TERM END EXAMINATIONS (TEE) – July 2024

Programme	:	B.Tech.	Semester	:	Winter Semester 2023-24
Course Title/ Course Code	:	Fundamentals in AI and ML/ CSA2001	Slot	:	D11+D12+D13
Time	:	3 Hrs.	Max. Marks	:	100

Answer ALL the Questions

Q. No.		Question Description	Marks
		PART A – (60 Marks)	
1	(a)	Consider the driverless cars. The car may ply through both heavy-traffic and traffic-less areas. What are the PEAS components needed for it? Also explain, how do you estimate its performance?	12
		OR	
	(b)	Is it rational for the agent to oscillate needlessly back and forth after all the dirt is cleaned up? Why? How might a vacuum-cleaner agent adapt its behaviour in an environment where clean squares can become dirty again?	12
2	(a)	Develop an algorithm for a 3×3 game board for a simple two-player Tic-Tac-Toe game.	12
		OR	
	(b)	Draw the state space diagram for the Hill Climbing Search and explain several regions of it.	12
3	(a)	Discuss the role of unification in the First Order Predicate Logic. Provide examples to illustrate how unification is applied when resolving variables in different clauses.	12
		OR	
	(b)	Create a Prolog program demonstrating backward chaining with a knowledge base related to the courses and prerequisites of a B. Tech. student at VIT Bhopal University	12
4	(a)	A road map can be represented as a set of facts: road(City1, City2, Distance) This predicate means that there is a direct road between the cities City1 and City2. road(zuerich, baden, 22). road(baden, basel, 83). road(zuerich, rotkreuz, 39). road(baden, olten, 43). road(olten, bern, 67). road(olten, luzern, 57). road(olten, basel, 39). road(rotkreuz, luzern, 18). road(rotkreuz, schwyz, 26).	12

road(luzern, altdorf, 39).
road(schwyz, altdorf, 16).

Implement the predicate:

route(X, Y, W, L)

Hint: This predicate means that there is a route W from X to Y of the length L. W is the ordered list of the cities in between, starting with X.

OR

(b) Discuss the various trust models that are useful for multi-agent systems. Also, discuss the recommendation protocols. 12

5 (a) The following dataset represents the relationship between the number of study hours (an independent variable) and the score achieved in an exam (a dependent variable): 12

Study Hours (X): [2, 3, 4, 5, 6]

Exam Score (Y): [65, 75, 80, 85, 90]

Fit a linear regression model to predict the exam score based on the number of study hours. Use the model to predict exam scores if study hours are 12.

OR

(b) Discuss the types of learning with suitable examples. 12

PART B – (40 Marks)

6 Explain the significance of utility in the context of agent behaviour, and decision-making, and how does it relate to goals and performance measures? 8

7 Provide a step-by-step procedure or a pseudocode required to apply backtracking search to solve a SUDOKU puzzle. 8

8 Create a Prolog program with a basic knowledge base about animals and their characteristics, and implement queries to retrieve information. 8

9 For a given program, how would Prolog respond to the query if you kept entering ';' after each solution? 8

Program:

```
p(a,b).
p(b,c).
p(X, Y):-p(Y, X).
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Query:

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?- p(X,Y).
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10 What are the key factors needed for choosing the target function in the learning concept? Explain it. 8

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