

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

Carry on

Nov-Dec 2024 June 2025

B. Tech Program: **Electronics and Telecommunications** Scheme: **II**

Regular Examination: LY Semester: **VII**

Course Code: **EXDLC7041**

Course Name: **Neural Network and Deep Learning**

Date of Exam: **23/11/2024**

Duration: **02.5 Hours**

Max. Marks: **60**

30/06/2025

Instructions:

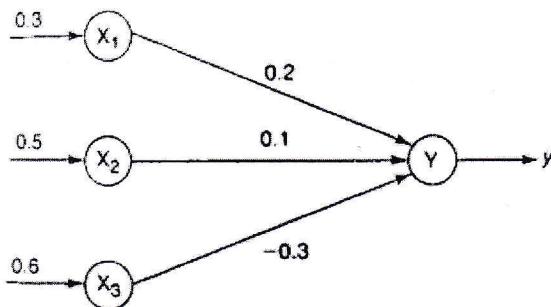
- (1) All questions are compulsory.
- (2) Draw neat diagrams wherever applicable.
- (3) Assume suitable data, if necessary.

| 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) Find the output of the neuron Y for the network shown in figure below using binary sigmoid activation function 2 A



c) What is 3 U

a. Overfitting b. Underfitting.

What are different scenarios in which a neural network model can,

a. Overfit b. Underfit

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) Write any four applications of Deep Neural Network in different domains. 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 3 U
i. Rmsprop

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

Carry on

Nov-Dec 2024

June 2025

B. Tech Program: Electronics and Telecommunications Scheme: II

Regular Examination: LY Semester: VII

Course Code: EXDLC7041

Course Name: Neural Network and Deep Learning

Date of Exam: 23/11/2024

Duration: 02.5 Hours

Max. Marks: 60

30/86/2025

ii. adam

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. 1 A

a. 3 input AND gate

b. 3 input OR gate

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
