K. J. Somaiya Institute of Technology, Sion, Mumbai-22
(Autonomous College Affiliated to University of Mumbai)

July/Aug ~~May~~ - ~~June~~ 2025 (Carry On)
B. Tech Program: **Electronics and Telecommunications** Scheme: **IID**
Supplementary ~~Regular~~ Examination: **LY** Semester: **VII**
Course Code: **EXDLC7041** Course Name: **Neural Network and Deep Learning**
Date of Exam: ~~18/08/2025~~ 25/08/25 Duration: 02.5 Hours Max. Marks: 60

Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3)Assume suitable data, if necessary.

		Marks	CO	BT
Q 1	Solve any **two** questions out of three: (05 marks each)	**10**		
a)	State and prove perceptron Converge Theorem		1	U
b)	What is optimization? Compare different types of optimizers?		2	A
c)	What is a. Overfitting b. Underfitting. What are different scenarios in which a neural network model can, a. Overfit b. Underfit		3	U
Q 2	Solve any **two** questions out of three: (05 marks each)	**10**		
a)	Draw LeNet-5 architecture.		5	U
b)	Describe greedy layer-wise training.		4	U
c)	What is a classification decision boundary?		6	R
Q.3	Solve any **two** questions out of three. (10 marks each)	**20**		
a)	What are activation functions? What is their significance. Explain any two of them in detail.		2	U
b)	Explain following optimization methods i. Rmsprop ii. adam		3	U
c)	Explain the process of training of Deep Neural Network with Back Propagation.		4	U
Q.4	Solve any **two** questions out of three. (10 marks each)	**20**		
a)	Implement following logic gate using McCulloch and Pitt algorithm and explain their operation. a. 3 input AND gate b. 3 input OR gate		1	A

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b) Consider a Convolutional Neural Network model defined by the layers defined in the following table. Fill in the shape of the output volume and the number of parameters for each layer. You can write activation shapes in the format (H, W, C), where H, W, C are height, width and channel dimensions, respectively. Unless mentioned consider stride = 1, padding = 0 and pooling layer is 'Max-pooling', where appropriate. 5 A

Notations:
CONVx-N: convolution layer with N filters height and width equal to x.
POOLp-s: Max-pooling layer of size p x p and stride s.
FLATTEN: Flattens the 3-dimensional into one dimensional vector.
e.g. Size of an input image of 12 x 12 x 10 on 'FLATTENing' becomes 1440 x 1
FC-N: a fully connected layer with N neurons.

Layer	Activation Volume Dimension	Number of parameters
Input	32x32x3	0
CONV3-8		
POOL2-1		
CONV5-16		
POOL2-1		
CONV2-32		
POOL2-1		
FLATTEN		
FC10		

c) Draw LSTM cell and explain it in details with proper equations. 6 U

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