BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION MO/2024)

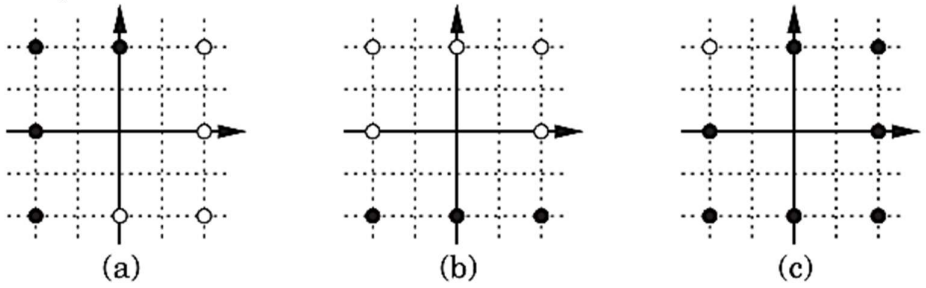
CLASS: BTECH **SEMESTER : VII**
BRANCH: ECE **SESSION : MO/2024**

SUBJECT: EC415R1 NEURAL NETWORKS AND FUZZY SYSTEM

TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**

			CO	BL
Q.1(a)	How do neurons transmit messages? Briefly explain with reference to biological neurons.	[2]	1	2
Q.1(b)	How the McCulloch-Pitts Neuron is different from Perceptron? Single MP neuron cannot classify nonlinearly separable data. Justify it with the help of XOR problem.	[3]	1,2	3
Q.2(a)	What are the different learning strategies in machine learning? Briefly explain each strategy with examples and their applications.	[2]	1	1
Q.2(b)	Consider the machine learning model, with only one input x and one output y. Given training instances, $(x, y) = (0.4, 0.3), (1.8, 0.6)$, $w = 1.2, b = -1.4$ and the activation function is logistic sigmoid function. Compute the Loss function, $L(w,b) = \frac{1}{2}\sum_{i=1}^{n}\left(y_i - f(x_i)\right)^2$.	[3]	2	4
Q.3(a)	Write the perceptron learning algorithm.	[2]	2	2
Q.3(b)	Solve the three simple classification problems shown in the following figure by drawing a decision boundary. Find weight and bias values that result in single-neuron perceptron with the chosen decision boundaries.	[3]	1,2	4



Q.4(a)	What is the difference between regression and classification in machine learning? Explain with suitable examples.	[2]	1	2
Q.4(b)	Derive the estimated output of a simple linear regression problem.	[3]	2	3
Q.5(a)	What is the difference between parameters and hyperparameters in ML. Give some examples of both.	[2]	2	2
Q.5(b)	Write pseudocode to determine the optimal number of clusters for K-means clustering on a dataset using the Elbow Method.	[3]	2	4

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