

Name:	 UPES UNIVERSITY WITH A PURPOSE
Enrolment No:	

UNIVERSITY OF PETROLEUM AND ENERGY STUDIES
End Semester Examination, May 2019

Course: Artificial Intelligence
Program: B. Tech (CS) All Branches
Course Code: CSEG344

Semester: 6
Time 03 hrs.
Max. Marks: 100

Instructions:

SECTION A (20 Marks)

S. No.		Marks	CO
Q 1	How Artificial Intelligence is related to human based nature? Develop PEAS description for the following task environment: <ul style="list-style-type: none"> • Shopping for used AI books on the Internet 	(4)	CO1
Q 2	You have met a person who claims to be your distant cousin, with a common ancestor named “RAMESH”. You would like to verify his claim. Determine whether goal-driven or data-driven search would be preferable for solving above problem. Justify your answer.	(4)	CO2
Q 3	“AI is interdisciplinary in nature and its foundations are in various fields.” Justify the statement with valid reasons. Why did earlier AI programs as ELIZA failed to prove their intelligence?	(4)	CO1
Q 4	Perform unification of the following: <ul style="list-style-type: none"> a) $p(f(y), w, g(z, y) = p(x, x, g(z, A))$ b) $f(x, g(f(a), u)) = f(g(u, v), x)$ 	(4)	CO3
Q 5	There are 5 people in John’s family. All are having different issues with one another. Due to this, before being pictured in any photograph, they must have the following constraints to be satisfied: <ol style="list-style-type: none"> 1. John’s father will not stand immediate position with John. 2. John’s mother will not stand with her daughter 3. John must stand between two ladies 4. John’s brother in law should not stand next to John’s father Drive a methodology by which they can have a group photograph.	(4)	CO2

SECTION B (40 Marks)

Q 6	Write a short note on “Natural Language Processing. List out some of the application areas of NLP. Draw a parse tree for the sentence: <p style="text-align: center;">“I need to fly between India to London”.</p>	(10)	CO4
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<p>Q 7</p>	<p>Draw and explain biological and artificial neural network. What are the roles of activation function in ANN? List some of the linear and nonlinear activation functions with their suitable representations.</p> <p style="text-align: center;">OR</p> <p>State baye’s theorem and solve the given problem using naïve baye’s classifier. Classify Red Domestic SUV.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Example No.</th> <th>Color</th> <th>Type</th> <th>Origin</th> <th>Stolen?</th> </tr> </thead> <tbody> <tr><td>1</td><td>Red</td><td>Sports</td><td>Domestic</td><td>Yes</td></tr> <tr><td>2</td><td>Red</td><td>Sports</td><td>Domestic</td><td>No</td></tr> <tr><td>3</td><td>Red</td><td>Sports</td><td>Domestic</td><td>Yes</td></tr> <tr><td>4</td><td>Yellow</td><td>Sports</td><td>Domestic</td><td>No</td></tr> <tr><td>5</td><td>Yellow</td><td>Sports</td><td>Imported</td><td>Yes</td></tr> <tr><td>6</td><td>Yellow</td><td>SUV</td><td>Imported</td><td>No</td></tr> <tr><td>7</td><td>Yellow</td><td>SUV</td><td>Imported</td><td>Yes</td></tr> <tr><td>8</td><td>Yellow</td><td>SUV</td><td>Domestic</td><td>No</td></tr> <tr><td>9</td><td>Red</td><td>SUV</td><td>Imported</td><td>No</td></tr> <tr><td>10</td><td>Red</td><td>Sports</td><td>Imported</td><td>Yes</td></tr> </tbody> </table>	Example No.	Color	Type	Origin	Stolen?	1	Red	Sports	Domestic	Yes	2	Red	Sports	Domestic	No	3	Red	Sports	Domestic	Yes	4	Yellow	Sports	Domestic	No	5	Yellow	Sports	Imported	Yes	6	Yellow	SUV	Imported	No	7	Yellow	SUV	Imported	Yes	8	Yellow	SUV	Domestic	No	9	Red	SUV	Imported	No	10	Red	Sports	Imported	Yes	<p>(10)</p>	<p>CO4</p>
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<p>Q 8</p>	<p>Consider the following sentences:</p> <p>(a) Marcus was a man. (b) Marcus was a Roman. (c) All men are people. (d) Caesar was a ruler. (e) All Romans were either loyal to Caesar or hated him (or both). (f) Everyone is loyal to someone. (g) People only try to assassinate rulers they are not loyal to. (h) Marcus tried to assassinate Caesar.</p> <p>i) Translate these sentences into formulas in predicate logic ii) Convert the formulas into CNF iii) Prove that “Marcus Hated Caesar” using Resolution graph.</p> <p style="text-align: center;">OR</p> <p>Using the given facts, derive the production rules and solution graph and tree of a problem</p> <ul style="list-style-type: none"> • Ram was a man • Ram was a saint • All saints are Hindus • Ravana was a ruler • All Hindus were either loyal to Ravana or hated him 	<p>(10)</p>	<p>CO3</p>																																																							

	<ul style="list-style-type: none"> • Everyone is loyal to someone • People only try to assassinate rulers they are not loyal to. • Ram tried to assassinate Ravana • All men are people <p>Find the answer of ‘Did Ram hate Ravana?’</p>		
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Q 9	<p>Write a short note on the following, with example:</p> <ul style="list-style-type: none"> a) Backtracking Search b) Learning using intelligent agents c) Importance of Search techniques in AI 	(10)	CO1, CO2
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SECTION-C (40 Marks)

Q 10	<p>Data set of computer files provided, to derive model for virus identification. Considering ‘class’ as class label attribute, construct a decision tree for the given data.</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>WRITABLE</th> <th>UPDATED</th> <th>SIZE</th> <th>CLASS</th> </tr> </thead> <tbody> <tr> <td rowspan="6" style="writing-mode: vertical-rl; transform: rotate(180deg);">DATASET</td> <td>1</td> <td>yes</td> <td>no</td> <td>small</td> <td>infected</td> </tr> <tr> <td>2</td> <td>yes</td> <td>yes</td> <td>large</td> <td>infected</td> </tr> <tr> <td>3</td> <td>no</td> <td>yes</td> <td>med</td> <td>infected</td> </tr> <tr> <td>4</td> <td>no</td> <td>no</td> <td>med</td> <td>clean</td> </tr> <tr> <td>5</td> <td>yes</td> <td>no</td> <td>large</td> <td>clean</td> </tr> <tr> <td>6</td> <td>no</td> <td>no</td> <td>large</td> <td>clean</td> </tr> </tbody> </table> <p align="center">OR</p> <p>Discuss the architecture of an Expert system with diagram, in detail. Design the 10 IF-THEN type rules, for each, that help you to</p> <ul style="list-style-type: none"> a) Buy a bike b) Make excuses for a late assignment 		WRITABLE	UPDATED	SIZE	CLASS	DATASET	1	yes	no	small	infected	2	yes	yes	large	infected	3	no	yes	med	infected	4	no	no	med	clean	5	yes	no	large	clean	6	no	no	large	clean	(20)	CO4
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Q 11	<p>Demonstrate the following predicates into Semantic nets:</p> <ul style="list-style-type: none"> a) Is_a(Cricket player, MS dhoni) b) Is_a(Cricket player, Virat Kohli) c) Instance(Chennai SuperKings, MS Dhoni) d) Instance(Royal Challenge Bangalore, Virat Kohli) e) Team(Chennai SuperKings, Indian Premier League) f) Team(Royal Challenge Bangalore, Indian Premier League) g) Is_a(Cricket player, adult male) h) Batting_avg(Virat Kohli, 84.45) i) Batting_avg(MS Dhoni, 79.30) <ol style="list-style-type: none"> 1. Identify the Relations between Chennai SuperKings and Royal Challenge Bangalore. 2. Convert the above Semantic net into Frames representation. 	(20)	CO3
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Instructions:

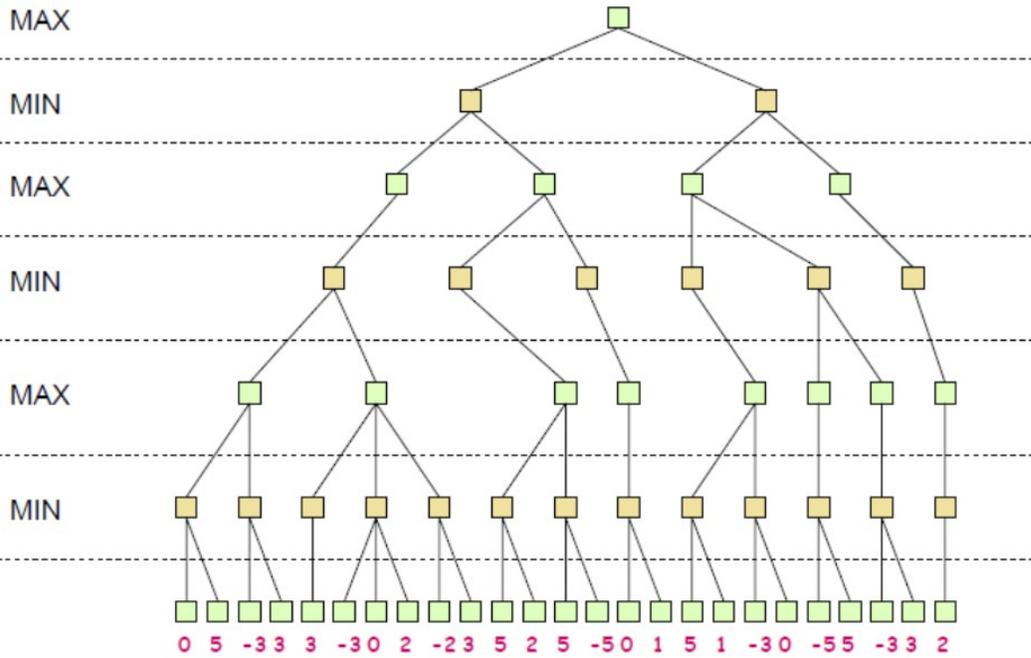
SECTION A

S. No.	Question	Marks	CO
Q 1	Write as short note on model-based intelligent agent, with diagram	(4)	CO1
Q 2	Explain, with example, why backward chaining is considered goal-driven and forward chaining is considered data-driven.	(4)	CO3
Q 3	Show that DFS is neither complete nor optimal search.	(4)	CO2
Q 4	Perform unification of the following: c) $p(x, x) = p(y, f(y))$ d) $f(A, x, f(g(y))) = f(z, f(z), f(A))$	(4)	CO3
Q 5	Discuss the main aspects considered before solving a complex AI problem. State your understanding on state space representation in AI.	(4)	CO1

SECTION B

Q 6	Discuss the following, with example: <ul style="list-style-type: none"> Intelligent Agents A* Algorithm Map- coloring problems 	(10)	CO1, CO2
Q 7	Consider the following axioms: <ul style="list-style-type: none"> Anyone whom Mary loves is a football star. Any student who does not pass does not play. John is a student Any student who does not study does not pass. Anyone who does not play is not a football star. Prove using resolution process that “If John does not study, then Mary does not love John” . <p style="text-align: center;">OR</p> Consider the following at sentences: <ol style="list-style-type: none"> 1. Dogs likes bones 2. Dogs eat everything they like 3. Pasta is a dog 	(10)	CO3

	Prove that Pasta eats bones . (a). Convert to clausal form (b). do resolution by refutation. Draw resolution tree.														
Q 8	Draw and explain biological and artificial neural network. What are the roles of activation function in ANN? List some of the linear and nonlinear activation functions with their suitable representations.	(10)	CO3												
Q 9	The sales of a company (in million dollars) for each year are shown in the table below. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x (year)</td> <td>2005</td> <td>2006</td> <td>2007</td> <td>2008</td> <td>2009</td> </tr> <tr> <td>y (sales)</td> <td>12</td> <td>19</td> <td>29</td> <td>37</td> <td>45</td> </tr> </table> i. Find the least square regression line $y = a x + b$. ii. Use the least squares regression line as a model to estimate the sales of the company in 2012.	x (year)	2005	2006	2007	2008	2009	y (sales)	12	19	29	37	45	(10)	CO4
x (year)	2005	2006	2007	2008	2009										
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SECTION-C															
Q 10	The following is the ruleset of a simple weather forecast expert system: 1 IF cyclone THEN clouds 2 IF anticyclone THEN clear sky 3 IF pressure is low THEN cyclone 4 IF pressure is high THEN anticyclone 5 IF arrow is down THEN pressure is low 6 IF arrow is up THEN pressure is high a) Use forward chaining to reason about the weather if the working memory contains the fact: “ arrow is down ”. b) Use backward chaining to reason about the weather if the working memory contains the fact: “ clouds ”. Show your answer in a similar table. c) Show your answer in a table naming the rules matching the current working memory(conflict set),which rule you apply, and how the working memory contents changes on the next cycle after a rule has fired: <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;">Cycle</td> <td style="width: 30%;">Working-Memory</td> <td style="width: 30%;">Conflict set</td> <td style="width: 25%;">Rule fired</td> </tr> </table>	Cycle	Working-Memory	Conflict set	Rule fired	(20)	CO4								
Cycle	Working-Memory	Conflict set	Rule fired												
Q 11	Explain the usage of alpha beta pruning in Game Playing. Find out the alpha beta cuts for the following tree.														



(20)

CO2

OR

Given the following search tree, apply the alpha-beta pruning algorithm to it and show the search tree that would be built by this algorithm. Make sure that you show where the alpha and beta cuts are applied and which parts of the search tree are pruned as a result.

