Roll No:													

BTECH

(SEM. VI) THEORY EXAMINATION 2025-26

MACHINE LEARNING TECHNIQUES

TIME: 3 HRS **M.MARKS: 70**

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

1. Attempt *all* questions in brief. **02 x 7 = 14**

Q no.	Question	CO	Level
a.	What is Machine Learning?	1	K1
b.	What are well-defined learning problems?	1	K1
c.	What is a Bayes Optimal Classifier?	2	K1
d.	Explain Bayesian Belief Networks.	2	K1
e.	What is Decision Tree Learning?	3	K1
f.	What is a Perceptron?	4	K1
g.	What is a Markov Decision Process (MDP)?	5	K1

SECTION B

2. Attempt any *three* of the following: **07 x 3 = 21**

Q no.	Question	CO	Level
a.	Explain different types of learning in Machine Learning, such as supervised, unsupervised, and reinforcement learning.	1	K2
b.	What is Linear Regression and Logistic Regression, and how do they differ in terms of output and application?	2	K3
c.	What is information gain, and how does the ID3 algorithm use it to build a decision tree?	3	K3
d.	Derive and explain the Backpropagation algorithm used in training Multilayer Neural Networks.	4	K3
e.	Describe Q-Learning, including the Q-function and the steps involved in the Q-Learning algorithm.	5	K3

SECTION C

3. Attempt any *one* part of the following: **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Differentiate between Data Science and Machine Learning in terms of scope, goals, and applications.	1	K2
b.	Describe the design process of a Machine Learning system with suitable steps and examples.	1	K3

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4. Attempt any *one* part of the following: **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Describe the Naïve Bayes classifier and discuss its assumptions, advantages, and limitations.	2	K2
b.	What is Support Vector Machine (SVM), and how does it construct a hyperplane (decision surface) for classification?	2	K3

5. Attempt any *one* part of the following: **07 x 1 = 07**

Q no.	Question	CO	Level
a.	What is Instance-Based Learning, and how does k-Nearest Neighbour (k-NN) algorithm work?	3	K3
b.	Explain Locally Weighted Regression, Radial Basis Function Networks, and Case-Based Learning with suitable examples.	3	K2

6. Attempt any *one* part of the following: **07 x 1 = 07**

Q no.	Question	CO	Level
a.	What is a Self-Organizing Map (SOM), and how does it perform unsupervised learning?	4	K3
b.	Explain the concept of Convolutional Neural Networks (CNN) and the roles of different layers such as convolutional, pooling, activation, and fully connected layers.	4	K3

7. Attempt any *one* part of the following: **07 x 1 = 07**

Q no.	Question	CO	Level
a.	Explain the structure of a Reinforcement Learning task with suitable examples from real-world applications.	5	K3
b.	What are crossover and mutation in Genetic Algorithms, and how are they applied in Genetic Programming and real-world problems?	5	K3