Register Number:……..

KUMARAGURU
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B.TECH. DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Fourth Semester

INFORMATION TECHNOLOGY

U18ITI4202: Design and Analysis of Algorithms

COURSE OUTCOMES

CO1: Explain the fundamentals of analysis of algorithm
CO2: Explain mathematical analysis for recursive and non-recursive Algorithms
CO3: Explain the design techniques Brute force, Divide and Conquer, Decrease and Conquer, Dynamic programming
CO4: Explain the design techniques Greedy algorithms, back tracking, Branch and Bound
CO5: Explain the concepts of NP complete problems

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Explain the principle of optimality.	CO1	[K_2]
2.	Write the fundamental step for algorithmic problem solving.	CO1	[K_2]
3.	List out the steps in Mathematical Analysis of recursive Algorithms.	CO2	[K_2]
4.	Write the algorithm to compute the Greatest Common Divisor of two positive integers.	CO3	[K_2]
5.	List the pros and cons of Brute force design Strategy.	CO3	[K_2]
6.	State the Master theorem and its use.	CO3	[K_2]
7.	Explain Hamiltonian circuit problem and suggest the suitable design strategy to solve the problem?	CO4	[K_2]
8.	Explain the Fractional Knapsack problem.	CO4	[K_2]
9.	Brief about cook's theorem-I.	CO5	[K_2]
10.	List the Computability classes.	CO5	[K_2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.	a)	Design a recursive algorithm for computing a^n for any non-negative integer n that is based on the formula $a^n = a^{n-1} + a^{n-1}$	8	CO2	[K3]
	b)	Set up a recurrence relation for the number of additions made by the (Q.no. 11. a.) algorithm and solve it.	8	CO2	[K3]
12.	a)	Explain the general equation of divide and conquer design strategy. Analyze the merge sort algorithm and apply the algorithm to Sort. 7, 4, 5, 2, 1, 3, 8, 6	8	CO3	[K3]
	b)	With an appropriate design strategy solve the Josephus problem with n prisoners and k=2.	8	CO3	[K3]
13.	a)	Solve the following instance of the knapsack problem using greedy method by considering Minimum weight, Maximum value and Value/weight.	8	CO4	[K3]

Item weight value
1 5 40
2 7 35 Weight of the Knapsack W=15
3 2 18
4 4 4
5 5 10

	b)	Explain the job assignment problem using Branch and Bound	8	CO4	[K3]

	Job1	Job2	Job3	Job4
Person1	5	8	1	8
Person2	7	4	3	7
Person3	9	2	7	8
Person4	6	4	3	4

14.	a)	Explain the brute force string matching algorithm with an appropriate example.	8	CO3	[K2]
	b)	Apply back tracking to solve the N queen's problem.	8	CO4	[K3]
15.	a)	Explain Analysis Framework in detail.	8	CO1	[K2]
	b)	Construct a Huffman code for the following data:	8	CO4	[K3]

Symbol	A	B	C	D	E	F
Frequency	0.12	0.1	0.2	0.11	0.15	0.13

Encode ABAECFABAD using the code

16.		Briefly explain NP-Hard and NP-Completeness with examples.	16	CO5	[K3]

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