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18CS71

Seventh Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Artificial Intelligence and Machine Learning

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- Explain any two AI Techniques for solving tic-tac-toe problem. (10 Marks)
 - What is a state space? Explain the concept of state space representation using water jug problem. (10 Marks)

OR

- Explain steepest hill climbing technique with an algorithm. Comment on drawback and list out how overcome the drawbacks. (10 Marks)
 - Apply and show how AO* algorithm can be used to find the final path. Write the algorithm. (10 Marks)

Module-2

- Convert the following statement into its equivalent predicate logic. (10 Marks)
 - Marcus was man
 - Marcus was a Pompeian
 - All Pompeian were Romans
 - Caesar was a Ruler
 - All Romans were either loyal to Caesar or hated him
 - Everyone is loyal to someone
 - People only try to assassinate rulers they are not loyal to
 - Marcus tried to assassinate Caesar

- Apply candidate elimination algorithm on the following data to obtain the complete version space.

Example	Sky	Air temp	Humidity	Wind	Water	Forest	enjoy
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	No
4	Sunny	Warm	High	Strong	Cool	Change	Yes

(10 Marks)

OR

- List the properties of a good knowledge representation system. (05 Marks)
 - What are Horn clause? Write a declaration and procedural representation. List the synthetic difference between Logic and PROLOG. (07 Marks)

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- Construct maximally specific hypothesis for the following training examples and write algorithm.

Time	Weather	Temperature	Company	Humidity	Wind	Goes
Morning	Sunny	Warm	Yes	Mild	Strong	Yes
Evening	Rainy	Cold	No	Mild	Normal	No
Morning	Sunny	Moderate	Yes	Normal	Normal	Yes
Evening	Sunny	Cold	Yes	High	Strong	Yes

(08 Marks)

Module-3

- Construct decision tree using ID3 algorithm for the following data :

Day	Outlook	Temp	Humidity	Wind	Decision
1	Sunny	Hot	High	Weak	Yes
2	Sunny	Hot	High	Strong	No
3	Overcast	Hot	High	Weak	Yes
4	Rain	Mild	High	Weak	No
5	Rain	Cool	Normal	Weak	Yes

(12 Marks)

- Derive Gradient Descent Rule. (08 Marks)

OR

- Write an algorithm for back propagation which uses Stochastic gradient descent method. Comment on the effect of adding momentum. (10 Marks)
 - Discuss the perceptron training and delta rule that solves learning problem and also how a single perceptron can be used to represent Boolean functions AND, OR (10 Marks)

Module-4

- Explain Naïve Bayes classifier. (10 Marks)
 - Explain Bayesian Belief Network and conditional independence with example. (10 Marks)

OR

- Discuss MDL principle in brief. (10 Marks)
 - Explain Brute force MAP learning algorithm. (10 Marks)

Module-5

- Explain KNN learning algorithm. (10 Marks)
 - Discuss with an algorithm locally weighted regression. (10 Marks)

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OR

- Write short note on Q-Learning. (10 Marks)
 - Discuss about Radial basis function in detail. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.