D Y PATIL UNIVERSITY
DEEMED TO BE
NAVI MUMBAI

Semester-III	**B. Tech . In Artificial Intelligence and Data Science**	**38122302**
Course Code ADC302	**Design and Analysis of Algorithm**	
Date:17.05.2024	**Time:02.0PM TO 4.00 PM**	**Max Marks: 60**

Q.1	**Solve any Four**		**20 Marks**	**CO**	**BT**
a)	Solve the following recurrence relations using Master's method. i. $T(n) = 8T(n/2) + n2$ ii. $T(n) = 2T(n/2)+ n \log n$		5	CO1	BT3
b)	Perform Quick sort for the data 9 8 7, 6, 5, 4, 3, 2, 1.		5	CO2	BT3
c)	Compare Greedy and Dynamic programming approaches.		5	CO3	BT3
d)	Determine the longest common subsequence for the following strings String 1: abaabb String 2: bababbab		5	CO4	BT3
e)	Discuss P and NP classes of problems with suitable example.		5	CO6	BT3
f)	Illustrate naïve string matching with some example. Also discuss its complexity.		5	CO5	BT3

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Q.2	**Solve any Four**		**20 Marks**	**CO**	**BT**
a)	Discuss various notations for asymptotic complexities of algorithms.		5	CO1	BT3
b)	Write algorithm for Binary search. Discuss its complexity.		5	CO2	BT3
c)	Solve the following Job sequencing problem with the given deadline to find maximum profit gained for N=8. Profits P ={30, 15, 20, 18, 10, 60, 40, 55 } Deadlines D= {1, 3, 4, 3, 2, 1, 2, 1}		5	CO3	BT3
d)	Solve the following instance of knapsack problem using Dynamic programming for capacity M = 8 **Profit P** = {1, 2, 5, 6} **Weight W** = {2, 3, 4, 5}		5	CO4	BT3
e)	Illustrate the solution of n-queen problem for n=4 using backtracking.		5	CO5	BT3
f)	Explain the Vertex Cover Problem.		5	CO6	BT2

Q.3 **Solve any Two**   **20 Marks**   **CO**   **BT**

a) Discuss recurrence relations and various methods to solve recurrence relations. Evaluate the complexity of given recurrence relation using recursion tree method.   10   CO1   BT4

$$T(n) = 3T\left(\left\lfloor\frac{n}{4}\right\rfloor\right) + \theta(n^2)$$

b) Discuss Minimum Spanning Tree. Determine the Minimum Spanning tree for the following graph using Prim's Algorithm.   10   CO3   BT3
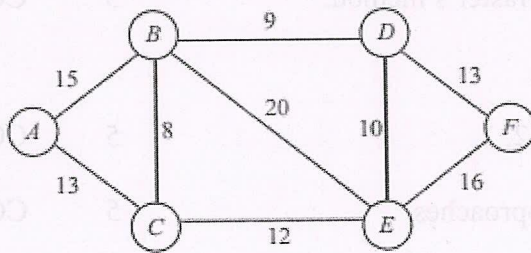
c) Determine the single shortest path for the following graph using Bellman Ford. Consider the source vertex to be v1.   10   CO4   BT2