

<b>Name:</b>	 <b>UPES</b> UNIVERSITY WITH A PURPOSE
<b>Enrolment No:</b>	

**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2019**

**Course:** Design and Analysis of Algorithm

**Semester:** III

**Program:** B.Tech Computer Science + LLB CL/ET-IPR

**Time:** 03 hrs.

**Course Code:** CSEG 2003

**Max. Marks:** 100

**Instructions:** Attempt each question with suitable diagrammatic representation of concepts.

**SECTION A**

S. No.		Marks	CO
Q 1	What are the characteristics of an algorithm? Discuss the various stages of algorithm design and analysis process using flow chart.	4	CO1
Q 2	What is an asymptotic notation? Give the different notations used to represent the complexity of algorithms?	4	CO1
Q 3	Sort the list of the elements 10,5,7,6,1,4,8,3,2,9 using merge sort algorithm and show its computing time is $O(n \log n)$	4	CO1
Q 4	Define Divide & Conquer Strategy. Describe the time complexity of Divide And Conquer in the recurrence form.	4	CO2
Q 5	Differentiate between Greedy method and dynamic programming.	4	CO3

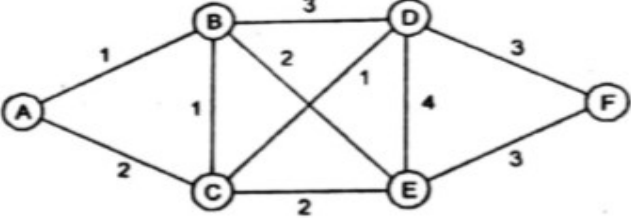
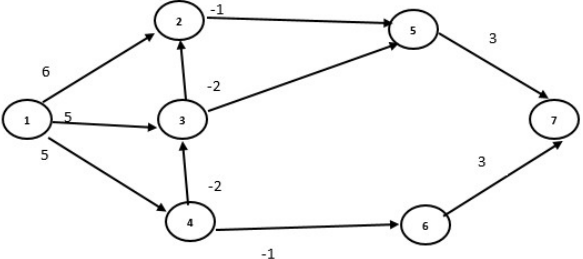
**SECTION B**

Q 6	Solve the given list 10 80 30 90 40 50 70 using quick sort algorithm. Also analyse its complexity.	10	CO2
Q 7	What do you mean by recurrence relation? What are the three methods to solve the recurrence relation? Solve $T(n) = 2T(n/2) + c$ using recurrence tree.	10	CO2
Q 8	Describe the Travelling sales person problem and discuss how to solve it using dynamic programming.	10	CO3

Q 9	<p>Sort the list 15, 1, 321, 10, 802, 2, 123, 90, 109, 11 using Bucket sort. Also show its time complexity.</p> <p style="text-align: center;"><b>OR</b></p> <p>Explain how backtracking is used for solving n- queens problem. Show the state space tree.</p>	<b>10</b>	<b>CO4</b>
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**SECTION-C**

Q 10	<p>Solve the following Knapsack problem with given capacity W: 5 using greedy strategy.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Item</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>6</td> <td>7</td> </tr> <tr> <td>Profit</td> <td>₹10</td> <td>₹5</td> <td>₹15</td> <td>₹7</td> <td>₹6</td> <td>₹18</td> <td>₹3</td> </tr> <tr> <td>Weight</td> <td>2</td> <td>3</td> <td>5</td> <td>7</td> <td>1</td> <td>4</td> <td>1</td> </tr> </table>	Item	1	2	3	4	5	6	7	Profit	₹10	₹5	₹15	₹7	₹6	₹18	₹3	Weight	2	3	5	7	1	4	1	<b>20</b>	<b>CO2</b>
Item	1	2	3	4	5	6	7																				
Profit	₹10	₹5	₹15	₹7	₹6	₹18	₹3																				
Weight	2	3	5	7	1	4	1																				

Q 11	<div style="text-align: center;">  </div> <p>(a) Apply Dijkstra's Algorithm on the above graph and find shortest path from node A to rest of the nodes.(Explain step by step).</p> <p>(b) Find minimum spanning tree for the same garph using Prim's Algorithm</p> <p style="text-align: center;"><b>OR</b></p> <p>Apply Bellman-Ford algorithm on following graph.</p> <div style="text-align: center;">  </div>	<b>20</b>	<b>CO4</b>
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