U.S.N.										

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

Autonomous Institute Affiliated to VTU

September / October 2023 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**
Course Code: 22AM4PCDAA **Max Marks: 100**
Course: Design and Analysis of Algorithms **Date: 22.09.2023**

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)		Differentiate asymptotic notations diagrammatically with the suitable mathematical representation for each.	*CO1*	*PO1*	**10**
	b)		Write a recursive algorithm to compute factorial of a given number. Set up and solve recurrence relation for the same to find its time complexity.	*CO 1*	*PO 2*	**10**
			UNIT - II			
2	a)		Apply quicksort to sort the list E, X, A, M, P, L, E in alphabetical order. Draw recursive call tree. Quick sort is stable or not, justify your answer.	*CO 3*	*PO 3*	**10**
	b)		Write single source shortest path algorithm.	*CO 3*	*PO 3*	**10**
			OR			
3	a)		Write an algorithm to demonstrate the working of Kruskal's algorithm. Depict the same with a suitable example.	*CO 3*	*PO 3*	**10**
	b)		Write an algorithm and derive best, worst, and average case efficiencies for brute force string matching. Determine the number of character comparisons made by the brute-force algorithm in searching for the pattern GANDHI in the text. THERE_IS_MORE_TO_LIFE_THAN_INCREASING_ITS _SPEED. Assume that the length of the text is 47 characters long and is known before the search starts.	*CO 3*	*PO 2*	**10**
			UNIT - III			
4	a)	i.	Define Decrease and conquer technique. Explain the general plan based on which the Decrease and conquer works with the help of diagrammatic representation.	*CO 3*	*PO 2*	**10**
		ii.	Demonstrate BFS and DFS traversals starting from vertex 0 for the network given below:			

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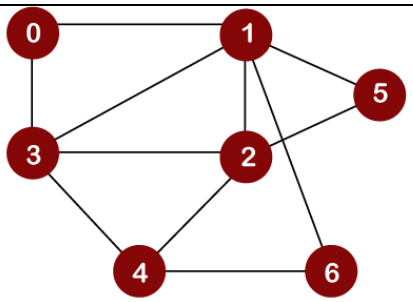
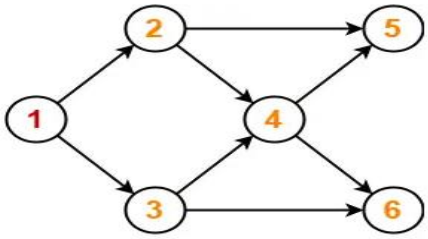
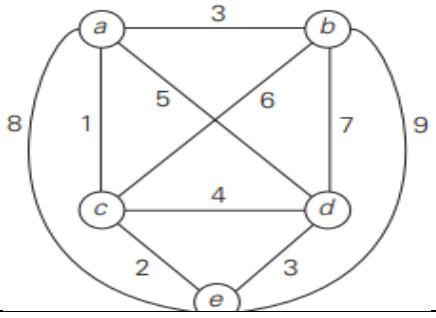
						
		b)	Apply topological sorting algorithm to the following graph and find all possible topological orderings. 	*CO 3*	*PO 2*	**10**
			OR			
	5	a)	Apply Decrease and Conquer strategy and write an algorithm to check whether a graph is connected or not using DFS method. Give an example.	*CO 3*	*PO 2*	**10**
		b)	Write Horspool Algorithm for String matching. Trace the algorithm to find the pattern "ELECTION" in the text. "EDUCATION_ONLY_HELPS_IN_SELECTION"	*CO 3*	*PO 3*	**10**
			UNIT – IV			
	6	a)	Discuss the working principle of 2-3 Tree and Construct a 2-3 tree for the following elements: 3, 1, 4, 5, 9, 2, 6, 8, 7.	*CO 3*	*PO 3*	**10**
		b)	Consider the following weights and profits, apply 0/1 Knapsack problem by considering the knapsack capacity as 8 Kgs, Weights: {3, 4, 6, 5}, Profits: {2, 3, 1, 4}.	*CO 3*	*PO 2*	**10**
			UNIT – V			
	7	a)	Solve the travelling salesmen problem for the graph given below by applying the branch bound technique with help of state space tree. 	*CO 3*	*PO 3*	**12**
		b)	Discuss the following terms in detail i. P – Class. ii. NP hard– Class. iii. NP Complete Class.	*CO 2*	*PO 1*	**8**

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