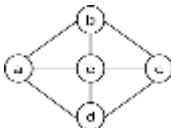
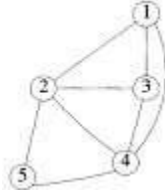
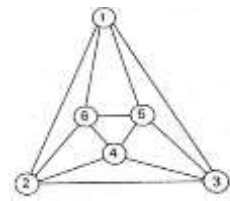
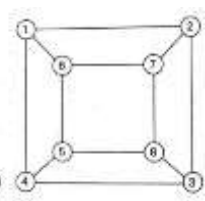
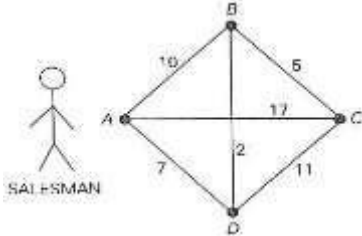
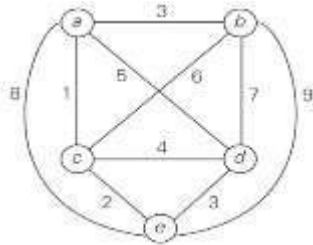


## Module-5: Backtracking

### Question Bank

Backtracking – General Method			
1	What is backtracking. Give the general Procedure. OR Write the pseudocode for backtracking algorithm	6	
N-Queens problem			
2	Give the problem statement of n-queens problem. Explain the solution for 4-queens problem using state space tree.	6 8	Jul 17 Jul 16 Jan 15
Sum of subset problem			
3	Write a note on Sum of Subset problem	5	Jul 20
4	Let $w = \{3, 5, 6, 7\}$ and $m = 15$ . Find all possible subsets of $w$ that sum to $m$ . Draw the state space tree that is generated	9	Jan 18 Jul 17
5	Apply backtracking to solve the following instance of the subset-sum problem : $S = \{1, 3, 4, 5\}$ and $d = 11$ . Draw the state space tree.	6	
6	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.	8	Jul 18
Graph Coloring			
7	Define Graph coloring problem. Apply backtracking to solve the 3-coloring problem for the graph given below.  	4	

8	Apply backtracking based graph coloring algorithm for the graph given below with $m=4$ . Give state space tree showing first 3 valid assignments.	6																										
																												
9	Draw the portion of the state space tree for $m$ – colorings of a graph when $n=4$ and $m=3$	7	Jan 18																									
10	Find different solutions for 4 nodes and all possible 3 coloring problem	6	Jul 19																									
Hamiltonian Cycles																												
11	What is Hamiltonian cycle? Give the backtracking based algorithm to find the Hamiltonian cycle in the graph. Write the functions used to generating next vertex and for finding Hamiltonian cycles.	9	Jul 18 Jan 20																									
12	Apply the backtracking to the problem of finding Hamiltonian cycle in the following graphs	6																										
<div><p>(a)</p></div> <div><p>(b)</p></div>																												
Branch and Bound- Assignment Problem																												
13	What branch and bound method. How it is different from backtracking.	5																										
14	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.	6 8 1 0	Jul 18 Jul 17 Jan 16 Jan 15 Jul 19 Jan 20																									
<table><tr><th>Job 1</th><th>Job 2</th><th>Job 3</th><th>Job 4</th><th></th></tr><tr><td>9</td><td>2</td><td>7</td><td>8</td><td>Person a</td></tr><tr><td>6</td><td>4</td><td>3</td><td>7</td><td>Person b</td></tr><tr><td>5</td><td>8</td><td>1</td><td>8</td><td>Person c</td></tr><tr><td>7</td><td>6</td><td>9</td><td>4</td><td>Person d</td></tr></table> <p>What are the two additional items required by branch and bound technique, compared with backtracking?</p>				Job 1	Job 2	Job 3	Job 4		9	2	7	8	Person a	6	4	3	7	Person b	5	8	1	8	Person c	7	6	9	4	Person d
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7	6	9	4	Person d																								

Branch and Bound - Travelling Sales Person problem																								
15	Explain how TSP can be solved using branch and bound technique.	6	Jul 18																					
16	Apply the branch-and-bound algorithm to solve the travelling sales man problemfor the following graph. Consider start city as A. Give the statespace tree.	6																						
																								
17	Apply the branch-and-bound algorithm to solve the travelling sales man problemfor the following graph. Start city is <b>a</b> . Give the statespace tree.	8	Jan 18 Jan 20																					
																								
0/1 Knapsack problem																								
18	Explain LC branch & bound and FIFO branch and bound for knapsack problem	8	Jul 17 Jul 19																					
19	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	6	Jan 16, Jan 17																					
	<table><tr><td>Item No.</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Weight</td><td>4</td><td>7</td><td>5</td><td>3</td></tr><tr><td>Value</td><td>40</td><td>42</td><td>25</td><td>12</td></tr></table>	Item No.	1	2	3	4	Weight	4	7	5	3	Value	40	42	25	12								
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20	With the help of a state space tree, solve the following instance of Knapsack problem by the branch and bound algorithm. Knapsack Capacity W = 15	8																						
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21	Apply <b>Least Cost Branch and Bound (LCBB)</b> method for the following instance of 0/1 Knapsack problem to get the optimal solution. Knapsack Capacity $W = 15$ <table><tr><td>Item No.</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Weight</td><td>2</td><td>4</td><td>6</td><td>9</td></tr><tr><td>Value</td><td>10</td><td>10</td><td>12</td><td>18</td></tr></table>	Item No.	1	2	3	4	Weight	2	4	6	9	Value	10	10	12	18	7	
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22	Apply <b>FIFO Branch and Bound</b> method for the following instance of 0/1 Knapsack problem to get the optimal solution.Knapsack Capacity $W = 15$ <table><tr><td>Item No.</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>Weight</td><td>2</td><td>4</td><td>6</td><td>9</td></tr><tr><td>Value</td><td>10</td><td>10</td><td>12</td><td>18</td></tr></table>	Item No.	1	2	3	4	Weight	2	4	6	9	Value	10	10	12	18	7	
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Value	10	10	12	18														
<b>NP-Complete and NP-Hard problems</b>																		
23	Write a note on deterministic and non deterministic algorithms.	6	Jul 18 Jul 19															
24	Explain the following with examples <ol style="list-style-type: none"><li>Class P Problems</li><li>Class NP Problems</li><li>NP complete problem</li><li>NP hard problem.</li></ol>	6/ 8	Jul 16 Jan 16 Jan 15 Jul 19 Jan 20															