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

Subject Code: ~~ELX7041~~ EXDLC7041 Subject Name: Neural Network and Deep Learning

Date: 10/12/2022

Nov - Dec 2022

B.Tech Program: EXTC

Examination: LY

Semester: VII

Course Code: Neural Networks and Deep Learning

Course Name:

Duration: 2.5 Hours

Max. Marks: 60

Instructions:

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

	Max. Marks	CO	BT level
Q 1 Solve any six questions out of eight:	12		
i) Draw a perceptron network with the notation	2	1	U
ii) Why Neural Network didn't take off?	2	2	U
iii) Explain the problem of vanishing gradient.	2	3	U
iv) What is greedy layer wise training in neural network?	2	4	R
v) What is average pooling layer?	2	5	U
vi) What are limitations of RNN?	2	6	U
vii) What will be the dimensions of the output activation if a convolution filter of dimension 3 x 3 is applied over an input image of dimension 32 x 32 with stride = 2 and no padding.	2	5	A
viii) Explain the concept of 'saddle point' in brief.	2	2	U
Q.2 Solve any four questions out of six.	16		
i) Explain the concept of linear separability of data with example.	4	1	U
ii) What is loss function in neural network? Explain Mean square loss.	4	2	U
iii) What is a. Overfitting b. Underfitting. What are different scenarios in which a neural network model can, a. Overfit b. Underfit	4	3	U
iv) What are hyper parameters? List the hyper parameters of deep. Explain impact of any three hyper parameters on the deep neural network.	4	4	U
v) Draw LeNet-5 architecture.	4	5	U

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vi) Write any four applications of Deep Neural Network in different domains. 4 6 U

Q.3 Solve any two questions out of three. 16

i) Implement following logic gate using McCulloch and Pitt algorithm and explain their operation. 8 1 A
 a. 3 input AND gate
 b. 3 input OR gate

ii) Explain how following methods of regularization reduce overfitting 8 3 An
 a. L1 and L2 regularization
 b. Dropout
 c. Data augmentation
 d. Early stopping

iii) What is vanishing gradient problem and exploding gradient problem. How to address these issues. 8 4 U

Q.4 Solve any two questions out of three. 16

i) What is the significance of activation functions in the neural network? List different activation function. Write mathematical model and graphical representation for atleast three. 8 2 U

ii) 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. 8 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		

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CONV2-32		
POOL2-1		
FLATTEN		
FC10		

iii) Explain LSTM in detail.

8 6 U
