PVP 23

Code: 23CS3301, 23AM3301, 23DS3301

II B.Tech - I Semester – Regular / Supplementary Examinations
NOVEMBER 2025

ADVANCED DATA STRUCTURES AND ALGORITHM ANALYSIS

(Common for CSE, AIML, DS)

Duration: 3 hours Max. Marks: 70

Note: 1. This question paper contains two Parts A and B.
2. Part-A contains 10 short answer questions. Each Question carries 2 Marks.
3. Part-B contains 5 essay questions with an internal choice from each unit. Each Question carries 10 marks.
4. All parts of Question paper must be answered in one place.

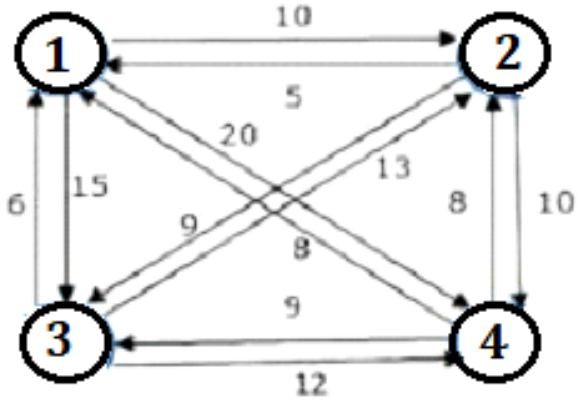
BL – Blooms Level CO – Course Outcome

PART – A

		BL	CO
1.a)	What is meant by an algorithm?	L2	CO1
1.b)	Define Time complexity of an algorithm.	L1	CO1
1.c)	Differentiate between adjacency matrix and adjacency list.	L2	CO1
1.d)	What are disjoint sets?	L2	CO1
1.e)	What are the advantages and disadvantages of divide and conquer method?	L2	CO1
1.f)	Define minimum cost spanning tree.	L1	CO1
1.g)	What is the Time complexity of optimal binary search tree?	L2	CO1
1.h)	State one merit and one demerit of Bellman ford algorithm.	L2	CO1
1.i)	What are the general steps followed in backtracking?	L2	CO1
1.j)	Explain the classes of P and NP.	L2	CO1

PART – B

			BL	CO	Max. Marks
UNIT-I					
2	a)	List and explain characteristics of an algorithm.	L2	CO1	5 M
	b)	Explain about the asymptotic notations with suitable examples.	L2	CO1	5 M
OR					
3	a)	Write an algorithm to find sum of first n natural numbers.	L2	CO1	5 M
	b)	Explain non recursive algorithm for finding first n terms of Fibonacci sequence and analyze its time complexity.	L2	CO1	5 M
UNIT-II					
4	a)	Construct min-heap for the following data 50,80,40,60,45,30,35	L3	CO3	5 M
	b)	Write an algorithm for simple union.	L3	CO3	5 M
OR					
5	a)	Define Graph. Explain how graphs are represented.	L2	CO3	5 M
	b)	Explain Depth first Search with an example.	L3	CO3	5 M
UNIT-III					
6	Explain in detail the average case analysis of quick sort.		L3	CO2	10 M

	OR			
7	Explain Prim's and Kruskal's algorithms with an example.	L3	CO2	10 M
	UNIT-IV			
8	Find an optimal tour for the travelling sales person problem in the following graph by using dynamic programming. 	L3	CO2	10 M
	OR			
9	Using algorithm OBST compute w(i, j), r(i, j) and c(i, j), $0 \leq i \leq j \leq 4$ for the identifier set (a1, a2, a3, a4) = (end, goto, print, stop) with p(1) = 3, p(2) = 3 ,p(3) = 1, p(4) = 1, q(0) = 2, q(1) = 3, q(2) = 1, q(3) = 1, q(4) = 1, q(5) = 1. Using r(i, j), construct the optimal binary search tree.	L4	CO3	10 M
	UNIT-V			
10	a) Apply Backtracking method to solve the following sum of subsets problem S={2, 3, 5, 8, 10, 15} , n=6, m=20.	L3	CO4	5 M

	b)	Solve the following 0/1 knapsack problem using least cost branch and bound method. n=4, (p1, p2, p3, p4) = (10, 10, 12, 18), (w1, w2, w3, w4) = (2, 4, 6, 9), knapsack capacity m=15.	L3	CO4	5 M
OR					
11	a)	Apply Least cost branch and bound method to solve the TSP for the following cost matrix $C=\begin{bmatrix} \infty & 4 & 8 & 3 \\ 2 & \infty & 3 & 6 \\ 5 & 8 & \infty & 2 \\ 7 & 6 & 3 & \infty \end{bmatrix}$	L3	CO4	5 M
	b)	Explain the classes of NP hard and NP complete.	L2	CO4	5 M