PAPER ID-310430

Subject Code: KOE073

Roll No: | | | | | | | | | | | | | |

BTECH

(SEM VII) THEORY EXAMINATION 2024-25

MACHINE LEARNING

TIME: 3 HRS **M.MARKS: 100**

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

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	CO	Level
a.	Describe the differences between well-defined and ill-defined learning problems.	1	K2
b.	Describe the trade-off between bias and variance in machine learning.	1	K2
c.	What is inductive bias in the context of decision tree learning?	2	K1
d.	Explain how overfitting can affect decision tree performance.	2	K2
e.	What is hypothesis accuracy in machine learning?	3	K1
f.	What is Bayes theorem?	3	K1
g.	Explain the relationship between sample size and generalization error for finite hypothesis spaces.	4	K2
h.	What is the mistake bound model of learning?	4	K1
i.	What is a hypothesis space in machine learning?	5	K1
j.	Explain the process of general-to-specific beam search in hypothesis generation.	5	K2

SECTION B

2. Attempt any *three* of the following: **10 x 3 = 20**

a.	Demonstrate an example of concept learning for a binary classification problem.	1	K3
b.	Demonstrate how Adaline adjusts its weights during training.	2	K3
c.	Describe the relationship between Bayes Optimal Classifier and posterior probabilities.	3	K2
d.	Demonstrate the implementation of k-NN for a simple classification problem.	4	K3
e.	Describe the advantages of FOIL over propositional rule learners.	5	K2

SECTION C

3. Attempt any *one* part of the following: **10 x 1 = 10**

a.	Explain the working steps of the Find-S algorithm.	1	K2
b.	Explain how the List-Then-Eliminate algorithm finds consistent hypotheses.	1	K2

4. Attempt any *one* part of the following: **10 x 1 = 10**

a.	Demonstrate the training of a perceptron using the perceptron learning rule.	2	K3
b.	Demonstrate how to update weights using the Delta rule.	2	K3

5. Attempt any *one* part of the following: **10 x 1 = 10**

a.	Explain the steps of the EM algorithm: Expectation step and Maximization step.	3	K2
b.	Describe how conditional probabilities are represented in Bayesian Belief Networks	3	K2

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6. Attempt any *one* part of the following: 10 x 1 = 10

a.	Demonstrate the application of the mistake bound model to the Perceptron learning algorithm.	4	K3
b.	Demonstrate the application of LWR to a simple regression dataset.	4	K3

7. Attempt any *one* part of the following: 10 x 1 = 10

a.	Explain the key components of a reinforcement learning framework: states, actions, rewards.	5	K2
b.	Describe the significance of the learning rate and discount factor in Q-learning.	5	K2