Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fifth Semester B.Tech (Hons) Degree Examination December 2021 (2019 admission)

Course Code: CST395

Course Name: NEURAL NETWORKS AND DEEP LEARNING

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1 Differentiate classification and regression tasks with examples. 3

2 The confusion matrix of win/loss prediction of a cricket match is given below. Compute accuracy, sensitivity and specificity. 3

	Actual Win	Actual Loss
Predicted Win	85	4
Predicted Loss	2	9

3 Explain the significance of loss function in a machine learning algorithm. 3

4 Compare T*anh* and sigmoid activation functions. 3

5 Explain the role of hyper parameter tuning in neural network training. 3

6 Initializing the weights of a neural network with very small or large random numbers is not advisable. Justify. 3

7 Determine the shape of output matrix of an image of size 19 × 19 that uses a padding size 2, stride size 2, and a 5 × 5 filter. 3

8 Discuss the importance of pooling layer in Convolutional Neural Networks (CNN). 3

9 Describe the shape or dimension of input data for a recurrent neural network. 3

10 List three differences between LSTM and GRU. 3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11 a) Compare overfitting and under fitting using the concept of Bias and Variance. Give examples. 7

b) Predict the yearly auto insurance premium of a person having 7 years of driving experience using regression model generated from the following data, where insurance premium is a function of driving experience. 7

Driving Experience (Years)	Yearly Auto Insurance Premium (Hundreds)
5	64
2	87
12	50
9	71
15	44
6	56
25	42
16	60

12 a) Explain K-fold cross validation algorithm with an example. 7

b) Identify the type of machine learning algorithm that maps an input to an output based on example input-output pairs. Explain the identified algorithm with example. 7

Module -2

13 a) Show that a single layer perceptron can be used to represent the Boolean AND, OR, NAND, and NOR functions. 12

b) Discuss any two methods to mitigate the problem of overfitting. 2

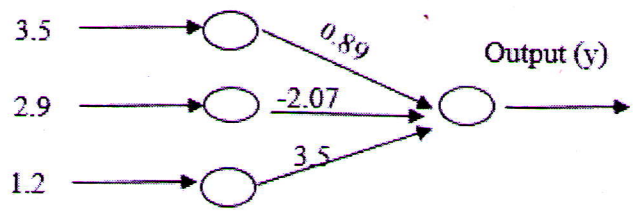
14 a) Explain back propagation algorithm for neural network training. 8

b) Compute output of the following neuron if activation function is: 6

(i) sigmoid function

(ii) Tanh function

(iii) RELU function (assume same bias 0.5 for each node).



Module -3

15 a) Explain the concept of deep feed forward neural networks. 6

b) Discuss any four regularization techniques in deep learning. 8

16 a) A 2 × 2 image is represented by the following pixel value matrix. 10

$$\begin{bmatrix} 5 & 4 \\ 2 & 7 \end{bmatrix}$$

This image is given to a 3-layer neural network, that is, two hidden layers and one output layer. Draw schematic diagram of the network.

Assuming all inter-connection weights having values 1, bias having value 0, the hidden layers having 3 neurons each, and a simple activation function of the form $\frac{1}{1+x}$ being used, compute output for one round of forward propagation.

b) Explain Gradient Descent with momentum. 4

Module -4

17 a) Describe zero padding strategies used in Convolution. 8

b) In Convolutional Neural Networks, there is no need to perform feature extraction. Justify with an example. 6

18 a) With the help of a diagram, explain basic building blocks of Convolutional Neural Network architecture. 10

b) Explain the role of filter, padding, and strides in a convolution layer of a CNN with an example. 4

Module -5

19 a) The vanishing gradient problem is more pronounced in RNN than in traditional neural networks. Give reason. Discuss a solution for the problem. 8

b) Draw and explain the architecture of an RNN. 6

20 a) Explain the architecture of LSTM. 7

b) Describe any one problem on Natural Language Processing domain and provide a solution using LSTM. 7

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