

Name:

Enrolment No:



**UNIVERSITY OF PETROLEUM AND ENERGY STUDIES**  
**End Semester Examination, December 2018**

**Course: ARTIFICIAL INTELLIGENCE**

**Course Code : CSEG315**

**Semester: V**

**Programme: B.Tech. (CSE)-LLB-CL**

**Time: 03 hrs.**

**Max. Marks: 100**

**Instructions:**

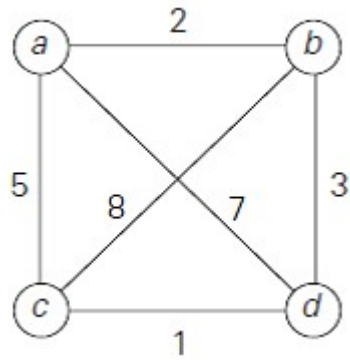
**Section A**

S. No.		Marks	CO
1.	What is an Imitation Game? Explain using an illustration.	4	[CO1]
2.	Given an example of a problem for which breadth-first search would work better than depth-first search.	4	[CO2]
3.	Explain Ridges, Plateau and Local Maxima with context to Steepest Hill Climbing Algorithm. How these problems can be handled?	4	[CO3]
4.	Explain Forward chaining and Back Chaining methods of Resolution.	4	[CO4]
5.	What are the sources and types of Knowledge Acquisition?	4	[CO5]

**Section B**

6.	<p><i>Note: Attempt all questions. All questions carry equal marks.</i></p> <p>Consider the following Production system:</p> <p><i>A farmer want to get a lion, a fox, a goose and some corn across a river. There is a bot but he can take one in addition to himself on each trip. The corn cannot be left with goose, as it will eat the corn; similarity the fox can eat goose if left together. The lion also cannot be left with the fox. How does everything get across the river? Assume animals do not wander off when left alone.</i></p> <p>a) Give the Start and Goal states b) Draw the state-space search tree to find the first solution. c) Write the production rules for the problem.</p>	10	[CO2]
7.	Explain A* Algorithm using suitable example.	10	[CO3]

	<b>OR</b>		
	Explain <b>Best First Search</b> Algorithm using suitable example.		
<b>8.</b>	i. Prove the following theorem in Natural Deduction System: $\text{infer } (A \rightarrow B) \rightarrow (\sim A \rightarrow \sim A)$ ii. Write a short note on Well-formed Formulae (WFF).	<b>10</b>	<b>[CO4]</b>
<b>9.</b>	Write a short note on Inferential Adequacy, Inferential Efficiency and Acquisitional Efficiency.	<b>10</b>	<b>[CO5]</b>
	<b><u>Section C</u></b>		
<b>10.</b>	i. Consider A, B, C and D to be propositional symbols. Using the truth table, show that the following formula is Tautology or not. $(\sim A \rightarrow B) \rightarrow (C \vee D)$ ii. Consider the following sentences and translate these sentences into First order predicate logic: <ol style="list-style-type: none"> <li>There is a language, which is spoken by everyone in this room.</li> <li>Some person in this room speaks every language.</li> <li>There is a person in this room who speaks English.</li> <li>Every person in this room speaks either English or Hindi but not both.</li> <li>No two persons in this room speak the same language.</li> </ol>	<b>5</b>	<b>[CO4]</b>
		<b>15</b>	
<b>11.</b>	Solve the following Cryptarithmic Problem. Write Constraint equations and show the steps in finding solution. $\begin{array}{r} \text{S E N D} \\ + \text{M O R E} \\ \hline \text{M O N E Y} \\ \hline \end{array}$ <p style="text-align: center;"><b>OR</b></p> Demonstrate the solution of following TSP problem using <b>Best First Search</b> :	<b>20</b>	<b>[CO3]</b>



*A travelling salesperson has a list of cities, each of which he must visit exactly once. There are direct routes between each pair of cities on the list. Find the route that the salesperson should follow for the shortest trip that both starts and finishes at City 'a'.*

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**Section A**

S. No.		Marks	CO
1.	How can you analyze that a solution steps be ignored or undone? Also, explain Ignorable, Recoverable and Irrecoverable conditions with examples.	4	[CO1]
2.	Differentiate between BFS and DFS.	4	[CO2]
3.	Write the differences between Simple Hill Climbing and Steepest Hill Climbing Algorithms.	4	[CO3]
4.	Write a short note on Symbolic & Non-Symbolic Logic.	4	[CO4]
5.	What do you understand by Expert System Shell?	4	[CO5]

**Section B**

6.	<p><i>Note: Attempt all questions. All questions carry equal marks.</i></p> <p>Consider the following Production system:</p> <p><i>There are two jugs, a 4-gallon one and a 3-gallon one. Neither jug has any measuring markings on it. How can you get exactly 2 gallons of water in the 4-gallon jug?</i></p> <p>a) Give the Start and Goal states and Production rules. b) Draw the state-space search tree to find the first solution.</p>	10	[CO2]
7.	<p>Explain <b>DFID Algorithm</b> using suitable example.</p> <p><b>OR</b></p> <p>Explain <b>Best First Search</b> Algorithm using suitable example.</p>	10	[CO3]
8.	<p>i. Prove the following theorem in Natural Deduction System:</p>	10	[CO4]

	<b><i>infer</i> <math>\sim A \rightarrow (A \rightarrow B)</math></b>		
	ii. Write a short note on Inference Rules.		
<b>9.</b>	<p>Explain the following Knowledge Representation Schemes in brief using suitable example:</p> <ul style="list-style-type: none"> <li>i. Logical</li> <li>ii. Procedural</li> <li>iii. Network</li> <li>iv. Structured</li> <li>v. Declarative</li> </ul>	<b>10</b>	<b>[CO5]</b>
	<b><u>Section C</u></b>		
<b>10.</b>	<p>i. Consider A, B, C and D to be propositional symbols. Using the truth table, show that the following formula is Tautology or not.</p> <p style="text-align: center;"><b><math>A \rightarrow (B \vee C) \rightarrow D</math></b></p> <p>ii. Consider the following sentences and translate these sentences into First order predicate logic:</p> <ul style="list-style-type: none"> <li>a) Marcus was a man.</li> <li>b) Marcus was a Pompein.</li> <li>c) All Pompeins were Romans.</li> <li>d) Caesar was a ruler.</li> <li>e) All Romans were either loyal to Caesar or hated him.</li> </ul>	<b>5</b>	<b>[CO4]</b>
		<b>15</b>	

11.

Solve the following Cryptarithmic Problem. Write Constraint equations and show the steps in finding solution.

20 [CO3]

$$\begin{array}{r} \text{T W O} \\ + \text{T W O} \\ \hline \text{F O U R} \\ \hline \end{array}$$

OR

Explain Min-Max Procedure. Solve the following problem using Min-Max algorithm.

