



Jain College of Engineering & Research

Udyambag, Belagavi.

(Approved by AICTE, New Delhi, Affiliated to VTU Belagavi & Recognized by Govt. of Karnataka)

NBA Accredited Programs- ECE & ME

**Program: Computer Science and Engineering (AIML) CONTINUOUS
INTERNAL EVALUATION-II**

Semester: 4th A

Course: Analysis and Design of Algorithms

Course Coordinator: Prof. Megha Varun Patil

Code: BCS401

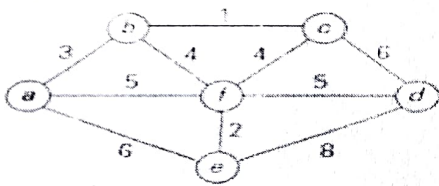
Date: 26/05/2025

Max. Marks: 50

Duration: 1 Hour 30 Min

Note: Answer any one full question choosing from each part.

Part -A

Part –A														
Q. No.	Question	Marks	CO	PO	R.B.T. Level									
1 a)	What are Huffman Trees? Construct the Huffman tree for the following data.	10	4	1,2,3	L1,L3									
	<table><tr><td>Character</td><td>A</td><td>B</td><td>C</td><td>D</td><td>E</td><td>-</td></tr><tr><td>Probability</td><td>0.5</td><td>0.35</td><td>0.5</td><td>0.1</td><td>0.4</td><td>0.2</td></tr></table> Enc ode DAD-CBE using Huffman Encoding.						Character	A	B	C	D	E	-	Probability
Character	A	B	C	D	E	-								
Probability	0.5	0.35	0.5	0.1	0.4	0.2								
1 b)	Construct minimum cost spanning tree using Kruskals algorithm for the following graph. 	10	4	1,2,3	L3									
1 c)	Draw a decision tree and find the number of key comparisons in the worst and average cases for the three-element basic bubble sort.	5	5	1,2,3	L2,L3									

OR

2 a)	Construct bottom up heap for the list 2,9,7,6,5,8. Obtain its time complexity	10	3	1,2,3	L3
2 b)	Design Horspools algorithm for string matching. Apply Horspools algorithm to find the pattern BARBER in the text: JIM_SAW_ME_IN_A_BARBERSHOP	10	3	1,2,3	L3
2 c)	Explain the following with examples i) P problem ii) NP Problem iii) NP- Complete problem iv) NP – Hard Problems	5	5	1,2,3	L2

Part -B

3 a)	Illustrate N queen's problem using backtracking to solve 4-Queens problem	10	5	1,2,3	L3
3 b)	Define heap. Explain the properties of heap along with its representation.	10	3	1,2,3	L, L2
3 c)	Construction the a 2-3 tree for the given list 9, 5, 8, 3, 2, 4, 7	5	3	1,2,3	L3

OR



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4 a)	Using Branch and Bound technique solve the below instance of knapsack problem. Capacity 5			10	5	1,2,3	L3
	Item	Weight	Value				
	1	2	12				
	2	1	10				
	3	3	20				
	4	2	5				
4 b)	What is backtracking? Apply backtracking to solve the below instance of sum of subset problem $S=\{5,10,12,13,15,18\}$ $d=30$			10	5	1,2,3	L3
4 c)	Define AVL Trees. Explain its four rotation types			5	3	1,2,3	L2

COURSE OUTCOMES (COs)

1	Apply asymptotic notational method to analyze the performance of the algorithms in terms of time Complexity.
2	Demonstrate divide & conquer approaches and decrease & conquer approaches to solve computational Problems.
3	Make use of transform & conquer and dynamic programming design approaches to solve the given real World or complex computational problems.
4	Apply greedy and input enhancement methods to solve graph & string based computational problems.
5	Analyze various classes (P, NP and NP Complete) of problems
6	Illustrate backtracking, branch & bound and approximation methods

REVISED BLOOMS TAXONOMY LEARNING LEVEL (RBT)

L1: Remember	L2: Understand	L3: Apply	L4: Analyze	L5: Evaluate	L6: Create
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PROGRAM OUTCOMES (POs)

1	Engineering Knowledge	5	Modern tool usage	9	Individual and Team-Work
2	Problem Analysis	6	Engineer and Society	10	Communication
3	Design / Development Solutions	7	Environment and Sustainability	11	Project Management and Finance
4	Conduct Investigations of Complex problems	8	Ethics	12	Life-long Learning