SRM Institute of Science and Technology
College of Engineering and Technology
School of Computing
SRM Nagar, Kattankulathur – 603203, Chengalpattu District, Tamilnadu

Academic Year: 2025-26 (ODD)

B.Tech-Computer Science & Engineering with specialization in BDA and DS

Test: FA-1 **Date: 07.08.25**
Course Code & Title: 21CSE422T & Convolutional Neural Networks
Duration: 15 minutes
Year & Sem: IV Year /VII Sem **Max. Marks: 10**

Set -A

Course articulation matrix:

PLO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO 1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Part - A

Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	Which of the following is not a linearly separable function? a) AND b) Sigmoid c) XOR d) OR Ans: c	1	1	1	1	**1.6.1**
2	Which task suits unsupervised learning best? a) Spam classification b) Fraudulent transaction of credit cards c) Image segmentation d) Heart disease predictions Ans: Image segmentation	1	1	1	**1**	**1.6.1**
3	What happens if your learning rate is too high? Instead of moving steadily toward the minimum of the loss function, the parameter updates "overshoot" it. This can cause the model to diverge, with the loss increasing rather than decreasing.	2	2	1	2	**2.6.2**
4	You have a single neuron with input vector X = [1, 2], weights W = [0.5, -1.0], and bias = 0.5. The activation function is sigmoid. Q1. What is the output of the neuron? Y= wx+b = 05 (1)+(-1)2+0.5=0.5-2+0.5=-1.5+0.5 =-1 Apply sigmoid $\sigma(-1) = \frac{1}{1+e^1} \approx \frac{1}{3.71828} \approx 0.2689.$	5	3	1	2	**2.6.2**

5	A self-driving car adjusting its steering through reward-based feedback loop is an example of _____ learning Ans: Reinforcement	1	4	1	1	**1.6.1**

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Set -B

Course articulation matrix:

PLO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO 1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Part - A

Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	The minimum number 2eurons for solving XOR with n hidden layers is _____ Ans:	1	1	1	1	**1.6.1**
2	Which task suits unsupervised learning best? a) Spam classification b) Fraudulent transaction of credit cards c) Image segmentation d) Heart disease predictions Ans: c	1	1	1	**1**	**1.6.1**
3	You observe that during training of an MLP on the XOR dataset, the loss curve oscillates violently and never converges. Give reasons. The most common reason is that the learning rate is set too high. Instead of moving smoothly toward the loss minimum, parameter updates overshoot the optimal values. This causes oscillations in the loss and prevents convergence.	2	2	1	2	**2.6.2**
4	You have a single neuron with input vector X = [2, 2], weights W = [0.5, 1.0], and bias = 0.5. The activation function is sigmoid. Q1. What is the output of the neuron?	5	3	1	2	**2.6.2**

	• Dot product: $0.5 \cdot 2 + 1.0 \cdot 2 = 1 + 2 = 3$ • Add bias 0.5: $3 + 0.5 = 3.5$ Apply sigmoid: $\sigma(3.5) = \frac{1}{1+e^{-3.5}} \approx 0.9707$. **Answer: ≈ 0.9707.**					
5	Which activation function can be used for getting output in the range of [-1, 1]? a) Tanh b) Sigmoid c) ReLU d) Softmax Ans: Tanh	1	4	1	1	**1.6.1**

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Set -C

Course articulation matrix:

PLO	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CO 1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1

Part - A

Instructions: Answer all

Q. No	Question	Marks	BL	CO	PO	PI Code
1	The minimum number of neurons for solving XOR with 1 hidden layer is _____ Ans: 2	1	1	1	1	**1.6.1**
2	You have a single neuron with input vector X = [1, 2], weights W = [-0.5, 1.0], and bias = 0.5. The activation function is sigmoid. Q1. What is the output of the neuron?	5	1	1	**1**	**1.6.1**

	• Dot: $(-0.5) \cdot 1 + 1.0 \cdot 2 = -0.5 + 2 = 1.5$ • Add bias 0.5: $1.5 + 0.5 = 2.0$ Apply sigmoid: $\sigma(2) = \frac{1}{1+e^{-2}} \approx 0.8808$. **Answer: ≈ 0.8808.**					
3	Train a CNN with 12 layers on a dataset of 50,000 labeled images. Despite using sigmoid activation, the training accuracy saturates at ~60% and doesn't improve further—even after 100 epochs. Q1. What is the most likely reason for poor training accuracy? A. Dataset size is too small B. Too many layers C. Sigmoid activation causing vanishing gradients D. Learning rate is too high Ans: C	1	2	1	2	**2.6.2**
4	Which activation function can be used in multi class classification? a) ReLU b) Softmax c) Sigmoid d) Tanh Ans: b	1	3	1	2	**2.6.2**
5	Why is a non-linear activation function essential in hidden layers of an ANN? If you use only linear activation (or none at all), each layer performs a linear transformation. This collapses into a single linear transformation. No matter how many layers you stack, the whole network is still equivalent to a single-layer linear model → it cannot model non-linear problems (like XOR).	2	4	1	1	**1.6.1**