PAPER ID-410293

Subject Code: KAI601

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

BTECH
(SEM VI) THEORY EXAMINATION 2023-24
MACHINE LEARNING TECHNIQUES

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

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief.

a.	Name two types of learning commonly used in machine learning.	02
b.	Give an example of a supervised learning problem.	02
c.	What is logistic regression, and how does it differ from linear regression?	02
d.	What are the three types of support vector kernels commonly used in SVMs?	02
e.	Define inductive bias in the context of decision tree learning.	02
f.	Describe the process of locally weighted regression in instance-based learning.	02
g.	Define perceptron and their role in artificial neural networks.	02
h.	What are the key characteristics of the Self-Organizing Map (SOM) algorithm?	02
i.	Define Reinforcement Learning (RL) and explain its key components.	02
j.	Discuss the components of a genetic algorithm.	02

SECTION B

2. Attempt any *three* of the following:

a.	Compare and contrast supervised, unsupervised, and reinforcement learning approaches in machine learning.	10
b.	Discuss the mathematical formulation of linear regression, including the hypothesis function, cost function, and optimization algorithm used for parameter estimation.	10
c.	Provide a detailed explanation of the ID3 algorithm used for constructing decision trees. Discuss the key steps involved in the iterative process of feature selection and node splitting.	10
d.	Explain the fundamental concepts behind the Backpropagation Algorithm and its importance in training neural networks.	10
e.	Explain the Q-learning algorithm and its role in Reinforcement Learning.	10

SECTION C

3. Attempt any *one* part of the following:

a.	Discuss the role of Bayesian networks in representing probabilistic relationships between variables. Explain how Bayesian networks are constructed, updated, and utilized for inference in real-world scenarios.	10
b.	Discuss the concept of model evaluation in machine learning. Compare and contrast evaluation metrics such as accuracy, precision, recall and F1-score.	10

4. Attempt any *one* part of the following:

a.	Discuss the fundamental principles of the Expectation-Maximization (EM) algorithm and its role in probabilistic modeling and parameter estimation.	10
b.	Define the concept of a hyperplane in the context of machine learning and Support Vector Machines (SVMs). Explain how hyperplanes are used as decision surfaces to separate classes in feature space.	10

5. Attempt any *one* part of the following:

a.	Discuss how entropy measures the uncertainty or randomness of a dataset and its role in quantifying the impurity of decision tree nodes.	10
b.	Describe the Locally Weighted Regression (LWR) technique and its purpose in machine learning.	10

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6. Attempt any *one* part of the following:

a.	Examine the effect of pooling layer parameters, such as pooling size and stride, on feature representation and network performance.	10
b.	Describe the role of Convolutional Neural Networks (CNNs), in diagnosing Diabetic Retinopathy.	10

7. Attempt any *one* part of the following:

a.	Critically analyze the strengths and limitations of Genetic Programming compared to other machine learning techniques.	10
b.	Critically analyze the trade-offs between exploration and exploitation in the GA cycle of reproduction.	10