U.S.N.										

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

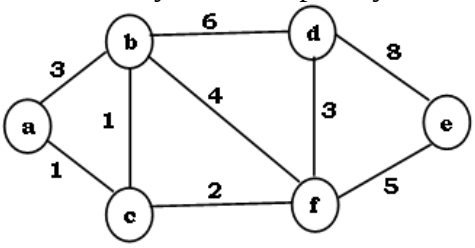
Autonomous Institute Affiliated to VTU

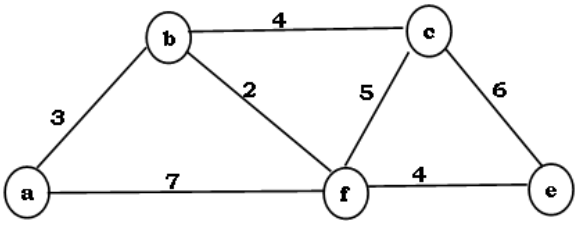
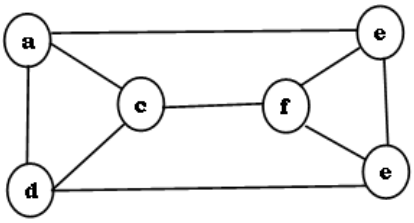
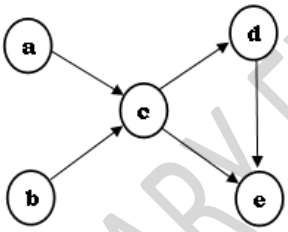
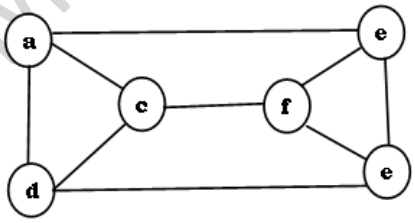
December 2023 Supplementary Examinations

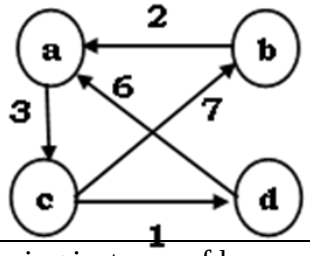
Programme: B.E. **Semester: IV**
Branch: Artificial Intelligence and Machine Learning **Duration: 3 hrs.**
Course Code: 22AM4PCDAA **Max Marks: 100**
Course: Design and Analysis of Algorithms

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)	Write an algorithm to compute n! recursively. Set up a recurrence relation for the algorithm's basic count and solve it.	CO1	PO1 PO2	**6**
	b)	Prove the following theorem of asymptotic notations: If t1(n)Є O(g1(n)) and t2(n)Є O(g2(n)) then t1(n) + t1(n) Є O(max(g1(n)), (g2(n)))	CO1	PO1 PO2	**6**
	c)	Define an algorithm? Explain the Characteristics of an algorithm. Illustrate the fundamentals of problem solving using an algorithm.	CO1	PO1 PO2	**8**
		UNIT - II			
2	a)	Write the Brute force string matching algorithm. Apply Brute string-matching algorithm for the following string and pattern. Analyze its time complexity. **NOBODY NOTICED HIM** **String to be searched: NOT**	CO3	PO1 PO2	**4**
	b)	Write Quick sort algorithm. Find the time complexity of the Same. Sort the following numbers using Quick sort. **5 3 1 9 8 2 4 7**	CO3	PO1 PO2	**8**
	c)	Illustrate Merge sort algorithm and discuss its time complexity Apply Merge sort to sort the following list in asending order. **8 3 2 9 7 1 5 4**	CO3	PO1 PO2	**8**
		OR			
3	a)	Find the minimum spanning tree and its cost using Prim's algorithm for the following graph. Reproduce the steps followed as an algorithm and analyze its complexity. 	CO3	PO1 PO2	**10**

		b)	Write single source shortest path algorithm. Find the shortest path to all nodes from node '**a**' in the following graph. 	*CO3*	*PO1* *PO2*	**10**
			UNIT - III			
	4	a)	Write Depth First Search algorithm. Find the DFS path for the following graph. 	*CO3*	*PO1* *PO2*	**6**
		b)	Apply DFS and Source removal methods of Topological sorting on following graph. 	*CO3*	*PO1* *PO2*	**8**
		c)	Generate all permutations of {1,2,3,4} by Bottom up minimal change algorithm and Johnson Trotter algorithm.	*CO3*	*PO1* *PO2*	**6**
			OR			
	5	a)	Write Breadth First Search algorithm. Find the BFS path for the following graph. 	*CO3*	*PO1* *PO2*	**6**
		b)	Construct the shift table and apply horspool string matching algorithm to find the pattern "BARBER" in the string: JIM_SAW_ME_IN_A_BARBERSHOP	*CO3*	*PO1* *PO2*	**6**
		c)	Illustrate Open hashing and closed hashing with an example for each.	*CO3*	*PO1* *PO2*	**8**
			UNIT - IV			
	6	a)	Apply heapsort for the list of elements 82, 90, 10, 12, 15, 77, 55, 23 using bottom up approach. Provide tree representation of each step.	*CO3*	*PO1* *PO2*	**7**

		b)	Apply Floyd's algorithm to compute all pairs shortest paths for the following graph. 	*CO3*	*PO1* *PO2*	**7**
		c)	Solve the following instance of knapsack problem, using dynamic programming: Weight = {2,1,3} profit = {12,10,20} and Knapsack Capacity = 4.	*CO3*	*PO1* *PO2*	**6**
			UNIT - V			
	7	a)	Find possible solutions for 4 Queen's problem using backtracking technique. Construct the state space tree for the same.	*CO3*	*PO1* *PO2*	**7**
		b)	By constructing state space tree find all possible subsets of set S= {3,5,6,7} whose sum d=15.	*CO3*	*PO1* *PO2*	**7**
		c)	Write a note on NP Complete, NP and P class problem.	*CO2*	*PO1* *PO2*	**6**