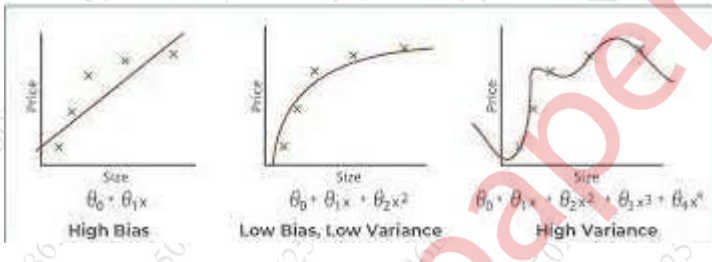
22/05/2025 TE CSE-AIML SEM-VI C-SCHEME ML QP CODE : 10082442

Duration: 3hrs **[Max Marks: 80]**

N.B. : (1) Question No 1 is Compulsory.
(2) Attempt any three questions out of the remaining five.
(3) All questions carry equal marks.
(4) Assume suitable data, if required and state it clearly.

1 Attempt any FOUR [20]

a With reference to below figure 1,2,3 explain under-fitting and over-fitting. Identify best fit and overfitted line. [5]



b 200 emails that were actually spam were correctly predicted as spam. 50 emails that were actually spam were incorrectly predicted as not spam. 60 emails that were actually not spam were incorrectly predicted as spam. And 330 emails that were actually not spam were correctly predicted as not spam. For the given data build the confusion matrix and find accuracy, precision, recall and f1 score. [5]

c In a SVM explain the kernel trick. [5]

d Draw and explain a biological neuron. Compare ANN with BNN. [5]

e What is curse of dimensionality? [5]

2 a Find the eigenvalues of the 2 x 2 matrix [10]

$$A = \begin{bmatrix} 0 & -2 \\ 3 & 4 \end{bmatrix}$$

Also find eigen vectors

b Diagonalize the matrix [10]

$$\begin{matrix} 2 & 0 & 2 \\ -1 & 2 & 1 \\ 0 & 1 & 4 \end{matrix}$$

[10]

3 a Find the values of a and b to estimate the **linear regression equation** (y= a+bx) for the following two sets of data:

x	2	4	6	8
y	3	7	5	10

b Explain the need for regularization. Compare Lasso and Ridge Regression techniques for regularization. [10]

4 a State the **algorithm** for Hebb learning rule. Design Hebb network for **AND gate**. State weights and bias assumptions clearly. Assume bipolar inputs and targets. [10]

b Explain the Expectation Maximization algorithm with neat flowchart. [10]

5 a Explain various activation functions with appropriate diagrams, equations, ranges and their applications in real world. [10]

b Explain back error propagation with neat diagram and weight Updation equation. [10]

6 a Implement OR function using single layer perceptron upto 2 epochs. Assume initial values of weights and learning rate as follows w1=w2=b=0 threshold (Θ) =0.2 and learning rate (α) = 1. [10]

b Use Principal component analysis to arrive at the transformed matrix for the given data [10]

2	1	0	-1
4	3	1	0.5

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