USN

Seventh Semester B.E. Degree Examination, Dec.2024/Jan.2025
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

1 a. Describe the applications of Artificial Intelligence.   (05 Marks)
   b. Discuss game playing tree with a neat diagram.   (05 Marks)
   c. You are given 2 jugs, a 4-litre and 3-litre one. Neither of them have measuring markers. There is a pump to fill 2-litres and 4-litre jug. Using the production rules, solve the problem to fill 4-gallon jug with 2 litres.   (10 Marks)

OR

2 a. Discuss branches of Artificial Intelligence.   (08 Marks)
   b. Describe Program-2 version of tic-tac-toe game.   (12 Marks)

Module-2

3 a. Discuss the issues in knowledge representation. Translate the following in first order predicate logic.
   (i) Everyone is loyal to someone   (ii) Eatables are food
   (iii) No employee earn more than president   (iv) Some employees are sick today
   (v) People only try to assassinate someone they are not loyal to.   (10 Marks)
   b. Explain Find S algorithm for the given training set.

Example	Time	Weather	Temp	Humidity	Wind	Goes
1	Morning	Sunny	Warm	Mild	Strong	Yes
2	Evening	Rainy	Cold	Mild	Normal	No
3	Morning	Sunny	Moderate	Normal	Normal	Yes
4	Evening	Sunny	Cold	High	Strong	Yes

                                                                                               (10 Marks)

OR

4 a. Illustrate unification algorithm with an example.   (10 Marks)
   b. Explain candidate elimination algorithm with an example.   (10 Marks)

Module-3

5 a. For the following transactions shown in the table compute the following:
   (i) Entropy of collection of transaction records of the table with respect to classification.
   (ii) What are the information gain of a_1 and a_2 relative to the transactions of the table.

Instance	a_1	a_2	Target class
1	T	T	+
2	T	T	+
3	T	F	-
4	F	F	+
5	F	T	-
6	F	T	-
7	F	F	-
8	T	F	+
9	F	T	-

                                                                                               (10 Marks)

b. Explain artificial neural network with the concept of perceptron with a neat diagram.
                                                                                               (10 Marks)

OR

6 a. Explain Entropy and Information gain in ID_3 with an example.   (10 Marks)
   b. Explain back propagation algorithm. Mention its limitations.   (10 Marks)

Module-4

7 a. Compute the probability using Baye's theorem to play tennis on 15th day for the given example with conditions. {Temp = cool, Humidity = high, wind = strong, outlook = Sunny }

Day	Outlook	Temp	Humidity	Wind	Play Tennis
1	Sunny	Hot	High	Weak	No
2	Sunny	Hot	High	Strong	No
3	Overcast	Hot	High	Weak	Yes
4	Rain	Mild	High	Weak	Yes
5	Rain	Cool	Normal	Weak	Yes
6	Rain	Cool	Normal	Strong	No
7	Overcast	Cool	Normal	Strong	Yes
8	Sunny	Mild	High	Weak	No
9	Sunny	Cool	Normal	Weak	Yes
10	Rain	Mild	Normal	Weak	Yes
11	Sunny	Mild	Normal	Strong	Yes
12	Overcast	Mild	High	Strong	Yes
13	Overcast	Hot	Normal	Weak	Yes
14	Rain	Mild	High	Strong	No

                                                                                               (10 Marks)

b. The following table gives data set about stolen vehicles. Using Naïve Bayes classifier classify net data { Color = Red, Type = SUV , Origin = Domestic }

Color	Type	Origin	Stolen
Red	Sports	Domestic	Yes
Red	Sports	Domestic	No
Red	Sports	Domestic	Yes
Yellow	Sports	Domestic	No
Yellow	Sports	Imported	Yes
Yellow	SUV	Imported	No
Yellow	SUV	Imported	Yes
Yellow	SUV	Domestic	No
Red	SUV	Imported	No
Red	Sports	Imported	Yes

                                                                                               (10 Marks)

8 a. Describe Maximum likelihood hypothesis for predicting probabilities.   (10 Marks)
   b. Explain the concept of EM algorithm.   (10 Marks)

Module-5

9 a. Describe K-nearest neighbour learning algorithm for continuous values target function.
                                                                                               (10 Marks)
   b. Explain the Q-function and Q-learning algorithm.   (10 Marks)

OR

10 a. Explain the concept of Radial basis function.   (10 Marks)
   b. Discuss case-based reasoning with an example.   (10 Marks)