U.S.N.										

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

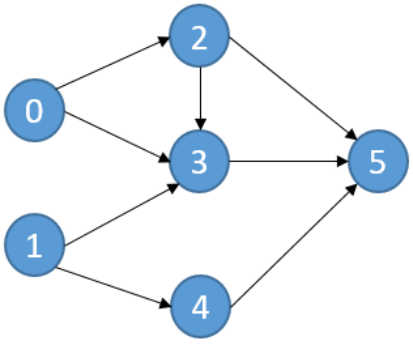
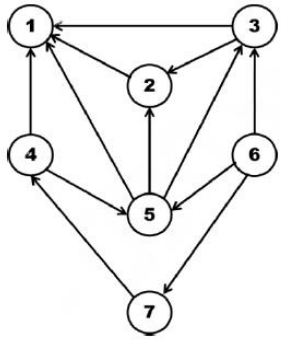
Autonomous Institute Affiliated to VTU

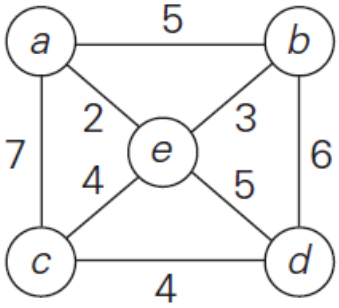
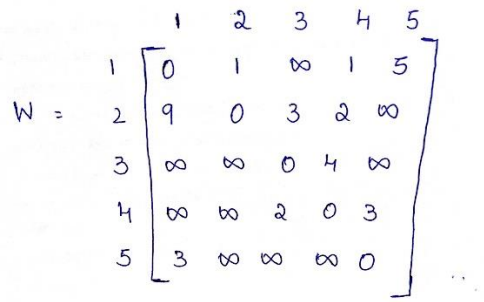
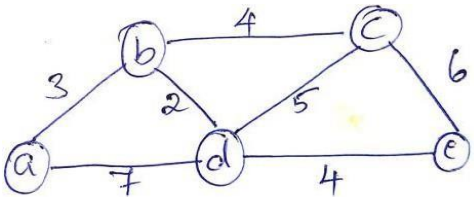
August 2024 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Information Science and Engineering **Duration: 3 hrs.**
Course Code: 23IS4PCADA **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)	Explain different asymptotic notations used to represent the time complexities with suitable examples.	CO1	-	10
	b)	Outline selection sort and Bubble sort algorithms with example.	CO2	PO1	10
		UNIT - II			
2	a)	Write the quick sort algorithm. Apply the same to sort the list {E, X, A, M, P, L, E} in alphabetical order.	CO2	PO1	12
	b)	Apply source removal method to solve the following topological sorting problem. 	CO2	PO1	08
		OR			
3	a)	Find the BFS and DFS traversals starting from vertex 6 for the following Graph. Also, write the BFS and DFS Algorithms. 	CO2	PO1	12

		b)	Apply Merge sort algorithm to sort the numbers {14, 91, 07, 01, 10, 29, 08, 02}. Show the Merge call tree for the same.	*CO2*	*PO1*	**08**
			UNIT - III			
	4	a)	Write the Prim's algorithm. Apply Prim's algorithm to the following graph. Start from vertex 'a'. 	*CO3*	*PO1*	**10**
		b)	Solve the following instance of Knapsack problem using dynamic programming. Knapsack Capacity M=10 Item 1 2 3 4 Weight 4 7 5 3 Profit 40 42 25 12	*CO2*	*PO1*	**10**
			OR			
	5	a)	Apply Floyd's algorithm to find all pairs shortest path for the given adjacency matrix. 	*CO2*	*PO1*	**10**
		b)	Using Dijkstra's algorithm, trace the following graph to get shortest path from vertex 'a' to all other vertices. Also, write the algorithm. 	*CO3*	*PO1*	**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*	*PO1*	**12**

<table>
<tr><td></td><td></td><td>b)</td><td>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</td><td>CO2</td><td>PO1</td><td>08</td></tr>
<tr><td></td><td></td><td></td><td>UNIT - V</td><td></td><td></td><td></td></tr>
<tr><td></td><td>7</td><td>a)</td><td>Differentiate between NP Hard and NP Complete Problems.</td><td>CO2</td><td>PO2</td><td>06</td></tr>
<tr><td></td><td></td><td>b)</td><td>Find any one solution to 4-queens problem using backtracking. Draw the state-space tree.</td><td>CO3</td><td>PO1</td><td>05</td></tr>
<tr><td></td><td></td><td>c)</td><td>Obtain the optimal solution for the given job assignment problem using Branch and Bound method.
<table>
<tr><td></td><td>JOB1</td><td>JOB2</td><td>JOB3</td><td>JOB4</td></tr>
<tr><td>Person A</td><td>9</td><td>2</td><td>7</td><td>8</td></tr>
<tr><td>Person B</td><td>6</td><td>4</td><td>3</td><td>7</td></tr>
<tr><td>Person C</td><td>5</td><td>8</td><td>1</td><td>8</td></tr>
<tr><td>Person D</td><td>7</td><td>6</td><td>9</td><td>4</td></tr>
</table></td><td>CO2</td><td>PO1</td><td>09</td></tr>
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