Reg. No.												

Question Paper Code	11077

Sri SAI RAM INSTITUTE OF TECHNOLOGY

An Autonomous Institution | Affiliated to Anna University & Approved by AICTE, New Delhi

Accredited by NBA and NAAC "A+" | An ISO 9001:2015 Certified and MHRD NIRF ranked institution

Sai Leo Nagar, West Tambaram, Chennai - 600 044. www.sairamit.edu.in

B.E / B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2021

Fourth Semester

Computer Science and Engineering

(Common to Information Technology)

CS8451 - Design and Analysis of Algorithm

(Regulations 2017)

Duration: 3 Hours | Max. Marks 100

Answer ALL Questions

PART-A (10 × 2 = 20 Marks)

1.	Give Euclid algorithm to compute GCD	K1	CO1
2.	Compare the order of growth of n(n-1)/2 and n2	K4	CO1
3.	State convex hull problem	K1	CO1
4.	Give the general plan of divide and conquer algorithms	K1	CO3
5.	What are memory functions?	K1	CO4
6.	Define principle of optimality	K1	CO3
7.	What do you mean by perfect matching in bipartite graphs	K2	CO6
8.	When a linear program is said to be unbounded	K1	CO6
9.	How NP-Hard problems are different from NP-Complete	K4	CO5
10.	What are tractable and non-tractable problems	K1	CO5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 - Create

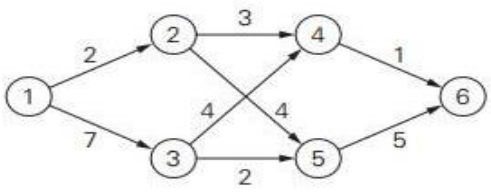
PART – B (5 × 13 = 65 marks)

11.	a)	(i) Find the closest asymptotic tight bound by solving the recurrence equation T(n)=8T(n/2)+n2 with T(1)=1 using the recurrence tree method.	7	K3	CO2
		(ii) Derive the recurrence relation for Fibonacci series algorithm; also carry out the time complexity analysis.	6	K3	CO2
		OR			
	b)	Use the most appropriate notation to indicate the time efficiency class of the sequential search algorithm in the worst case, best case, and the average case.	13	K3	CO2
12.	a)	(i) Sort the following set of elements using merge sort : 12, 24, 8, 71, 4, 23, 6, 89, 56.	6	K3	CO3
		(ii) Write an algorithm for Quick sort and write its time complexity with example list 5,3,1,9,8,2,4,7.	7	K3	CO3
		OR			
	b)	(i) There are 4 people who need to be assigned to execute 4 jobs(one person per job) and the problem is to find an assignment with the minimum total cost. The assignment cost is given below, Solve the assignment problem by exhaustive search.	6	K2	CO1

	Job 1	Job 2	Job 3	Job 4
Person 1	9	2	7	8
Person 2	6	4	3	7
Person 3	5	8	1	8
Person 4	7	6	9	4

		(ii) Explain the concept of Closest pair and Convex Hull problem and solve the problems using Brute force approach.	7	K2	CO1
13.	a)	How memory functions are used in dynamic knapsack? Write the algorithm and analyze its efficiency class.	13	K3	CO4
		OR			
	b)	Analyze the algorithm of Optimal Binary Search Tree with suitable examples.	13	K4	CO4

14. a) Find Max-flow and Min-cut value for the problem given below. 13 K3 CO6



OR

b) (i) For the given ranking matrix, Solve stable marriage problem 6 K3 CO6

	A	*B*	*C*	*D*
α	1, 3	2, 3	3, 2	4, 3
β	1, 4	4, 1	3, 4	2, 2
γ	2, 2	1, 4	3, 3	4, 1
δ	4, 1	2, 2	3, 1	1, 4

(ii) Maximize p=2x+3y+z using Simplex method. 7 K3 CO6
Subject to $x+y+z \leq 40$, $2x+y-z \geq 10$, $-y+z \geq 10$, $x \geq 0$, $y \geq 0$

15. a) Find the optimal jobs assigned for a person with the following cost matrix using Branch and Bound methods. 13 K4 CO4

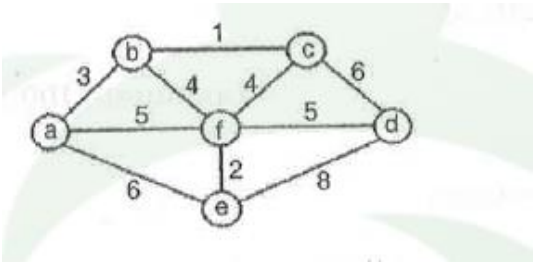
	Job 1	Job 2	Job 3	Job 4
Person 1	9	2	7	8
Person 2	6	4	3	7
Person 3	5	8	1	8
Person 4	7	6	9	4

OR

b) Solve the following instance of Knapsack problem by branch and bound algorithm. W=15 13 K4 CO4

ITEM	WEIGHT	PROFIT
1	5	40
2	7	35
3	2	18
4	4	4
5	5	10
6	1	2

PART C (1 × 15 = 15)

16.	a)	Give the pseudo code for Prim's Algorithm and apply the same to find MST. 	15	K3	CO3
		OR			
	b)	Solve the following recurrence relations : X(n)=x(n-1)+5 for n>1, x(1)=0 X(n)=3x(n-1) for n>1, x(1)=4 X(n)=x(n/2)+n for n>1, x(1)=1 [solve for $n=2^k$]	15	K3	CO2