VIT
Vellore Institute of Technology
(Deemed to be University under section 3 of UGC Act, 1956)

Slot: C1+TC1+C2+TC2

School of Information Technology and Engineering

Summer-II Semester 2023-2024

Mid-Term

Programme Name & Branch: MCA & Computer Application

Course Name & code: Machine Learning & ITA6016

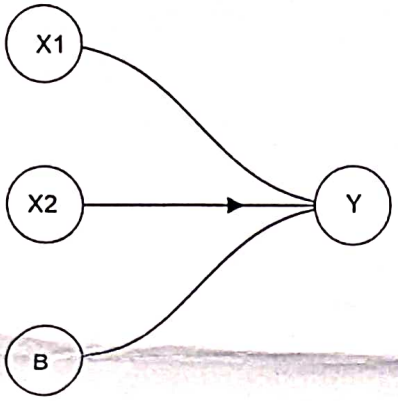
Class Number (s): VL2022230701064 / 62 / 59 / 58

Faculty Name (s): Dr. SELVA RANI B, Dr. CHEMMALAR SELVI G, Dr. BHUVANA S, Dr. ARUN PANDIAN J

Exam Duration: 90 Min. **Maximum Marks: 50**

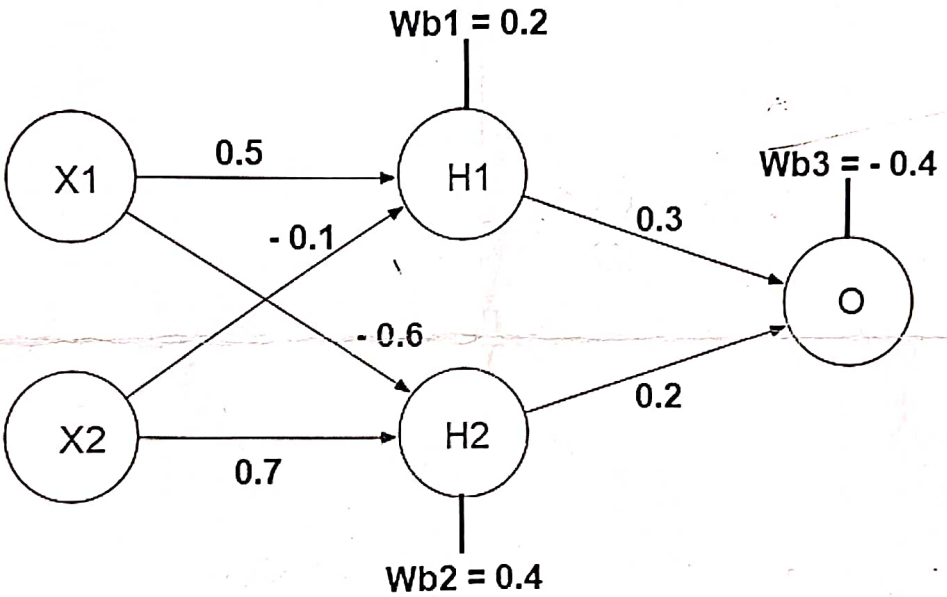
Q. No.	Question	Max Marks
1.	A hospital developed a two-class classifier model for predicting cancer infections in the patients scan images. There are two classes of output known as "Yes" and "NO." Here, Yes means that the patient has the cancer infection, and No means that the patient does not have that infection. The classifier has made a total of 100 predictions. Out of 100 predictions, 89 are true predictions, and 11 are incorrect predictions. The model has given a prediction of "yes" for 32 times and "No" for 68 times. Whereas the actual "Yes" was 27, and actual "No" was 73 times. a) Draw a confusion matrix from the classification model output and define true positive, true negative, false positive, and false negative. (5 Marks) b) Calculate accuracy, precision, recall, and the F1 score from the confusion matrix. (5 Marks)	10
2.	Classify the following dataset using support vector machine (SVM) technique and find the bias and weights of the classifier. Also, Draw a hyper-plane of the SVM classifier.	10
3.	Implement a neuron for finding targeted output (Y) from inputs (X1 and X2) of the following truth table. Consider the initial weight values are $W_1 = 1$, $W_2 = 1$ and $W_b = 1$. And, use the learning rate (η) of 0.5 and step activation function $Y = \begin{cases} 1, & Z \geq 1 \\ 0, & Z < 1 \end{cases}$	10

S. No.	X1	X2	Output Class
1	4	0	Positive
2	5	- 1	Positive
3	5	1	Positive
4	6	0	Positive
5	1	- 1	Negative
6	1	1	Negative
7	2	- 1	Negative
8	2	1	Negative



X1	X2	Y
0	0	0
1	0	0
0	1	1
1	1	0

4. Using back-propagation network, Find the new weights for the network shown in the following figure. The network presented with the input pattern [X1 = 1, X2 = 0] and targeted output 1. Use learning rate of 0.3 and sigmoid activation function. 10



Note: Perform one pass of back-propagation and list the updated weight values.

5. Consider a simple linear regression model Y = 4X + 3 for the following dataset. Update the coefficients of the regression model using gradient descent technique with the learning rate of 0.02. Perform minimum two weight updating process using gradient descent technique. 10

X	Y
1	5
2	8
3	11
4	14
5	17