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

II B.Tech - II Semester – Supplementary Examinations
NOVEMBER 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.

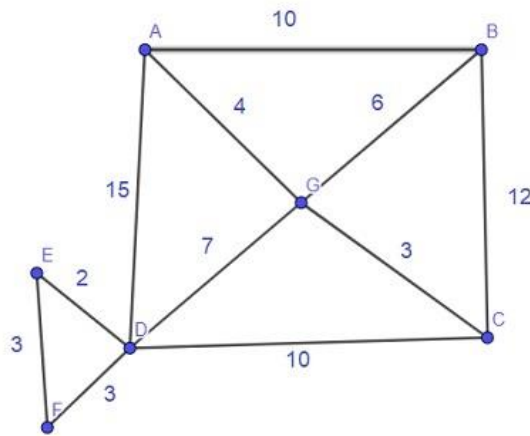|		**UNIT – I**	
1.	a)	Explain the notion of an algorithm. Provide examples of real-world problems where algorithms play a crucial role.	7 M
	b)	Given an algorithm with a time complexity expressed in Big O notation, analyze its efficiency.	7 M
		OR	
2.	a)	Classify algorithms into basic efficiency classes (constant time, logarithmic time, linear time, polynomial time, exponential time). Provide examples for each class and discuss the implications of their efficiency.	8 M
	b)	Give an example of a problem where brute force technique can be applied to obtain a solution but not an optimal solution.	6 M
		UNIT – II	
3.	a)	Illustrate the Strassen's Matrix multiplication algorithm with an appropriate example and bring out the divide and conquer methodology.	8 M

|			
	b)	Write an algorithm using the divide and conquer approach to find the maximum element in a given array of integers.	6 M
		OR	
4.	a)	Illustrate the Binary Search algorithm with your own example. What is the required condition for Binary Search algorithm to be applied on an array of integers?	8 M
	b)	Write the Merge Sort algorithm and illustrate the same with an example of your own.	6 M

UNIT-III

5.	a)	Apply the Prim's algorithm on the following graph to obtain a Minimum spanning tree.	7 M
	b)	Write an algorithm for the Job Sequencing Problem and illustrate the same with an example of your own.	7 M
		OR	
6.	a)	For the given network, apply the Dijkstra's algorithm to find the shortest paths originating from node 1 to all other nodes.	7 M
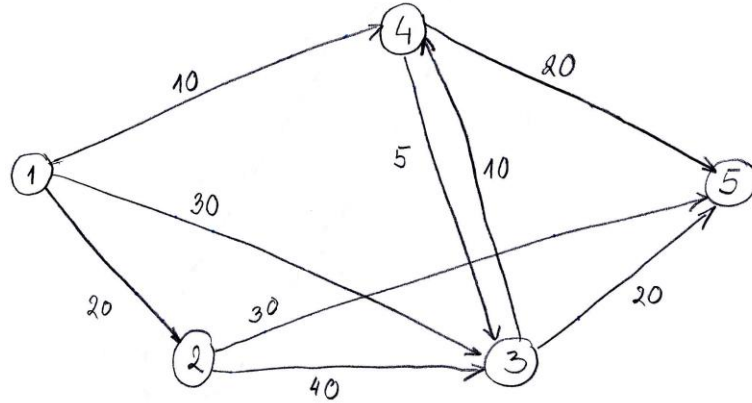
	b)	What is the Minimum coin change problem? Explain with an example and give an algorithm that will find a solution to the problem. Will your algorithm output an optimal solution?	7 M

UNIT – IV

7.	a)	Illustrate with your own example the dynamic programming solution to the all-pair shortest paths problem.	8 M
	b)	Write a brief note on dynamic programming and explain the concept with an example.	6 M

OR

8.	a)	Define the Travelling salesman problem with an example. Illustrate how the dynamic programming approach can obtain a solution for the travelling salesman problem.	7 M
	b)	Illustrate how dynamic programming method is applied on the Optimal Binary search tree problem with your own example. Bring out the dynamic programming methodology through your illustration.	7 M

UNIT – V

9.	a)	Explain the concept of backtracking in your own words using your own example.	7 M
	b)	Give a real time example of a problem that can be solved using branch and bound technique. Illustrate the methodology using the same example.	7 M
OR			
10.	a)	What is an NP-Complete problem? How do you show that a problem belongs to the class NP-Complete?	7 M
	b)	Illustrate and bring out the difference between P and NP in your own words using your own examples.	7 M