KUMARAGURU
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B.E/B.TECH DEGREE EXAMINATIONS: NOV/DEC 2023

(Regulation 2018)

Seventh Semester

INFORMATION SCIENCE AND ENGINEERING

U18ISE0008**:** Deep Learning

COURSE OUTCOMES

CO1: Understand the major technology trends driving Deep Learning.
CO2: Build,train an apply fully connected deep neural networks.
CO3: Effectively use the common neural network techniques.
CO4: Appropriately pick hyper parameters.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Define perceptron.	CO1	[K2]
2.	Summarize the types of activation functions.	CO1	[K2]
3.	How does backpropagation work?	CO2	[K2]
4.	Why do we need non-linear activation function?	CO2	[K2]
5.	Write the need of regularization.	CO2	[K2]
6.	Represent the various states of a DNN.	CO3	[K2]
7.	What is the dimension of the weight matrix, W_1 between the input layer and the first hidden layer of a Feed Forward neural network, given that there is only one hidden layer? 4 inputs, the first hidden layer also has 4 neurons, and there are 3 output classes.	CO3	[K3]
8.	Differentiate vanishing and exploding gradient.	CO3	[K2]
9.	List out some of the hyper parameters of Deep Neural Network.	CO4	[K1]
10.	How to approximate gradients numerically?	CO4	[K2]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. a)   Compute the derivatives with a computation graph for the given equation.   8   CO1   [K2]

   $J(a,b,c) = 3(a+bc)$ where a=7, b=3 and c = 1.

	b)	How XOR function is used in a perceptron ? Why can a multi layer of perceptron is used to solve linear inseparability?	8	CO1	[K₃]
12.	a)	Discuss about 1) Sigmoidal Activation function 2) Tanh 3) Relu, Leaky Relu functions.	8	CO2	[K₂]
	b)	Derive the equation for Forward Propagation for a Shallow Neural Network	8	CO2	[K₂]
13.	a)	State the purpose of forward propagation algorithm for deep neural network and discuss the same	8	CO2	[K₂]
	b)	Define hyper parameter. Why hyper parameter tuning is used in any algorithm?	8	CO2	[K₂]
14.	a)	How to normalize inputs? Discuss about zero , weight and random initialization.	8	CO3	[K₃]
	b)	How to build a DNN ? Discuss about the components needed.	8	CO3	[K₂]
15.	a)	How to fit a Batch Norm into a neural network? Discuss it.	8	CO4	[K₂]
	b)	Define bias and variance with formulae and explain the trade-off between Bias and Variance of a deep network.	8	CO4	[K₂]
16.	a)	Define gradient descent and write about the Mini-batch gradient descent algorithm.	8	CO4	[K₂]
	b)	Discuss about the loss function and cost function of a softmax classifier. How a SOFTMAX classifier is trained?	8	CO4	[K₃]