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BTECH
(SEM V) THEORY EXAMINATION 2024-25
MACHINE LEARNING TECHNIQUES

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.	What is the first step in designing a learning system?	1	2
b.	What is the importance of inductive bias in machine learning?	1	2
c.	What is a perceptron in artificial neural networks?	2	2
d.	What is backpropagation in neural networks?	2	2
e.	What is the difference between accuracy and precision in evaluating hypotheses?	3	2
f.	Explain the term "population" in the context of sampling.	3	2
g.	Define sample complexity in machine learning	4	2
h.	Define the k-Nearest Neighbour (k-NN) algorithm.	4	2
i.	What is the difference between evolution and learning in genetic algorithms?	5	2
j.	What is Q-learning in reinforcement learning?	5	2

SECTION B**2. Attempt any three of the following: 10 x 3 = 30**

a.	Explain the concept of hypothesis representation and its significance in learning.	1	2
b.	What is pruning in decision tree learning? Explain its types with examples.	2	3
c.	Explain the role of ROC curves and AUC in comparing classifiers.	3	3
d.	Discuss the role of confidence intervals and error bounds in sample complexity.	4	3
e.	Discuss how genetic programming can be used for symbolic regression.	5	2

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

a.	Compare the Find-S and Candidate Elimination algorithms in terms of their approach and limitations.	1	4
b.	How does the general-to-specific ordering framework help in managing complex hypothesis spaces?	1	3

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

a.	Explain how generalization is achieved in neural networks using backpropagation.	2	3
b.	Compare and contrast decision trees and artificial neural networks for classification problems.	2	4

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

a.	Discuss the strengths and weaknesses of the Naïve Bayes classifier in text classification.	3	3
b.	Compare the EM algorithm with gradient descent in machine learning.	3	4

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

a.	Explain the challenges of handling high-dimensional data in k-NN.	4	3
b.	Provide a detailed comparison of instance-based learning techniques in real-world applications.	4	4

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

a.	Discuss the impact of evolutionary strategies on optimization problems.	5	3
b.	Compare on-policy and off-policy methods in reinforcement learning.	5	4