

JAMIA HAMDARD
Department of Computer Science & Engineering
School of Engineering Sciences & Technology
New Delhi – 110062

Examination: Even Semester Examination 2023

Sub: Design and Analysis of Algorithms

Sub. Code: BTCSE 404 / BTCSEAI 404

Max. Time: 3 hours

Max. Marks: 75

Note: Follow proper numbering for answering the questions.

SECTION – A

Attempt all questions.

7 x 5 = 35 Marks

SL. NO	Questions	Marks	CO	BL
1.	What is an algorithm? Discuss the significance of algorithms and thus explain the concept of time-space tradeoff.	5	CO1	L1
2.	Describe the different types of asymptotic notations with their graphs.	5	CO1	L2
3.	Explain the various strategies used to design an algorithm.	5	CO2	L2
4.	Design an algorithm which can sort an array of numbers using divide and conquer strategy. Also find its runtime complexity.	5	CO2	L6
5.	Formulate the problem statement for the following: i. Shortest Path Problem ii. N-Queen Problem	5	CO3	L6
6.	Discuss P, NP, NP-hard and NP-Complete with example for each	5	CO4	L2
7.	Justify the statement “Approximation Algorithms can be used to solve NP-Complete problem in polynomial time”	5	CO5	L4

SECTION – B

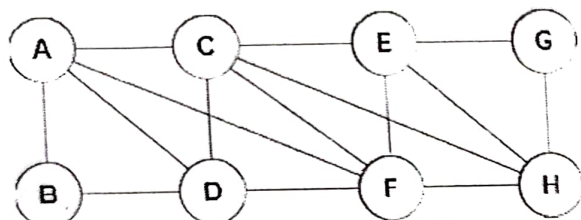
Attempt any four out of six questions.

4 x 10 = 40 Marks

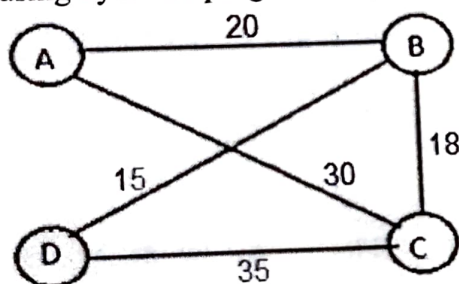
SL NO	Questions	Marks	CO	BL
1.	Solve any two of the following recurrence equations: i. $T(n) = \begin{cases} T(n-1) + n, & \text{if } n > 0 \\ 0 & \text{if } n = 0. \end{cases}$ ii. $T(n) = 16T\left(\frac{n}{8}\right) + n\sqrt{n}$. iii. $T(n) = 4T(\sqrt{n}) + \log n$.	10	CO1	L3
2.	Given below are four items with their respective weights and cost and a knapsack with maximum capacity 10. Solve fractional knapsack problem and 0/1 knapsack problem and thus compare the results.	10	CO2	L3

Item	A	B	C	D
Weight (W)	3	4	6	5
Cost (V)	50	40	30	10

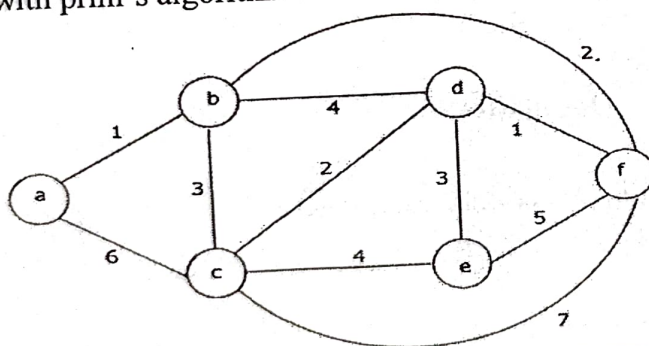
3. Describe Breadth First search (BFS) and Depth First Search (DFS)? Find the BFS and DFS traversal from A for the following graph.



4. Suppose a politician, living at A, needs to address the gathering in four cities namely A, B, C and D such that he/she visits all the cities once and return back to the city of his residence. Given below is a graph depicting the cities and the number on the edges shows the distance of two adjacent cities. Suggest all those tours having minimum distance using dynamic programming technique.



5. Find Minimum Spanning tree for the given graph using Kruskal's and also with prim's algorithm and thus compare the results.



6. Write Short note on:
i. Tractable and intractable problems
ii. Randomized Algorithms

BL – Bloom's Taxonomy Levels (1 – Remembering, 2 – Understanding, 3 – Applying, 4 – Analyzing, 5 – Evaluating, 6 – Creating)
