

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APR/MAY 2026****Third Semester****Artificial Intelligence and Data Science****UADTL24301 - DESIGN AND ANALYSIS OF ALGORITHMS****Regulations - 2024****Duration : 3 Hrs****Maximum : 100 Marks****PART – A(ANSWER ALL QUESTIONS) (Marks 10*2=20)**

Q.No	Questions	BTL	CO	Marks
1.	List the characteristics of a good algorithm.	L1	1	2
2.	Differentiate between recursive and non-recursive algorithms.	L2	1	2
3.	Infer the drawbacks of brute force techniques.	L2	2	2
4.	Differentiate between decrease-and-conquer and divide-and-conquer.	L2	2	2
5.	State the principle of optimality in dynamic programming.	L2	3	2
6.	Show how a Huffman tree can be built using greedy method for the given frequencies {a:5, b:9, c:12, d:13}	L3	3	2
7.	List the applications of iterative improvement method.	L1	4	2
8.	What is meant by Bipartite Graph?	L1	4	2
9.	Differentiate between NP-Hard and NP-Complete problems.	L2	5	2
10.	Define Hamiltonian cycle.	L1	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No	Questions	BLT	CO	Marks
11.	a i Demonstrate the mathematical analysis of a <i>recursive algorithm</i> . Show the recurrence relation and solve it for time complexity.	L2	1	8
	ii Arrange the following term in increasing order of asymptotic complexity: $2^n, n^{3/2}, n \log n, n, \log n$ and explain the reason.	L2	1	8
	Or			
	b Illustrate the concept of asymptotic notations (Big O, Big Ω , and Big Θ) by providing examples of functions that belong to each category.	L2	1	16
12.	a i Illustrate the working of the Brute Force string matching algorithm with an example.	L3	2	8
	ii Apply the divide and conquer technique to find the closest pair of points among the following 5 points: (2,3), (12,30), (40,50), (5,1), (12,10). Show all the steps of your solution	L3	2	8
	Or			
	b Explain heap sort and arrange the following numbers in increasing order using heap sort, 18,29,68,32,43,37,87,24,47,50	L4	2	16
13.	a Analyze the following algorithm with an example.	L4	3	16
	i) Warshall's Algorithm.			
	ii) Floyd's Algorithm.			
	Or			
	b i Examine the greedy method based on profit/weight ratio to solve the 0/1 Knapsack problem with items: weights {2, 3, 4}, profits {3, 4, 5}, and capacity 5. Determine the selected items and total profit.	L4	3	16

14. a i Summarize the simplex method. L2 4 8
 ii Explain the maximum matching in bipartite graph. L2 4 8

Or

- b Explain in detail about stable marriage problem with an example. L2 4 16
15. a Given the set {3, 1, 7, 9, 12}, check if there is a subset that sums to 15 using a simple backtracking approach. L3 5 16

Or

- b Solve the Traveling sales man problem for the given 5 cities using branch and bound technique. L3 5 16

	A	B	C	D	E
A	0	11	7	16	12
B	7	0	10	18	13
C	9	12	0	10	22
D	13	7	9	0	15
E	22	18	13	12	0
