Roll No.

CONTROLLER OF EXAMINATIONS
AU
CHENNAI
600 025
ADDITIONAL

B.E (FT) END SEMESTER EXAMINATIONS – April / May 2024
Computer Science and Engineering
Semester - VII
CS6005 & Deep Learning Techniques
(Regulation 2018 - RUSA)

Time: 3 Hours | Answer ALL Questions | Max. Marks 100

CO1	Differentiate the various deep neural network models
CO2	Design systems by applying appropriate deep neural network concepts
CO3	Analyze and provide modifications to deep learning principles to suit any application
CO4	Justify the need for Boltzmann machine principles for a target application
CO5	Apply deep learning concepts for any target application

BL – Bloom's Taxonomy Levels
(L1-Remembering, L2-Understanding, L3-Applying, L4-Analysing, L5-Evaluating, L6-Creating)

Sl.No.	PART- A (10 x 2 = 20 Marks)	Marks	CO	BL
1.	How feature engineering is done in machine learning?	2	1	2
2.	Why the Perceptron cannot fit the training data generated from XNOR? Give a proper explanation	2	2	2
3.	Distinguish between validation and testing when constructing a deep learning model.	2	3	1
4.	What is the purpose of semi-supervised learning?	2	3	2
5.	List the applications of Generative Adversarial Networks.	2	2	2
6.	What are the advantages of LSTM?	2	1	1
7.	What is Slow Feature Analysis (SFA) and how does it contribute to the field of deep learning?	2	3	2
8.	How and when overfitting occurs? How do you overcome?	2	3	2
9.	Where is Boltzmann machines used?	2	4	2
10.	What are the features that can be extracted from speech signals?	2	5	2

	PART- B (8 x 8 = 64 Marks) (Answer any 8 questions)	Marks	CO	BL
11.	Explore the challenges that drive deep learning in contrast to traditional machine learning algorithms.	8	1	4
12.	Outline the progression of artificial neural networks, beginning with the biological neuron and culminating in the development of the multilayer perceptron (MLP).	8	3	4
13.	Explain briefly about the various activation and loss functions used for deep learning model and their appropriateness of usage.	8	2	3
14.	Compute the gradient with respect to the output units in the back propagation algorithm.	8	2	2
15.	Explain the various regularization techniques available in detail.	8	3	2
16.	Explain how a Deep Belief Network get trained and when will the training process converge?	8	2	4
17.	Consider the following input matrix, 1 2 3 4 5 6 2 4 7 9 5 4 3 2 4 1 5 6 5 7 4 3 1 9 2 a) Given the stride rate 1 and kernel size 2 x 2, compute the outputs for the Max pooling operation on the given input matrix.	8	2	3

	b) Use the following kernel and give the feature maps with stride rates 1 and 2. 1 0 1 0 8 0 1 0 1			
18.	Describe the basic structure of a recurrent neural network (RNN) and demonstrate its process of learning sequential information.	8	2	2
19.	Write short notes on (i) Probabilistic PCA (ii) Independent Component Analysis	8	1	1
20.	Define transfer learning and identify its applicability. Discuss the type of transfer learning that could be used when source and target tasks are learned concurrently, providing a rationale for your choice.	8	3	4
21.	Describe how learning and reconstruction happens in Restricted Boltzmann Machines.	8	4	4
22.	Discuss the fundamental components of natural language processing (NLP) and provide a detailed real-time application as an example.	8	5	3

	PART- C (1 x 16 = 16 Marks)	Marks	CO	BL
23.	You are a data scientist working on a project aimed at developing a deep learning model for medical image diagnosis. The task is to identify and classify different abnormalities in X-ray images, such as pneumonia or lung nodules. a. Which deep learning architecture would you select for building the model of the given application and why? Sketch a diagram illustrating the process flow. b. How do you measure the performance of the model you developed and validate?	16	5	6

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