Bharatiya Vidya Bhavan's

SARDAR PATEL INSTITUTE OF TECHNOLOGY

(Autonomous Institute Affiliated to University of Mumbai)

Munshi Nagar, Andheri (W), Mumbai – 400 058.

MSE - March 2024

Max. Marks: 30 **Duration: 60 Min.**

Class: MCA **Semester: II**

Course Code: MC507

Name of the Course: Design and Analysis of Algorithms

Instruction:

1) **All questions are compulsory.**
2) **Draw neat diagrams.**
3) **Assume suitable data if necessary but justify the same.**

Q. No.	Question	Max. Marks	CO-BL
Q. 1	Define the following terms with diagrammatic representation and an example of each. i) Big O Asymptotic Notation ii) Ω Asymptotic Notation What do you mean by Algorithm? What is the role of Algorithm in computing.	6	CO1-2
Q. 2	Consider the following two sequences X=ebtbcadf and Y=abbcdgf. Find the ***Longest Common Subsequence*** using Dynamic Programming Approach. Show all intermediate solutions and directions in terms of matrices of all common sub-sequences of X and Y.	7	CO3-3
Q. 3	Find the solution to the following recurrence relation using both ***Master Theorem*** and ***Recursion Tree Methods***. $T(n)=3T(n/2)+n^2$	8	CO1-4 CO2-3
Q. 4	Consider the knapsack problem. Given a knapsack with maximum capacity W, and a set S consisting of $n=7$ items. Each item i has some weight w_i and benefit value b_i (all w_i, b_i and W are integer values). How to pack the knapsack to achieve maximum total profit value of packed items? Let w_i = {2, 3, 4, 7, 9, 12, 13 } and b_i = {1, 2, 3, 4, 5, 6, 8} and W= 25 Answer the following for the given knapsack problem: 1. Show the optimal solution for the given knapsack problem using greedy approach. 2. Justify the time Complexity for the same. 3. How much is the maximum profit obtained for the same. 4. Write the algorithm for the same.	2+3+2+2	CO3-3 CO1-4