U.S.N.										

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

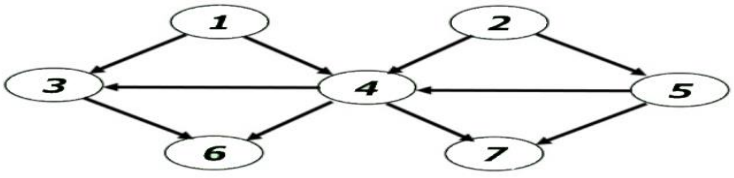
Autonomous Institute Affiliated to VTU

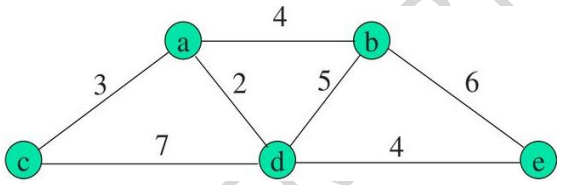
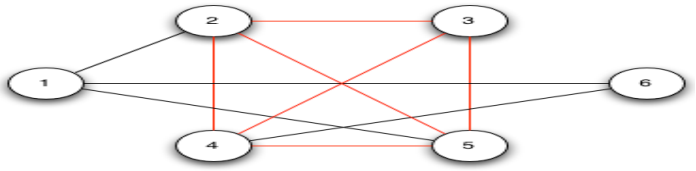
September / October 2024 Supplementary Examinations

Programme: B.E. **Semester: IV**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 22CS4PCADA **Max Marks: 100**
Course: Analysis and Design of 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)	With the help of flow chart, explain the various stages of algorithm design and analysis process.	*CO1*	*PO2*	**8**
	b)	Explain with formal definitions the various asymptotic notations.	*CO1*	*PO2*	**6**
	c)	Solve the following recurrence relation using backward Substitution method: $x(n)=x(n-1) + 1$ for $n>1$,$x(1)=1$	*CO1*	*PO2*	**6**
		UNIT - II			
2	a)	Determine the number of character comparisons made by the Brute-Force pattern matching algorithm in searching for the pattern "WOOD" in the text "TWO_ROADS_DIVERGED_IN_A_YELLOW_WOOD". Also write an algorithm for the same and derive the best-case and worst-case time complexities.	*CO1*	*PO2*	**10**
	b)	Generate the no of permutation for the numbers 1 3 7 9 using Johnson trotter algorithm. Write the Algorithm	*CO2*	*PO1*	**10**
		OR			
3	a)	Apply the partition-based algorithm to find the median of the following list of nine numbers: 4, 1, 10, 8, 7, 12, 9, 2, 15.Write the time complexity in the worst case.	CO2	PO1	**10**
	b)	Find the topological order for the following graph using DFS method and Source removal method by explaining source removal Algorithm 	**CO2**	**PO1**	**10**
		UNIT - III			
4	a)	Explain the central idea of Strassen's matrix multiplication. Set up the recurrence formula to find the total number of multiplications	*CO2*	*PO1*	**10**

			required to perform Strassen multiplication. Compare this method with regular matrix multiplication.			
		b)	Explain the divide and conquer methodology. Apply quick sort to sort the following elements: 5,3,1,9,8,2,4,7. Derive the time complexity for the worst case in Quick sort.	***CO2***	***PO1***	**10**
			OR			
	5	a)	Define heap. Give an algorithm to construct a heap for the given array by bottom up approach. Show bottom up heap construction step by step for the given list 2,9,7,6,5,8 and sort the heap.	***CO2***	***PO1***	**10**
		b)	Apply Horspool string matching algorithm for the pattern BARBER in the main string text "J I M _ S A W _ M E _ I N _ A _ B A R B E R S H O P".	***CO2***	***PO1***	**05**
		c)	Design a Presorting -based algorithm to find the mode and determine its time efficiency.	***CO2***	***PO1***	**05**
			UNIT - IV			
	6	a)	Apply Dynamic programming technique to solve coin row problem for the coins 5,1,2,10,6,2.Write the algorithm along with the recurrence equation and show the steps.	***CO2***	***PO1***	**10**
		b)	Write Dijkstra's algorithm to find single source shortest paths. Apply Dikstra's algorithm to get shortest path from vertex 'a' to all other vertices. 	***CO2***	***PO1***	**10**
			UNIT - V			
	7	a)	Determine the vertex cover for the following graph. Write the steps and prove that how clique problem is reduced to vertex cover that satisfies NP Completeness. 	***CO3***	***PO1***	**8**
		b)	Apply Backtracking for 4 Queens problem and draw state space tree to obtain the solution. Also write an algorithm for the same .	***CO3***	***PO1***	**12**

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