	Marks
			UNIT - I			
1	a)		Design a Dynamic Programming-based algorithm to find Longest Common Subsequence. Apply the same on the below strings to find Longest Common Subsequence. S1=BDCB and S2=BACDB	CO1,3	PO1,3	**10**
	b)		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	CO1,3	PO1,3	**10**
			UNIT - II			
2	a)		Design a Multithreaded algorithm to find n^{th} Fibonacci number. Also find WORK and SPAN for n=4.	CO1,3	PO1,3	**8**
	b)		What is race condition in Multithreaded algorithm? Explain with an example.	CO1	PO1	**6**
	c)		How Ford-Fulkerson algorithm can be used to solve Maximum Bipartite problem? Explain with an example.	CO2	PO2	**6**
			OR			
3	a)		Design an algorithm for Multithreaded Matrix Multiplication. Also find speedup achieved with an example.	CO2,3	PO2,3	**10**
	b)		How Ford Fulkerson algorithm can be extended to solve Multi Source and Multi Sink Flow problem? Explain with an example.	CO3	PO3	**5**

		c)	Analyze the given below Multithreaded Merge sort code and explain the speed up achieved by the code. MERGE-SORT′(A, p, r) 1 **if** p < r 2 q = ⌊(p + r)/2⌋ 3 **spawn** MERGE-SORT′(A, p, q) 4 MERGE-SORT′(A, q + 1, r) 5 **sync** 6 MERGE(A, p, q, r)	*CO2*	*PO2*	**5**
			UNIT - III			
	4	a)	Write Rabin Karp algorithm for string matching and apply the same for finding Pattern P=352 in Text T=23454768352. Use Mod 13. Also find number of spurious hits.	*CO1,3*	*PO1,3*	**12**
		b)	Compare Rabin Karp string matching and Naïve string matching.	*CO2*	*PO2*	**3**
		c)	Compare Finite Automata based string matching and KMP string matching algorithm with respect to time complexity.	*CO2*	*PO2*	**5**
			OR			
	5	a)	Design algorithm for Finite Automata-based string matching. Apply the same for Pattern P= "ababaca" and Text T= "abbabcababaca".	*CO1,3*	*PO1,3*	**12**
		b)	Apply KMP string matching algorithm to find Pattern P= "ababaca" in Text T= "abbabcababaca".	*CO1*	*PO1*	**8**
			UNIT - IV			
	6	a)	Solve below LPP using Simplex method: 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*	**10**
		b)	Convert below LPP to Standard form: Minimize x_1+x_2 Subject to $x_1-x_2>=5$ $x_1+x_2<=7$ $x_1>=0$	*CO1*	*PO1*	**5**
		c)	Formulate Max flow problem as LPP	*CO1*	*PO1*	**5**
			UNIT - V			
	7	a)	Write Graham Scan algorithm for finding Convex Hull. Also illustrate its working with an example.	*CO1*	*PO1*	**10**
		b)	Check whether OP and OQ are colinear or not where O=(0,20), P=(10,30) and Q=(-20,30).	*CO1*	*PO1*	**5**
		c)	Illustrate working of Jarvis's March algorithm for finding Convex Hull.	*CO1*	*PO1*	**5**

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