LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – COMPUTER SCIENCE

SECOND SEMESTER – APRIL 2023

PCS2MC01 – DESIGN AND ANALYSIS OF ALGORITHMS

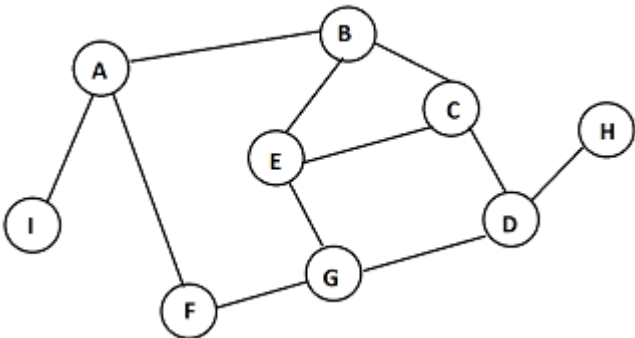Date: 02-05-2023   Dept. No.   Max. : 100 Marks
Time: 01:00 PM - 04:00 PM

SECTION A – K1 (CO1)

	Answer ALL the questions	**(5 x 1 = 5)**
1.	**Definitions**	
a)	Big O Notation	
b)	Divide and Conquer	
c)	Problem reduction	
d)	0/1 knapsack problem	
e)	Spanning tree	

SECTION A – K2 (CO1)

|	**Answer ALL the questions**	**(5 x 1 = 5)**
2.	**Fill in the blanks**	
a)	The asymptotic notation that provides an average time complexity is _____.	
b)	Merge sort uses _____ technique to implement sorting.	
c)	_____ is a technique of simplifying the problem to more convenient or simpler instances.	
d)	Time complexity of binomial coefficient algorithm is _____.	
e)	Greedy technique is used in _____ algorithm.	

SECTION B – K3 (CO2)

	Answer any THREE of the following in 300 words	**(3 x 10 = 30)**
3.	Explain any four data structures and its operation in detail.	
4.	Write BFS algorithm using Decrease and Conquer technique and write the output for the below graph with the starting node as A.	

5.	Explain about the variants of transform and conquer technique.	
6.	Calculate Binomial coefficient using dynamic programming technique.	
7.	Illustrate Nearest-neighbor algorithm with an example.	

SECTION C – K4 (CO3)

Answer any TWO of the following in 500 words   **(2 x 12.5 = 25)**

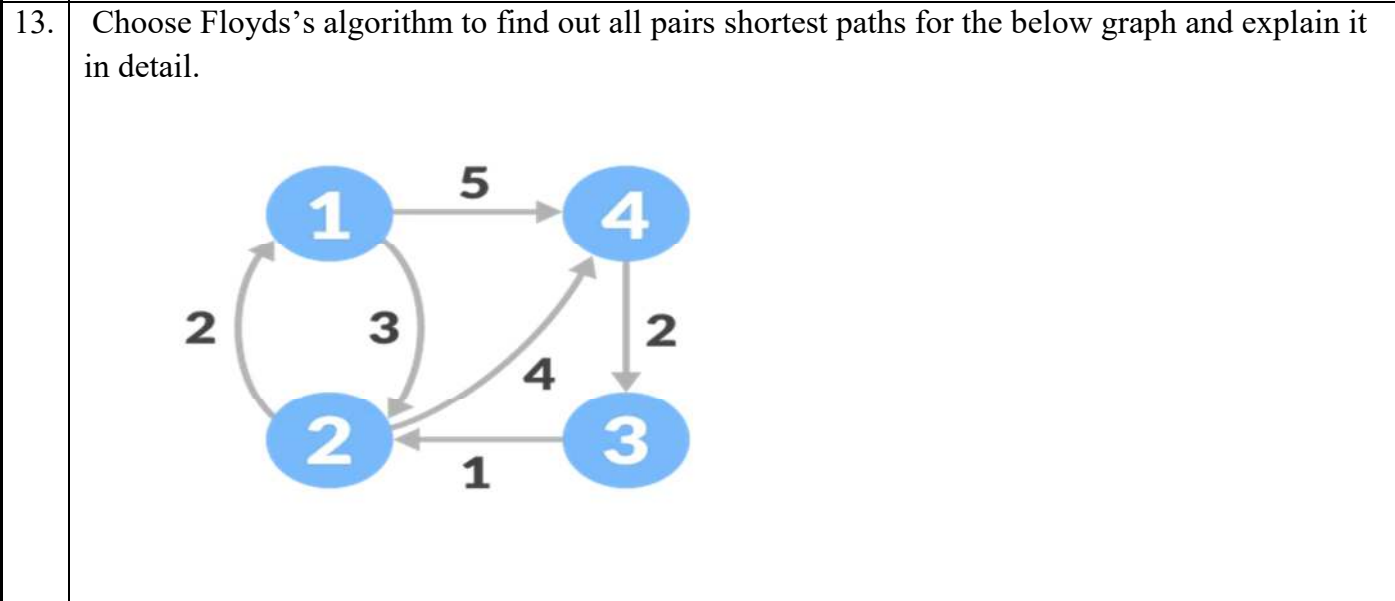| 8.	Analyze Brute force technique to search elements in the list.
9.	Explain binary search problem using divide and conquer and its complete analysis with example.
10.	Construct the minimum spanning tree with Prim's algorithm for the below graph.
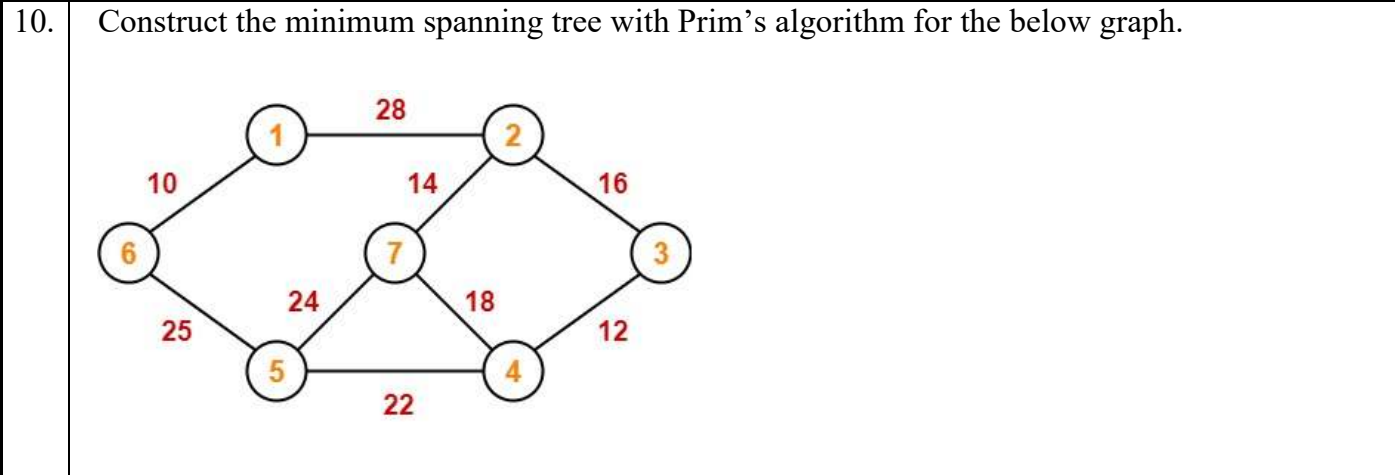
11.	Explain Twice-around-the-tree approximation algorithm for the traveling salesman problem with an example.

SECTION D – K5 (CO4)

Answer any ONE of the following in 750 words   **(1 x 15 = 15)**

12.	Summarize the Backtracking technique with N- Queen problem.
13.	Choose Floyds's algorithm to find out all pairs shortest paths for the below graph and explain it in detail.

SECTION E – K6 (CO5)

Answer any ONE of the following in 1000 words   **(1 x 20 = 20)**

14.	Develop the algorithm and solve the 0/1 Knapsack problem having weights and profits are: Weights: {5, 4, 6, 3} Profits: {10, 40, 30, 50} The weight of the knapsack is 10 kg The number of items is 4
15.	Write the procedure for the mathematical Analysis Framework of algorithm.

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