U.S.N.										

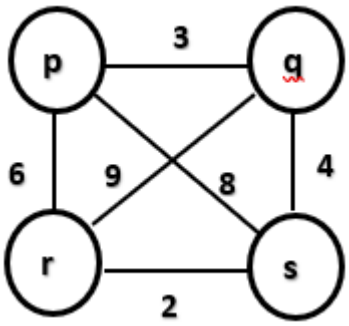
B.M.S. College of Engineering, Bengaluru-560019

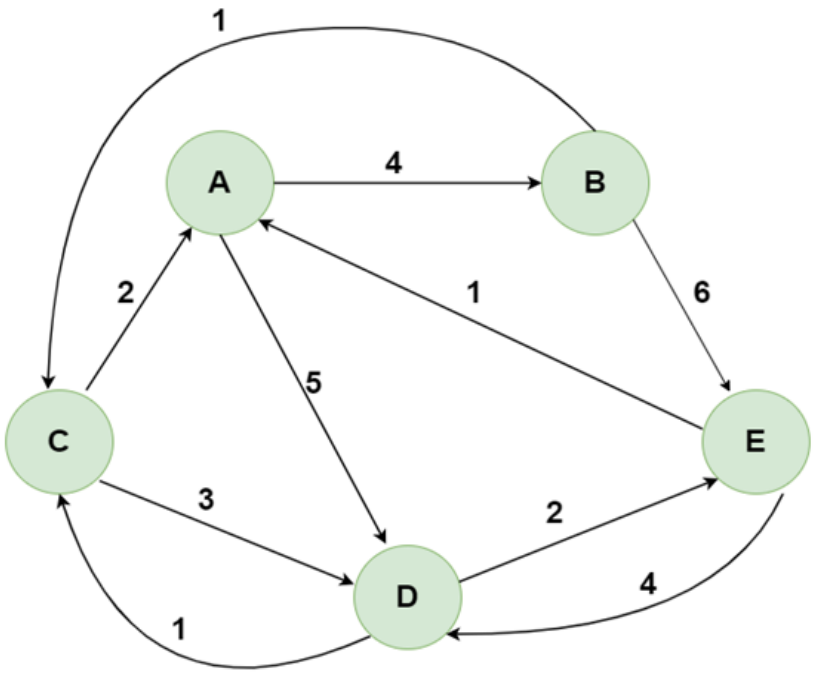
Autonomous Institute Affiliated to VTU

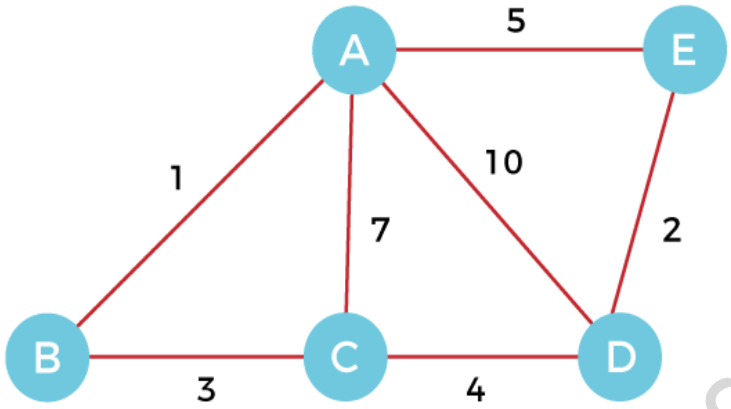
October 2024 Supplementary Examinations

Programme: B.E. **Semester: IV**
Branch: Computer Science and Engineering **Duration: 3 hrs.**
Course Code: 23CS4PCADA **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.

		UNIT - I	CO	PO	Marks
1	a)	With the help of a flowchart, explain the various stages of algorithm design process.	CO 1	PO 1	8
	b)	Differentiate among various asymptotic notations.	CO-1	PO1	6
	c)	Given a positive decimal integer n, write a recursive algorithm which computes the number of binary digits in the binary representation of n. Write the corresponding recurrence relation.	CO-1	PO1	6
		UNIT - II			
2	a)	Discuss the advantages and disadvantages of Brute force technique. Apply Brute force technique to list all tours starting from city p and find the shortest path among them. 	CO-2	PO2	6
	b)	For the given set **{2, 4, 6, 8}**, generate the permutations using following approaches: **i.** Bottom-up minimal change algorithm **ii.** The Johnson Trotter algorithm Also write an algorithm for the Johnson Trotter method.	CO-2	PO2	8
	c)	Apply Russian Peasant multiplication technique to perform the multiplication of 85*18.	CO-2	PO2	6

			UNIT - III			
	3	a)	Demonstrate the Divide-and-Conquer strategy used to multiply two large integers. Apply the same to compute: 2101*1130.	***CO-2***	***PO2***	**6**
		b)	Design an algorithm to sort the given elements using Divide and Conquer technique where the partition of the array is done according to their value. Analyze its time efficiency for all the cases. Apply the algorithm to sort the following list of elements: **{ 4, 2, 6, 5, 3, 9}**	***CO-2***	***PO2***	**8**
		c)	Demonstrate the Boyer-Moore algorithm for string matching with an example.	***CO-2***	***PO2***	**6**
			OR			
	4	a)	Differentiate among the variations of Transform-and-Conquer technique with an example.	***CO-2***	***PO2***	**6**
		b)	Apply Heap sort technique to sort the following list of elements in ascending order. Also write an algorithm for the same. **{2, 9, 7, 6, 5, 8 }**	***CO-2***	***PO2***	**8**
		c)	Write an algorithm to evaluate a polynomial at a given point by Horner's rule. Evaluate **$p(x)= 6x^3 - 2x^2 + 7x + 5$ at x = 4.**	***CO-2***	***PO2***	**6**
			UNIT - IV			
	5	a)	Apply Dynamic programming technique to find the solutions to the change-making problem for the denominations 1, 3, 4 and the amount n = 6.	***CO-2***	***PO2***	**6**
		b)	Apply Floyd's algorithm to solve all-pairs shortest-path problem for the following graph: 	***CO-2***	***PO2***	**8**
		c)	Demonstrate Warshall's algorithm to find path matrix with an example. Also find the time complexity of the algorithm.	***CO-2***	***PO2***	**6**

			OR			
	6	a)	Compare and contrast between Prims and Kruskals algorithms to find minimum spanning tree with an example.	***CO-2***	***PO2***	**6**
		b)	Apply Dijkstra's algorithm for computing single source shortest path for the following graph:  	***CO-2***	***PO2***	**8**
		c)	Construct a Huffman code for the following data character: **Character** | **A** | **B** | **C** | **D** | **-** **Probability** | **0.4** | **0.1** | **0.2** | **0.15** | **0.15** Encode the text **ABACABAD** using the code generated. Decode the text whose encoding is **10001011100101** with the code.	***CO-2***	***PO2***	**6**
			UNIT - V			
	7	a)	Distinguish between P, NP and NP-complete problems. Give examples for each category.	***CO-3***	***PO3***	**6**
		b)	Solve the following instance of the knapsack problem by the Branch-and Bound technique: **Knapsack Capacity W=10** **Item** | **Weight** | **Value** | **Value/Weight** **1** | **4** | **$40** | **10** **2** | **7** | **$42** | **6** **3** | **5** | **$25** | **5** **4** | **3** | **$12** | **4**	***CO-3***	***PO3***	**8**
		c)	Apply Backtracking technique to solve the following instance of the subset sum problem **S={ 1, 3, 4, 5 }** and **d=11**.	***CO-3***	***PO3***	**6**

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