PVP 20

Code: 20CS3403, 20IT3403, 20AM3403, 20DS3403

II B.Tech - II Semester – Regular / Supplementary Examinations
MAY - 2024

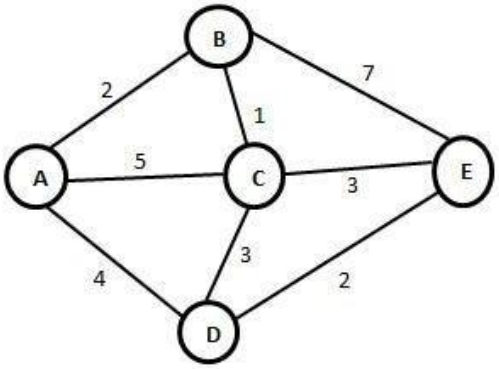
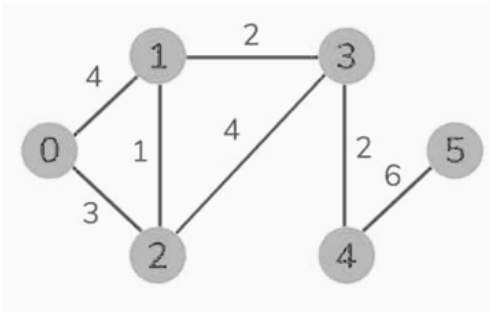
DESIGN AND ANALYSIS OF ALGORITHMS
(Common for CSE, IT, AIML, DS)

Duration: 3 hours Max. Marks: 70

Note: 1. This paper contains questions from 5 units of Syllabus. Each unit carries 14 marks and have an internal choice of Questions.
2. All parts of Question must be answered in one place.
BL – Blooms Level CO – Course Outcome

			BL	CO	Max. Marks
UNIT-I					
1	a)	Discuss the basic principles of brute force technique and provide examples of problems where it is appropriate.	L2	CO1	6 M
	b)	Define asymptotic notations (Big O, Omega, Theta). Provide examples of algorithms and express their time complexities using these notations.	L2	CO1	8 M
OR					
2	a)	Define exhaustive search as a specific application of the brute force technique. Highlight its strengths and limitations. Provide a real-world example where exhaustive search might be employed.	L3	CO2	8 M
	b)	Explain the significance of time complexity with an appropriate example.	L2	CO1	6 M

UNIT-II					
3	a)	Illustrate the Quick Sort algorithm with an appropriate example.	L3	CO2	8 M
	b)	In the Quick Sort algorithm, the choice of the pivot element determines the performance of the algorithm. Justify this statement with an appropriate example.	L3	CO2	6 M
OR					
4	a)	Define Binary Search and explain how it works on a sorted array? Discuss its time complexity and scenarios where it outperforms other searching algorithms.	L3	CO3	8 M
	b)	Write an algorithm to find the maximum and minimum element in a single pass. Derive its time complexity.	L3	CO3	6 M
UNIT-III					
5	a)	Find Huffman code for each symbol in following text : **ABCCDEBABFFBACBEBDFAAAABC DEEDCCBFEBFCAE**	L3	CO3	7 M
	b)	Apply the Dijkstra's algorithm on the following network to obtain the shortest path from the node A to all the other nodes.	L3	CO3	7 M

					
OR					
6	a)	Consider the knapsack problem where weights and profits are given as follows: Weights: {3, 4, 6, 5} Profits: {2, 3, 1, 4} Assuming that the total weight of the knapsack is 8 kg, write an algorithm that will apply the greedy method to maximize the profit earned. Illustrate your algorithm using the above example.	L3	CO3	8 M
	b)	Illustrate the Kruskal's algorithm to obtain a minimum spanning tree for the following graph. 	L3	CO3	6 M
UNIT-IV					
7	a)	Explain what is Dynamic Programming with a suitable example?	L3	CO2 CO3	7 M

	b)	Write a recursive algorithm for finding the n^{th} term in the Fibonacci series. Derive its time complexity. Explain how dynamic programming can be used to reduce the time complexity of the recursive algorithm.	L3	CO2 CO3	7 M
OR					
8	a)	Explain the dynamic programming principle behind the 0/1 Knapsack problem with an example.	L4	CO2 CO3	7 M
	b)	How does the dynamic programming principle work in Optimal Binary Search trees? Illustrate with an example.	L4	CO2 CO3	7 M
UNIT-V					
9	a)	Write a backtracking algorithm for the n-Queens problem and illustrate the same for n=4.	L3	CO4	7 M
	b)	Explain the Branch-and-Bound technique with an appropriate example.	L3	CO4	7 M
OR					
10	a)	Apply backtracking technique to solve the following instance of the sum of subsets problem S={3, 8, 9, 10, 12, 13} and m=32 (where S is set of elements and m is sum of elements)	L3	CO3	6 M
	b)	What are the different complexity classes? Explain each with an example.	L4	CO4	8 M