Roll No.	2	0	2	2	2	4	4	8	7	

NIST INSTITUTE OF SCIENCE & TECHNOLOGY
(Autonomous)

B. Tech 4th Semester (2022Batch)				Branch(s)	
Subject Code	22CS4PC03T	Subject Name		Design and Analysis of Algorithm	
Time	*90 min*	Exam	Mid Semester	Max. Marks	50
Examination Superintendent		Prof. Chittaranjan Biswal			
Name of the Instructor(s)		Dr. Sudhir Ranjan Pattanaik Dr. Sunil Kumar Nahak Mrs. Pragnya Das Mr. Sujith A			
Date of Examination		18/04/2024	Sitting	1st	

***Answer Question No.1from* PART-I *which is compulsory, any four from PART-*II *and any one from* PART-III.**
The figures in the right hand margin indicate marks.

PART-I

(Answer all the questions)

Q1.		CO	Level	**Level-1:** Knowledge **Level-2:** Comprehension **Level-3:** Application **Level-4:** Analysis **Level-5:** Synthesis **Level -6:** Evaluation	2 X 5
	(a)	1	2	What are the different mathematical notations used for algorithm analysis.	
	(b)	2	2	What is Longest common Subsequence	
	(c)	1	2	What is Divide and Conquer approach of problem solving?	
	(d)	2	2	Draw the recursion tree of $T(n) = 2T(n/2) + n$	
	(e)	2	2	What is Dynamic programming. What are its elements	

PART-II

(Answer Any Four questions out of six)

Q2.		CO	Level	**Level-1:** Knowledge **Level-2:** Comprehension **Level-3:** Application **Level-4:** Analysis **Level-5:** Synthesis **Level -6:** Evaluation	4 X 6
	(a)	1	2	Explain different asymptotic notation with diagram.	
	(b)	1	2	Write Merge Sort Algorithm to sort the element and find the time complexity.	
	(c)	1	2	How does Counting Sort Algorithm work? Explain with Example input array [2, 5, 4, 0, 2, 4, 0, 4].	
	(d)	1	3	Analyze the recurrence relation (use master method). T (n) =√2T(n/2)+logn and find the time complexity.	
	(e)	2	3	Find an optimal solution to the Knapsack instance n=4, m=20, (P1, P2, P3, P4) = (15, 25, 30, 15) and (W1, W2, W3, W4) = (18, 10, 15, 10) using a greedy approach.	
	(f)	2	2	Difference between Greedy method and Dynamic programming method	

PART-III

(Answer Any One question out of two)

		CO	Level	**Level-1:** Knowledge **Level-2:** Comprehension **Level-3:** Application **Level-4:** Analysis **Level-5:** Synthesis **Level -6:** Evaluation	1 X 16
Q3.	**(a)**	1	3	What is heap? Sort the array in descending order using heap sort algorithm.<20,30,60,40,70,10,80,50>	
	(b)	2	3	What is priority queue? Explain different operations of priority queue with example.	
Q4.	**(a)**	2	3	Explain how Matrix – chain Multiplication problem can be solved usingdynamic programming. Determine the lowest cost way for multiplying matrices for the following matrices having size 4 x 6,6 x 3, 3 x 4, 4 x 20, 20 x 2.	
	(b)	2	3	Write an algorithm for Huffman codes and find the total size of the following string after applying the Huffman code. String is BCAADABABDDCCABBCACAC	