ASSIGNMENT 1 (UNIT- I & II)				
SUBJECT: Supervised & Deep Learning		SUBJECT CODE: ML463T		SEM: III BRANCH: CSEA&B
S. NO	**QUESTION**	**CO**	**BL**	**MARKS**
1	A bank developed a **loan approval prediction model**. The confusion matrix on test data is given below: **Predicted: Approved** **Predicted: Rejected** **Actual: Approved** 70 (TP) 30 (FN) **Actual: Rejected** 10 (FP) 90 (TN) **Tasks:** 1. Calculate **Accuracy, Precision, Recall, and F1score**. 2. Interpret which metric is most important in this case (bank loans). 3. Suggest at least one way to improve the Recall of the model.	2	1,2,3,4	5
2.	You trained a **Linear Regression model** to predict house prices. The regression equation is: Price=50,000+2000 × (Size in sq. Ft) +10,000 × (No. of Bedrooms) For a **house with 1500 sq.ft and 3 bedrooms**: 1. Calculate the predicted price. 2. If the actual market price is ₹90,00,000, calculate the **Residual (Error)**. 3. Discuss whether Linear Regression is the best model here, or if **another ML algorithm** might perform better.	2	1,2,3,4	5

3	You design a simple feedforward neural network with the following architecture: • **Input layer**: 2 inputs x1, x2 • **Hidden layer**: 2 neurons with activation function = Sigmoid • **Output layer**: 1 neuron (sigmoid activation) The parameters are: • Weights from inputs to hidden layer: $w_{1,1}=0.4, w_{1,2}=0.6, w_{2,1}=0.5, w_{2},2=0.9$ **.** Hidden to output layer weights: $v_1=0.3, v_2=0.8$ • Bias for hidden neurons $b_h=0.1$, bias for output neuron $b_o=0.2$ • A single training example: x1=1, x2=2, target output y=1 Learning rate $\eta=0.1$ **Tasks:** 1. Perform **forward propagation**, compute the hidden layer outputs and then the final output. 2. Compute the error using **Mean Squared Error (MSE)**. 3. Using backpropagation, compute the gradients of the loss w.r.t all weights and biases, and compute the weight updates. Show final updated weights after one iteration.	2	1,2,3	5
4	Explain the role of **regularization techniques** in supervised and deep learning models. In your answer, discuss: 1. Why regularization is needed in machine learning models. 2. Difference between **L1, L2, and Elastic Net** regularization (with proper equations). 3. How **Dropout** and **Early Stopping** act as regularization methods in neural networks. 4. Real-life applications where regularization helps improve model generalization.	2	1,2,3	5