

Name:  
Enrolment No:



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

**Course: Artificial Intelligence & Expert Systems**

**Course Code: CSAI7003**

**Semester: I**

**Programme: M.Tech(Computer Science and Engineering)**

**Time: 03 hrs.**

**Max. Marks: 100**

**Instructions:**

**Section A**

S. No.		Marks	CO
1.	Explain Constraint Satisfaction problems and its various applications in Game theory.	4	[CO1]
2.	Define Resolution principle using appropriate example.	4	[CO2]
3.	Differentiate between monotonic and non-monotonic reasoning.	4	[CO3]
4.	Discuss the MP model in brief. How this model is different from Perceptron model?	4	[CO4]
5.	Explain Expert System Shell in brief.	4	[CO5]

**Section B**

6.	Consider the following Production system: <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> a) Identify the Start and Goal states and Production rules. b) Draw the state-space search tree to find the first solution.	10	[CO1]
7.	Explain the three classifications of ANNs based on their functions. Describe each in brief.	10	[CO3]
8.	Differentiate between Supervised, Reinforcement and Unsupervised learning with the help of appropriate examples. <b>OR</b> Elaborate Rule-based learning in AI using suitable examples.	10	[CO4]
9.	a) Explain FOPL. b) Consider A, B, C and D to be propositional Symbols. Which of these formulae are Tautologies? Show by using truth table approach. i. $(A \leftrightarrow (B \wedge C))$ ii. $(A \leftrightarrow B) \wedge (C \rightarrow D)$ iii. $(A \rightarrow B) \rightarrow (A \rightarrow \sim B)$ iv. $(A \leftrightarrow B) \leftrightarrow [(A \rightarrow B) \wedge (B \rightarrow A)]$	2+8	[CO2]

**Section C**

<b>10.</b>	<p>Solve the following Cryptarithmic Problem. Write Constraint equations and show the steps in finding solution.</p> <div style="text-align: center; margin: 20px 0;"> <math display="block">  \begin{array}{r}  \text{TWO} \\  + \text{TWO} \\  \hline  \text{FOUR} \\  \hline  \end{array}  </math> </div> <p style="text-align: center; margin: 20px 0;"><b>OR</b></p> <p>Explain Min-Max Procedure. Solve the following problem using Min-Max algorithm.</p> <div style="text-align: center; margin: 20px 0;"> <pre> graph TD     A((A)) --- B((B))     A --- C((C))     B --- D((D))     B --- E((E))     C --- F((F))     C --- G((G))     D --- D3[3]     D --- D5[5]     E --- E6[6]     E --- E9[9]     F --- F1[1]     F --- F2[2]     G --- G0[0]     G --- Gm[-1]         </pre> </div>	<b>20</b>	<b>[CO1]</b>
<b>11.</b>	<p>a) 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; margin: 10px 0;"><b><math>(\sim A \rightarrow B) \rightarrow (C \vee D)</math></b></p> <p>b) Consider the following sentences and translate these sentences into First order predicate logic:</p> <ol style="list-style-type: none"> <li>i. There is a language, which is spoken by everyone in this room.</li> <li>ii. Some person in this room speaks every language.</li> <li>iii. There is a person in this room who speaks English.</li> <li>iv. Every person in this room speaks either English or Hindi but not both.</li> <li>v. No two persons in this room speak the same language.</li> </ol>	<b>10</b>	<b>[CO2]</b>