

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

BCO402

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025 Analysis and Design Algorithms

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

Module – 1			M	L	C
Q.1	a.	What is algorithm? Elaborately asymptotic notations for analysis of an algorithm with an example.	06	L1	CO1
	b.	Explain the general plan for analyzing the efficiency of a recursive algorithm. Suggest a recursive algorithm to find factorial of number. Derive its efficiency.	10	L1	CO1
	c.	Write an algorithm using recursion that determine the GCD (m,n) of two numbers. Determine the time and space complexity.	04	L1	CO1
OR					
Q.2	a.	Write neat diagram explain different steps in designing and analyzing an algorithm.	07	L2	CO1
	b.	Explain the general plan of mathematical analysis of non-recursive algorithm with suitable example.	06	L2	CO1
	c.	Design and implement an algorithm for sort a given set of n integer elements using Selection sort – method and compute its time complexity.	07	L3	CO3
Module – 2					
Q.3	a.	Explain the concept of divide and conquer. Design an algorithm for merge sort and derive its time complexity.	10	L1	CO2
	b.	Design an insertion sort algorithm and obtain its time complexity, example of sorting with insertion sort.	10	L2	CO3
OR					
Q.4	a.	Explain Strassen's matrix multiplication and derive its time complexity.	10	L2	CO1
	b.	Apply source removal method to obtain topological sort for the given graph.	10	L3	CO2
<pre> graph TD C1((C1)) --> C3((C3)) C2((C2)) --> C3 C3 --> C4((C4)) C3 --> C5((C5)) </pre>					
Module – 3					
Q.5	a.	Define AVL Trees. Explain into four rotation types.	10	L3	CO3
	b.	Construct bottom up heap for the list 2,9,7,6,5,8 . Obtain its time complexity.	10	L3	CO3
1 of 3					

OR

Q.6	a.	Define heap Explain the properties of heap along with its representation.	10	L3	CO3
	b.	Design Harspool algorithm for string matching. Apply Horspools algorithm to find the pattern BARBER in the text: JIM_SAW_ME_IN_A_BARBER SHOP	10	L2	CO5

Module – 4

Q.7	a.	Construct minimum cost spanning tree using Krustal's algorithm for the following graph.	10	L2	CO1
	b.	What are Huffman Tree? Construct the Huffman tree for the following data. Character A B C D Probability 0.35 0.1 0.2 0.2 0.15 Encode DAD –CBE using Huffman Encoding.	10	L2	CO1

OR

Q.8	a.	Apply Dijkstra's algorithm to find single source shortest path for the given graph by considering a as the source vertex.	10	L2	CO1
	b.	Define transitive closure of a graph. Apply warshalls algorithm to compute transitive closure of a directed graph. $\begin{matrix} & 0 & 1 & 0 & 0 \\ & 0 & 0 & 0 & 1 \\ & 0 & 0 & 0 & 0 \\ & 1 & 0 & 1 & 0 \end{matrix}$	10	L1	CO1

Module – 5

Q.9	a.	Explain the following with examples. i) P Problem ii) NP Problem iii) NP – Compete Problem iv) NP – Hard Problems	10	L1	CO1															
	b.	What is backtracking? Apply backtracking to solve the below instance of sum of sub set. Problem A = { 1,2,5,6,8 } d = 9	10	L1	CO2															
OR																				
Q.10	a.	Illustrate N Queen's problem using backtracking to solve 4 – Queens problem.	10	L2	CO3															
	b.	Using Branch and Bound technique solve the below instance of Knapsack problem. <table><tr><th>Item</th><th>Weight</th><th>Value</th></tr><tr><td>1</td><td>4</td><td>40</td></tr><tr><td>2</td><td>7</td><td>42</td></tr><tr><td>3</td><td>5</td><td>25</td></tr><tr><td>4</td><td>3</td><td>12</td></tr></table> Capacity = 10	Item	Weight	Value	1	4	40	2	7	42	3	5	25	4	3	12	10	L3	CO4
Item	Weight	Value																		
1	4	40																		
2	7	42																		
3	5	25																		
4	3	12																		
