

CONTINUOUS INTERNAL EVALUATION- 3

Dept: CSE Sem / Div: 4th(A&B) Sub: Design and Analysis of Algorithms S Code: 18CS42

Date: 30/08/22 Time: 3- 4.30 PM Max Marks: 50 Elective: N

Note: Answer any 2 full questions, choosing one full question from each part.

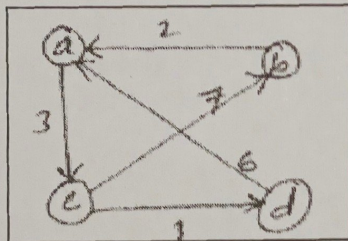
Q	Questions	Marks	RBT	COs
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PART A

1 a	Find the optimal binary search tree for the keys given below. <table border="1" style="margin-left: 20px;"> <tr> <td>key</td> <td>A</td> <td>B</td> <td>C</td> <td>D</td> </tr> <tr> <td>probability</td> <td>0.1</td> <td>0.2</td> <td>0.4</td> <td>0.3</td> </tr> </table>	key	A	B	C	D	probability	0.1	0.2	0.4	0.3	10	L1	CO4
key	A	B	C	D										
probability	0.1	0.2	0.4	0.3										
b	Design a 3-stage system with device types A, B, C whose costs are 30, 15, 20 and reliability are 0.9, 0.8, 0.5 respectively. Budget available is 105. Design a system with highest reliability.	10	L1	CO4										
c	Give the problem statement of n-queens problem. Explain the solution for 4-queens problem using state space tree.	5	L2	CO5										

OR

2 a	Apply floyds algorithm to find the all pair shortest path for the graph given below.	10	L2	CO4
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b	Solve the following TSP problem using dynamic programming. The start city is 1	10	L2	CO4
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$$\begin{bmatrix}
 0 & 10 & 15 & 20 \\
 5 & 0 & 9 & 10 \\
 6 & 13 & 0 & 12 \\
 8 & 8 & 9 & 0
 \end{bmatrix}$$

c	Explain the following with examples a. NP complete problem b. NP hard problem.	5	L3	CO5
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PART B

3 a	Apply backtracking to solve the following instance of the subset-sum problem : $S = \{5, 10, 12, 13, 15, 18\}$ and $d = 30$. Give all possible solutions.	10	L1	CO5
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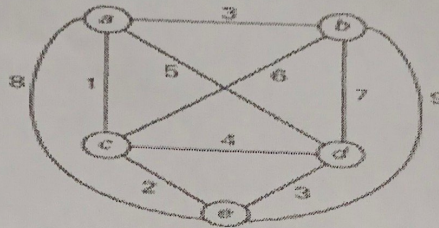
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b Apply the branch-and-bound algorithm to solve the traveling sales man problem for the following graph. Start city is *a*. Give the state space tree.

10

L1

CO5



c What is branch and bound method. How it is different from backtracking .

5

L2

CO5

4 a With the help of a state space tree, solve the following instance of Knapsack problem by the branch and bound algorithm. Knapsack Capacity $W = 10$

10

L1

CO5

Item No.	1	2	3	4
Weight	4	7	5	3
Value	40	42	25	12

b Apply best-first branch and bound method for the following instance of assignment problem to find the optimal solution. Give the complete state space tree.

10

L2

CO5

	Job 1	Job 2	Job 3	Job 4	
9	2	7	8	Person a Person b Person c Person d	
6	4	3	7		
5	8	1	8		
7	6	9	4		

c Explain the following with examples

5

L2

CO5

a. Class P Problems

b. Class NP Problems