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M.Sc. COMPUTER SCIENCE WITH SPECIALISATION IN DATA SCIENCE
THIRD SEMESTER EXAMINATION, JANUARY 2022
20-359-0319 DEEP LEARNING
(Regular)

Time : 3 Hours

Maximum marks:50

(Answer ANY FIVE questions)
 Each question carries EQUAL Marks

No	QUESTIONS	MARKS	CO	BL	PI
1.	(a) Design a perceptron model representing a hyperplane decision surface in the n-dimensional space. The model's output should be 1 for instances lying on one side of the hyperplane and -1 for samples lying on the other side. Represent the model mathematically and specify the value of the thresholding parameter.	6	CO1	L6	1.3.1
	(b) Write the perceptron learning algorithm to classify positive inputs and negative inputs present in a dataset.	4	CO1	L3	1.4.1
2	(a) A single perceptron can be used to represent many Boolean functions. Use a two-input perceptron to implement (i) AND function. (ii) OR function	6	CO1	L3	1.3.1
	(b) How does splitting a dataset into train, validation and test sets help to identify overfitting?	4	CO1	L2	1.3.1
3	You have a dataset D1 with 100 labelled training examples. Design a DNN to classify D1. Use at least 4 hidden layers and ReLu activation in each layer. Design the model using the facilities available in Keras. Specify the loss function and optimization function needed and justify the use of these functions in the model.	10	CO2	L4	1.4.1

4	(a)	Gradient descent is an iterative optimization algorithm for finding the local minimum of a function. Justify this argument by explaining the mathematical concepts involved in the process. Also, write the algorithm to implement this optimization approach.	5	CO2	L3	1.4.1
	(b)	Discuss the architecture differences between VGG16 and Inception V3	5	CO4	L2	
5		Suppose you have a time series data with date and number of patients affected with COVID 19 in each day from 2020 January 1 to till date. Design a suitable deep learning architecture to predict the number of covid patients after one week. Explain the architecture in detail.	10	CO3	L4	2.2.4
6		As you train your model, you realize that you do not have enough data. You are not ready to use any data augmentation techniques. But you decided to train the model with the available data. Which methodology in deep learning you will suggest to get an efficient result from the existing data. Design an architecture diagram with necessary explanation to solve the task.	10	CO5	L3	1.4.1
7		Consider a Generative Adversarial Network (GAN) which successfully produces images of apples. What are the different components we have to implement to design such a network? Explain these components with the help of facilities available in Keras.	10	CO6	L4	1.3.1
