U.S.N.										

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

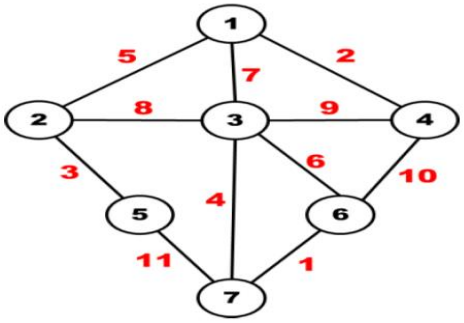
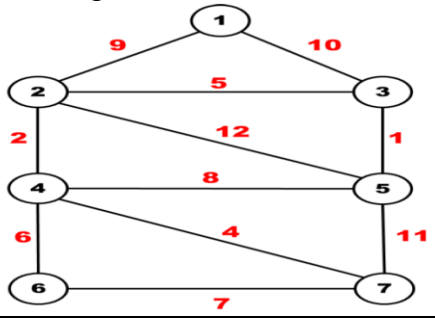
Autonomous Institute Affiliated to VTU

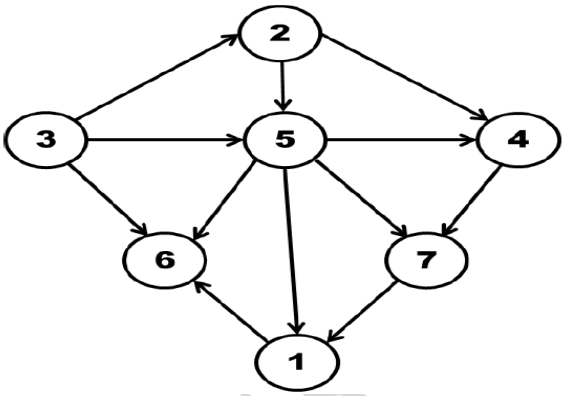
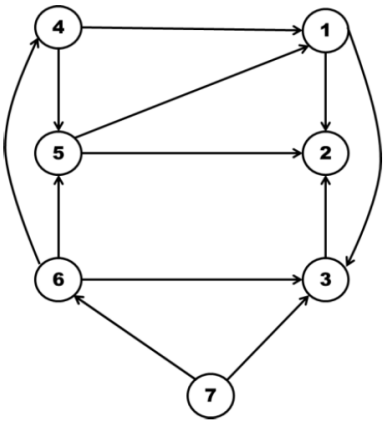
December 2023 Supplementary Examinations

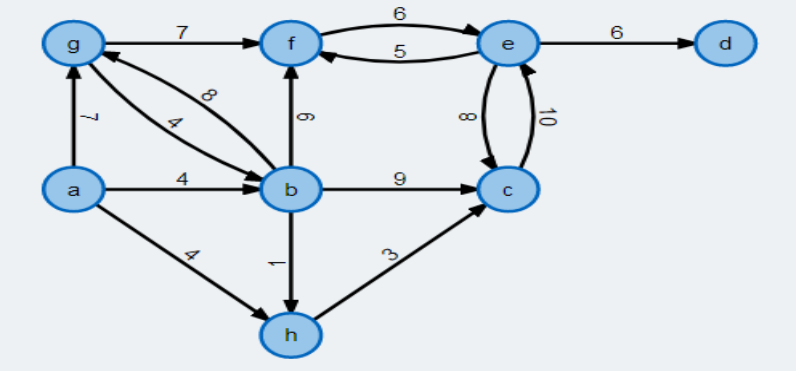
Programme: B.E. **Semester: IV**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 22IS4PCADA **Max Marks: 100**
Course: Analysis and Design of Algorithms

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.

			UNIT - I	*CO*	*PO*	Marks
1	a)		Derive the time complexity for the following Algorithms: i) Tower of Hanoi ii) To find the nth factorial of a number	CO2	P02	**08**
	b)		Describe with a neat flowchart, the process of algorithm design and analysis.	CO1	P01	**06**
	c)		Define Big Oh, Omega and Theta notations for analyzing the algorithm.	CO1	P01	**06**
			UNIT - II			
2	a)		Apply Merge Sort to sort the characters in the list {F, D, G, E, A, H, B, C} in alphabetical order. Also, derive the time complexity of Merge Sort.	*CO2*	*PO2*	**10**
	b)		Solve the following graph for its minimum spanning tree using i)Prim's algorithm (source vertex= 2)  ii) Kruskal's algorithm  	*CO3*	*P03*	**10**

			OR			
	3	a)	Explain how exhaustive search can be applied to the sorting problem and determine the efficiency class of such an algorithm.	*CO2*	*PO2*	**04**
		b)	With an example, discuss how to find the Pattern String in the Main String using Brute Force Pattern Matching Algorithm. Also, discuss its worst case time complexity.	*CO2*	*PO2*	**06**
		c)	Write the quick sort algorithm. Apply the same to sort the list 42,37,11,98,36,72,65,10,88,78	*CO2*	*PO2*	**10**
			UNIT - III			
	4	a)	Apply DFS Algorithm to find the graph traversal starting from vertex 3 along with the stack trace tree for the following Graph. Also, write the DFS algorithm. 	*CO2*	*PO2*	**10**
		b)	Find the Topological sequence for the following Graph using source removal method. Also, write the algorithm. 	*CO2*	*PO2*	**10**
			OR			
	5	a)	Write the Johnson Trotter algorithm. Generate all permutations for the set {4,3,2,1} using Johnson Trotter algorithm.	*CO2*	*PO2*	**10**
		b)	For the input {30, 20, 56, 75, 31, 19} and hash function h(k)=k mod 11 i) Construct the closed hash table ii) Find the largest and average number of key comparisons in a successful search for hash table	*CO3*	*PO3*	**10**

			UNIT - IV			
	6	a)	Write the Heap Sort Algorithm. Show how the following numbers are sorted using Heap Sort {11, 44, 10, 65, 50, 6, 88, 3}.	*CO3*	*PO3*	**10**
		b)	Apply Floyd's algorithm to compute all pairs shortest path for the following graph.  	*CO3*	*PO3*	**10**
			UNIT - V			
	7	a)	Differentiate between NP Hard and NP Complete Problems.	*CO1*	*PO1*	**05**
		b)	Find any one solution to 4-queens problem using backtracking. Draw the state-space tree.	*CO3*	*PO3*	**05**
		c)	Solve the following instance of the Job Assignment Problem using the branch-and-bound algorithm design technique. **Job 1 / Job 2 / Job 3 / Job 4** **Person 1**: 9, 6, 5, 7 **Person 2**: 2, 4, 8, 6 **Person 3**: 7, 3, 1, 9 **Person 4**: 7, 6, 9, 4	*CO3*	*PO3*	**10**

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