Paper id: 251009

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

BTECH
(SEM VI) THEORY EXAMINATION 2024-25
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.	Differentiate between supervised and unsupervised learning.	1	K2
b.	What is the role of the hypothesis in a learning system?	1	K1
c.	Define hyper plane in the context of SVM.	2	K2
d.	Differentiate between linear and logistic regression.	3	K2
e.	What is inductive bias?	3	K2
f.	What is gradient descent?	4	K3
g.	Define the Markov Decision Process (MDP).	5	K3

SECTION B

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

a.	Compare Naïve Bayes classifier and Bayesian belief networks.	1	K2
b.	Discuss the properties that make SVM effective for high-dimensional data with example.	2	K3
c.	Explain how k-NN works. What are its advantages and limitations?	3	K2
d.	Describe the basic architecture of a convolution neural network (CNN) with help of diagram.	4	K3
e.	Explain the GA cycle of reproduction with a neat diagram.	5	K2

SECTION C

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

a.	How Machine Learning algorithms help in detecting fraudulent activities in finance sector? Also give some real-time software used.	1	K2
b.	Compare regression, classification and clustering in machine learning along with suitable real-life applications.	1	K2

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

a.	Discuss entropy and information gain in detail. Why are they important in decision tree learning? Illustrate with a numerical example.	2	K3
b.	Discuss the concept of Radial Basis Function (RBF) networks. Provide the mathematical formulation and architecture.	2	K3

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

a.	Explain the working of instance-based learning. Use diagrams to show how classification is done using k-NN.	3	K2
b.	Explain the concept of SVM kernels. Compare different SVM kernels with mathematical formulation and application suitability. Also, explain how SVM determines the optimal hyper plane.	3	K2

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

a.	Explain the architecture and functioning of a Multilayer Perception (MLP). How does it differ from a single-layer perceptron?	4	K4

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b.	Discuss the concept of CNN architecture. Explain the role of different layers such as convolution, pooling, activation, and fully connected layers.	4	K4

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

a.	What is Deep Q-learning? How does it improve over traditional Q-learning? Explain with an architecture diagram.	5	K3
b.	Compare Genetic Algorithms and Reinforcement Learning in terms of learning paradigm, memory, and exploration strategy.	5	K3