Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 60026

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JAN. 2026
Fourth Semester
Information Technology
U19IT409 - DESIGN AND ANALYSIS OF ALGORITHMS
(Regulation 2019)

Time: Three Hours Maximum: 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Write the pseudo code for finding the factorial of given number.	2	K2	CO1
2.	State Master Theorem.	2	K1	CO1
3.	Derive the worst case time complexity of merge sort.	2	K2	CO2
4.	Outline the concept of greedy method in algorithm design.	2	K1	CO2
5.	Write about principle of optimality in shortest path problem.	2	K2	CO3
6.	What do you mean by 'perfect matching' in bipartite?	2	K2	CO3
7.	State Hamiltonian Circuit Problem and mention its significance in graph theory.	2	K2	CO4
8.	When can a search path be terminated in a branch-and-bound algorithm?	2	K2	CO4
9.	Define P and NP Problems.	2	K1	CO5
10.	Illustrate Subset sum problem with an example.	2	K2	CO5

PART – B

(5 x 13 = 65 Marks)

Q.No.			Questions	Marks	KL	CO
11.	a)	i.	Prove that if f(n) = O(g(n)) if and only if g(n) = Ω(f(n))	6	K2	CO1
		ii.	Discuss various methods used for mathematical analysis of recursive algorithms.	7		
			(OR)			
	b)	i.	Explain briefly Big oh Notation, Omega Notation and Theta Notations.	7	K3	CO1
		ii.	Solve the following recurrence relation a. $x(n) = x(n/2) + n$ for $n > 1$, $x(1) = 1$ (solve for $n = 2k$) b. $x(n) = x(n/3) + 1$ for $n > 1$, $x(1) = 1$ (solve for $n = 3k$)	6		
12.	a)		Discuss Quick Sort algorithm and explain it with example. Derive worst case and average case complexity.	13	K2	CO2
			(OR)			
	b)		Write Huffman's Algorithm. Construct the Huffman's tree for the following data and obtain its Huffman's Code	13	K3	CO2

Character	A	B	C	D	E	F
probability	0.5	0.35	0.5	0.1	0.4	0.2

13.	a)	i.	Consider three men and three women wish to find perfect match for their life. What kind of strategy would you suggest to find the perfect match based on their preference or conversation between three men and women? Analyze and explain the strategy. Also highlight the design issues related to the strategy proposed.	10	K3	CO3
		ii.	Determine the time efficiency class of the stable marriage problem.	3		
			(OR)			
	b)		Define dynamic programming and describe its key properties. Design an algorithm to solve the 0/1 knapsack problem using Dynamic programming.	13	K2	CO3
14.	a)		Explain the subset sum problem and how it can be solved using backtracking. Provide an example with step-by-step execution.	13	K3	CO4
			(OR)			
	b)		Elaborate how backtracking technique can be used to solve the N-queens problem. Explain with an example.	13	K2	CO4
15.	a)		Analyze the relationship between NP, NP-Complete, and NP-Hard problems. Provide suitable examples for each.	13	K3	CO5

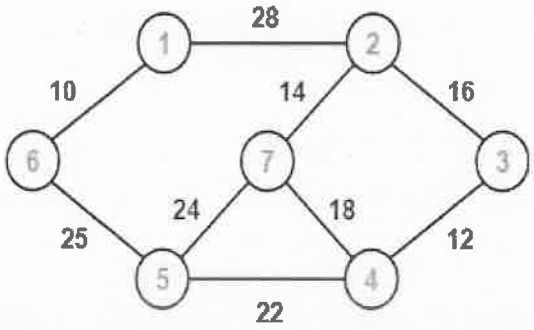
(OR)

	b)	Explain approximation algorithm for NP hard problems in general. Discuss the approximation algorithm for Travelling salesman problem.	13	K3	CO5

PART – C

(1 x 15 = 15Marks)

Q.No.		Questions	Marks	KL	CO
16.	a)	Construct the Minimum Spanning Tree (MST) for the given graph using Prim's Algorithm. Write the algorithm and discuss its working principle.	15	K3	CO2



(OR)

	b)	Explain the Assignment Problem using backtracking. Write the algorithm, estimate the cost for all possible solutions, and specify the implicit and explicit constraints.	15	K3	CO4