Reg. No.															

Question Paper Code	12825

B.E. / B.Tech. / M.Tech. - DEGREE EXAMINATIONS, APRIL / MAY 2024

Fourth Semester

Information Technology

(Common to Computer Science and Engineering, Computer Science and Engineering(AIML), Computer Science and Engineering(IoT), Artificial Intelligence and Data Science & M.Tech - Computer Science and Engineering)

20ITPC401 – DESIGN AND ANALYSIS OF ALGORITHMS

Regulations - 2020

Duration: 3 Hours | Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

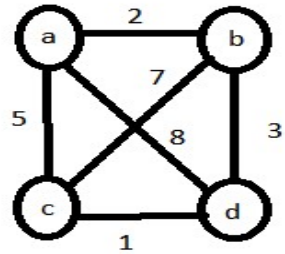
		Marks	K – Level	CO
1.	Define best, worst and average time complexity.	2	K1	CO1
2.	Define the concepts of asymptotic notations and its properties.	2	K1	CO1
3.	State Brute force approach.	2	K1	CO2
4.	You are given a knapsack that can carry a maximum weight of 60. There are 4 items with weights {20, 30, 40, 70} and values {70, 80, 90, 200}. What is the maximum value of the items you can carry using the knapsack? The following methods can be used to solve the Knapsack problem?	2	K2	CO2
5.	Write the difference between Greedy Method and Dynamic Programming.	2	K2	CO3
6.	What is multistage graph?	2	K1	CO3
7.	List the three properties of flow networks.	2	K1	CO5
8.	Define Ford – Fulkerson Method.	2	K1	CO5
9.	Define P and NP Problems.	2	K1	CO6
10.	Define backtracking.	2	K1	CO6

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

			Marks	K – Level	CO
11.	a)	Give the General Plan for Analyzing the Time Efficiency of Recursive Algorithms and use recurrence to find number of moves for Towers of Hanoi problem n.	13	K2	CO1
		OR			
	b)	If $f(n)=2n^2+5$ and $g(n)=n^2$, find the best case, worst case and average case.	13	K2	CO1

12. a) i) Find the shortest Hamiltonian circuit. *6 K2 CO2*



ii) Find the optimal solution for the following knapsack problem *7 K2 CO2*

Item	Weight	Value
1	2	$1
2	3	$2
3	4	$8
4	5	$6

Capacity W=8.

OR

b) i) Explain the concepts of Brute force string matching Algorithm. *7 K2 CO2*

ii) Explain the concepts of Closest pair problems by brute force. *6 K2 CO2*

13. a) Apply the bottom up dynamic programming algorithm to the following instance of Knapsack Problem. *13 K3 CO3*

Item	Weight	Value
1	7	$42
2	3	$12
3	4	$40
4	5	$25

Capacity W=10

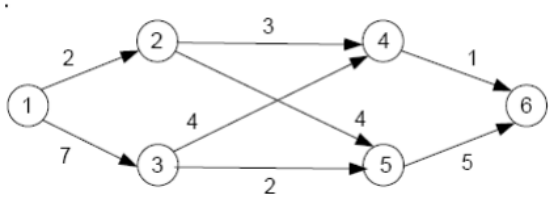
OR

b) Explain in detail about Binomial coefficient with an example. *13 K3 CO3*

14. a) Maximize: *13 K2 CO5*
Z=10x1+15x2+20x3 subject to 2x1+4x2+6x3<=24 and 3x1+9x2+6x3<=30 where x1,x2,x3>=0.

OR

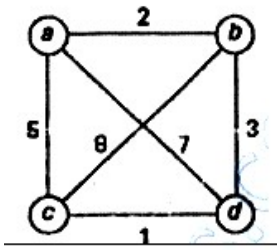
b) Illustrate pictorially the Ford –Fulkerson method by showing the flow augmenting paths in bold for the given flow network. *13 K2 CO5*



15. a) Elaborate how backtracking technique can be used to solve the n-queens problem. Explain with an example. *13 K2 CO6*

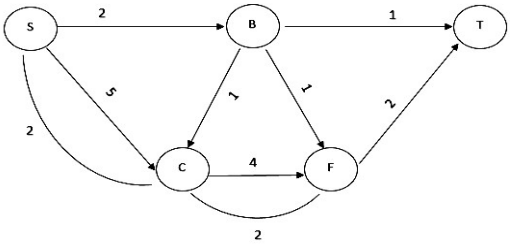
OR

b) Apply Branch and Bound algorithm to solve the travelling salesman problem for *13 K2 CO6*



PART - C (1 × 15 = 15 Marks)

16. a) Compute single source shortest path using floyd's method with its algorithm. *15 K3 CO3*



OR

b) Define merge sort. Sort the numbers 6, 5, 11, 9, 24, 7, 8, 3, 4 using merge sort. *15 K3 CO3*