Roll No.												

PRESIDENCY UNIVERSITY

BENGALURU

Make-up Examinations – December 2025

Date: 27 – 12- 2025 **Time:** 01:00pm – 04:00pm

School: SOCSE	**Program**: B. Tech. (CSE)	
Course Code: CSE3010	**Course Name:** Deep Learning Techniques	
Semester: MK	**Max Marks**: 100	**Weightage**: 50%

CO - Levels	**CO1**	**CO2**	**CO3**	**CO4**	**CO5**
Marks	**30**	**30**	**20**	**20**	**N/A**

Instructions:

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*
3. *Your answers for the **FIRST 12 questions** must end by **PAGE #12**. You must start answering **QUESTION 13** from **PAGE #13**.*

Part A

Answer ALL the Questions. Each question carries 2marks. **10Q x 2M=20M**

1	Name the activation function which takes a vector as input and returns a probability distribution as the output.	**2 Marks**	**L1**	**CO1**
2	Name any activation function which is used for binary classification.	**2 Marks**	**L1**	**CO1**
3	State the range for the ReLU activation function.	**2 Marks**	**L1**	**CO1**
4	Expand CNN	**2 Marks**	**L1**	**CO1**
5	State true or false. Cross-entropy is an activation function for multi-class classification.	**2 Marks**	**L1**	**CO1**
6	A particular pooling function takes the vectors V1 = [1,2,3] and V2 = [1,4,5]. It produces the output V = [1,4,5]. State the type of pooling function it is.	**2 Marks**	**L1**	**CO1**

7	Name the 2 different types of nodes in a Boltzmann Machine.	**2 Marks**	**L1**	**CO1**
8	State true or false. The entropy of a uniform distribution is maximum.	**2 Marks**	**L1**	**CO1**
9	Define Regularization.	**2 Marks**	**L1**	**CO1**
10	Write down the formula for the sigmoid activation function.	**2 Marks**	**L1**	**CO1**

Part B

Answer the Questions **Total 80 Marks.**

11.	**a.**	Write down the formula of the Leaky ReLU activation function. Calculate the slope of the Leaky ReLU activation function if x > 0 and x < 0. At x = 0, we will have multiple values of the slope. Derive a condition, so that the slope of the Leaky ReLU function is constant for all values of x.	**10 Marks**	**L2**	**CO1**
	b.	Given the loss function L(a,b,c) = 2a*(b-3c). Calculate the gradients of the loss function L with each of the inputs a, b, and c, when a = 3, b = 0, and c = 3.	**10 Marks**	**L3**	**CO2**

Or

12.	**a.**	Let f(x) be the ELU of x. Let f'(x) be the derivative of f(x) with respect to x. Prove that f'(x) = 1 if x > 0 and f'(x) = f(x) + a, if x is less than 0, where a is the parametric constant used in calculating the ELU.	**10 Marks**	**L2**	**CO1**
	b.	Given the loss function L(a,b,c) = 2a*(b-3c). Calculate the gradients of the loss function L with each of the inputs a, b, and c, when a = 7, b = 1, and c = 4.	**10 Marks**	**L3**	**CO2**

13.	The following are the weight matrices learnt in an LSTM: $Wf = \begin{bmatrix} 0 & -1 & 0 \\ -2 & 0 & -2 \end{bmatrix}, bf = \begin{bmatrix} 0 & -2 \\ -2 & 0 \end{bmatrix}$ $Wc = \begin{bmatrix} 0 & 1 & 0 \\ -1 & 0 & -1 \end{bmatrix}, bc = \begin{bmatrix} 0 & -1 \\ -4 & 0 \end{bmatrix}$ $Wi = \begin{bmatrix} 2 & 0 & 3 \\ 0 & 1 & 0 \end{bmatrix}, bi = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$ $Wo = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}, bi = \begin{bmatrix} 1 & 0 \\ -2 & -2 \end{bmatrix}$ For the input sequence: X1 = [1,1,1], X2 = [2,2,2], X3 = [3, 3, 3], calculate the output.	**20 Marks**	**L3**	**CO4**

Or

14.	The following are the weight matrices learnt in an LSTM: $Wf = \begin{bmatrix} 0 & -1 & 0 \\ -2 & 0 & -2 \end{bmatrix}, bf = \begin{bmatrix} 0 & -2 \\ -2 & 0 \end{bmatrix}$ $Wc = \begin{bmatrix} 0 & 1 & 0 \\ -1 & 0 & -1 \end{bmatrix}, bc = \begin{bmatrix} 0 & -1 \\ -4 & 0 \end{bmatrix}$ $Wi = \begin{bmatrix} 2 & 0 & 3 \\ 0 & 1 & 0 \end{bmatrix}, bi = \begin{bmatrix} 1 & 0 \\ 0 & 2 \end{bmatrix}$ $Wo = \begin{bmatrix} 1 & 1 & 0 \\ 0 & 0 & -1 \end{bmatrix}, bi = \begin{bmatrix} 1 & 0 \\ -2 & -2 \end{bmatrix}$ For the input sequence: X1 = [3,3,3], X2 = [2,2,2], X3 = [1, 1, 1], calculate the output.	**20 Marks**	**L3**	**CO4**

15.	The input to a softmax classifier is the following vector: X = [20000, 20000.001]. Calculate the output. **NOTE:** Your output should be correct up to **5 decimal places**.	**20 Marks**	**L3**	**CO2**

Or

16.	The input to a softmax classifier is the following vector: X = [1951, 1952, 1953, 1954].Calculate the output. **NOTE:** Your output should be correct up to **5 decimal places**.	**20 Marks**	**L3**	**CO2**

17.	Consider the following 6*6 matrix: 1 0 1 0 1 0 0 1 0 1 0 1 1 0 1 0 1 0 0 1 0 1 0 1 1 0 1 0 1 0 0 1 0 1 0 1 Calculate the output of applying the following convolution filter (stride = 1) to that matrix: 1 1 1 1 1 1 1 1 1	**20 Marks**	**L3**	**CO3**

Or

18.	Consider the following 6*6 matrix: 1 0 1 0 1 0 0 1 0 1 0 1 1 0 1 0 1 0 0 1 0 1 0 1 1 0 1 0 1 0 0 1 0 1 0 1 Calculate the output of applying the following convolution filter (stride = 1) to that matrix: 0 0 0 0 1 0 0 0 0	**20 Marks**	**L3**	**CO3**

******* BEST WISHES *******