

Time: 3 Hours

Max Marks: 80

Instructions:

- Figures to the right indicate max marks.
- Draw appropriate diagram whenever applicable.
- Assume suitable data wherever applicable. State your assumptions clearly.
- **Question number 1 is compulsory.**
- Attempt **any Three** questions from remaining questions.

Q1 Attempt Any Four from the following. (5 marks each) 20

- Differentiate different Machine Learning approaches. What is Cross Validation? Discuss bias variance trade-off with suitable diagram.
- Explain SVD and its applications.
- Discuss Support Vector Machines.
- Explain Eigen values and vectors.
- Implement XOR function using McCulloch Pitts Model

Q2 a) In the classification model, the values for the observations are as follows. True Negatives(TN) =300, True Positive(TP)=500, False Positive (FP) = 50, False Negatives (FN)=150. Evaluate the performance of the model by finding values of Accuracy, Precision, Recall and F1-Score. 10

b) What is the trace of a Matrix. What are its properties? 10

Q3 a) Diagonalize the Matrix 10

$$A = \begin{bmatrix} 1 & 3 \\ 2 & 2 \end{bmatrix}$$

b) Find Singular Value Decomposition of given matrix and indicate insights about linear transformations conveyed by this method. 10

$$A = \begin{bmatrix} 3 & -5 \\ 4 & 0 \end{bmatrix}$$

Q4 a) Discuss different activation functions used in Neural Networks. (Formula, Graph and Range). 10

b) Implement the ANDNOT logic functions using McCulloch Pitts Model. 10

Q5 a) Implement OR function (logic gate) using single layer perceptron. Assume initial values of weights and learning rate as follows $w_1=0.6$, $w_2=1.1$ learning rate = 0.5, Threshold = 1 10

b) Explain Multilayer perceptron with a neat diagram and its working with flowchart or algorithm. 10

- Q6** a) Why Dimensionality Reduction is very Important step in Machine Learning? Apply PCA on the following data and find the principle component. **10**

X	2	1	0	-1
Y	4	3	1	0.5

- b) Explain Back Propagation Neural Network with flowchart. **10**
