CBCS SCHEME

USN ⬜⬜⬜⬜⬜⬜⬜⬜⬜⬜

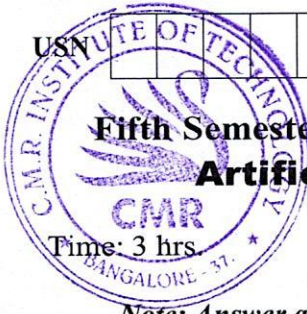## Fifth Semester B.E./B.Tech. Degree Examination, Dec.2024/Jan.2025
Artificial Intelligence and Machine Learning

Time: 3 hrs.

Max. Marks: 100

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

Module-1

1	a.	What is AI? Explain the terms:
		(i) Acting humanly
		(ii) Thinking rationally **(12 Marks)**
	b.	What is problem solving agent? Formulate a simple problem solving agent. **(08 Marks)**

OR

2	a.	Explain different types of problems. **(06 Marks)**
	b.	Explain well defined problem. **(08 Marks)**
	c.	What is 8 puzzle problem? Discuss. **(06 Marks)**

Module-2

3	a.	List and define the criteria used to evaluate search strategies. **(04 Marks)**
	b.	Explain BFS and DFS search strategies. **(12 Marks)**
	c.	What are the need for machine learning? **(04 Marks)**

OR

4	a.	Give a detail explanation on types of machine learning. **(08 Marks)**
	b.	Define the following:
		(i) Hypothesis testing
		(ii) P-value
		(iii) Confidence Intervals
		(iv) Z – test
		(v) t – test and paired t- test **(10 Marks)**
	c.	What do you mean by bivariate data and multivariate data? **(02 Marks)**

Module-3

5	a.	Explain different types of learning. **(05 Marks)**
	b.	Explain concept learning with example. **(05 Marks)**
	c.	Define bias and variance. **(02 Marks)**
	d.	Differentiate instance based learning and model based learning. **(08 Marks)**

OR

6	a.	Explain Nearest Neighbor Learning. Write the algorithm for the same. **(06 Marks)**
	b.	Consider the student performance training dataset of 8 data instances shown in Table.Q6(b) which describes the performance of individual students in a course and their CGPA obtained in the previous semesters. The independent attributes are CGPA, Assessment and Project. The target variable is 'Result' which is a discrete valued variable that takes two values 'Pass' or 'Fail'. Based on the performance of a student, classify whether a student will pass or fail in that course.

l. No.	CGPA	Assessment	Project Submitted	Result
1	9.2	85	8	Pass
2	8	80	7	Pass
3	8.5	81	8	Pass
4	6	45	5	Fail
5	6.5	50	4	Fail
6	8.2	72	7	Pass
7	5.8	38	5	Fail
8	8.9	91	9	Pass

Table.Q6(b) Training Dataset   **(08 Marks)**

c. Explain Locally Weighted Regression and solve the following problem. Consider the following Table.Q6(c) with four instances and apply locally weighted regression.

SL. No.	X = Salary (in Lakhs)	Y = Expenditure (in thousands)
1	5	25
2	1	5
3	2	7
4	1	8

Table.Q6(c)   **(06 Marks)**

Module-4

7 a. Using the decision tree, asses a student's performance during his course of study and predict whether a student will get a job offer or not in his final year of the course. The training data set T consists of 10 data instances with attributes such as 'CGPA', 'Interactiveness', 'Practical Knowledge' and 'Communication Skills' as shown in Table.Q7(a). The target class attribute is the 'Job offer'.

SL. No.	CGPA	Interactiveness	Practical Knowledge	Communication Skills	Job Offer
1	≥ 9	Yes	Very good	Good	Yes
2	≥ 8	No	Good	Moderate	Yes
3	≥ 9	No	Average	Poor	No
4	< 8	No	Average	Good	No
5	≥ 8	Yes	Good	Moderate	Yes
6	≥ 9	Yes	Good	Moderate	Yes
7	< 8	Yes	Good	Poor	No
8	≥ 9	No	Very good	Good	Yes
9	≥ 8	Yes	Good	Good	Yes
10	≥ 8	Yes	Average	Good	Yes

Table.Q7(a)   **(12 Marks)**

b. Define Bayes theorem. Explain the classification using Bayes model. Write an expression for MAP hypothesis and ML hypothesis.   **(08 Marks)**

OR

8 a. Asses a student performance using Naïve Bayes algorithm with the data set given in Table.Q7(a). Predict whether a student gets a job offer or not in his final year of the course.
                                                                (08 Marks)