24/02/2025

O.P.Code: 23CI0601	R23	H.T.No.									

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR

(AUTONOMOUS)

B.Tech.II Year I Semester Regular Examinations February-2025

DATA STRUCTURES & ALGORITHMS

(Computer Science & Information Technology)

Time: 3 Hours **Max. Marks: 70**

PART-A

(Answer all the Questions **10 x 2 = 20** Marks)

1	a	What do you mean by algorithm? List some of the properties of it.	CO1	L2	2M
	b	Define Balance Factor.	CO1	L1	2M
	c	Define Heapify.	CO2	L2	2M
	d	List out the applications of Heap tree.	CO2	L1	2M
	e	Define greedy method.	CO3	L2	2M
	f	What is 0/1 knapsack problem.	CO3	L1	2M
	g	Define Backtracking.	CO4	L2	2M
	h	What is Graph coloring?	CO4	L1	2M
	i	What are NP complete and NP Hard?	CO5	L2	2M
	j	State deterministic algorithm?	CO5	L1	2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2	a	Illustrate an algorithm for Finding sum of natural number.	CO1	L3	5M
	b	Analyze space complexity and time complexity in detail with example.	CO1	L2	5M
		OR			
3	a	What is Asymptotic Notation? Explain different types of notations with examples.	CO1	L2	5M
	b	Discuss briefly with suitable example about Big 'O' notation and Theta notation 'Θ'.	CO1	L4	5M

UNIT-II

4	a	Explain in detail about operations of Heap Tree.	CO2	L2	5M
	b	Compare between Min heap and Max heap.	CO2	L3	5M
		OR			
5	a	Explain Graph representations with suitable example.	CO2	L2	5M
	b	Discuss Connected components and Bi-connected components along with Applications.	CO2	L4	5M

UNIT-III

6	a	Build any one application of dynamic programming with an example.	CO3	L2	5M
	b	Explain 0/1 knapsack problem by using dynamic programming with an examples.	CO3	L3	5M
		OR			
7		Construct optimal binary search tree for the given problem n=4,(a1,a2,a3,a4)=(a,b,c,d),P(1,2,3,4,)=(3,3,1,1),Q(0,1,2,3,4)=(2,3,1,1,1).	CO3	L2	10M

UNIT-IV

8		Consider a set S= {5,10,12,13,15,18} and d=30. Solve it for obtaining Sum of Subset using Backtracking method.	CO4	L2	10M
		OR			
9		Describe how the backtracking method is applied to solve the 8-Queens problem.	CO4	L2	10M

UNIT-V

10		Explain and shows the relationship between P,NP,NP Hard and NP Complete with neat diagram.	CO5	L2	10M
		OR			
11		Determine the classes NP-hard and NP-complete problem with example.	CO5	L2	10M

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