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BTECH
(SEM VI) 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.	Write a short note on Clustering.	1	K2
b.	What is a well-defined learning problem?		
c.	Write the equation for logistic regression and explain the sigmoid function.		
d.	State Bayes' theorem and its significance in ML.		
e.	What is information gain in decision trees?		
f.	Describe k-Nearest Neighbour (k-NN) classification.		
g.	What is the role of an activation function in a neural network?		
h.	Explain pooling in CNN with an example.		
i.	Define Q-learning.		
j.	What is the role of mutation in genetic algorithms?		

SECTION B

2. Attempt any three of the following:

10 x 3 = 30

Q No.	Question	CO	Level
a.	Explain the different types of machine learning with appropriate examples.	1	K2
b.	Describe linear regression in detail. How is it used for prediction?		
c.	Explain the ID3 algorithm for decision tree learning with an example.		
d.	What is backpropagation? Derive the weight update rule using gradient descent.		
e.	What are genetic algorithms? Explain their components and applications in machine learning.		

SECTION C

3. Attempt any one part of the following:

10 x 1 = 10

Q No.	Question	CO	Level
a.	Discuss the issues in machine learning and differentiate between data science and ML.	1	K2
b.	Explain any four approaches to machine learning.		

4. Attempt any one part of the following:

10 x 1 = 10

Q No.	Question	CO	Level
a.	Explain the working of Naïve Bayes classifier with a suitable example.	1	K2



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b.	What are the types of kernels in SVM? Explain each with advantages and use cases.		
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5. Attempt any one part of the following: 10 x 1 = 10

Q No.	Question	CO	Level
a.	Describe entropy and information gain with example. How are they used in decision trees?	1	K2
b.	Explain radial basis function networks and case-based reasoning.		

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

Q No.	Question	CO	Level
a.	Derive the backpropagation algorithm for a multi-layer perceptron network.	1	K2
b.	Discuss the architecture and training of Convolutional Neural Networks (CNN) with one use case.		

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

Q No.	Question	CO	Level
a.	Explain the Q-learning algorithm with its working and applications.	1	K2
b.	What are the different stages in the genetic algorithm life cycle? Explain with a diagram.		

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