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

Nov – Dec 2024

(B.Tech) Program: Artificial Intelligence and Data Science Scheme

Examination: LY Semester: VII *Scheme-II*

Course Code: AIC701 and Course Name: Deep Learning

Max. Marks: 60

Date of Exam: 21/11/2024

Duration: 2.5 Hours

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 two questions out of three: (05 marks each)	10		
a)	Compare and contrast the learning capabilities of a McCulloch-Pitts neuron, a single-layer perceptron, and a multilayer perceptron.		CO1	U
b)	What is an undercomplete autoencoder, and how is it designed to learn meaningful representations?		CO3	U
c)	What is the difference between Fully connected NN and RNN?		CO5	U
Q.2	Solve any two questions out of three: (05 marks each).	10		
a)	Design two input i) NAND logic, ii) OR logic using McCulloch Pitts Neuron Model		CO1	Ap
b)	Assume a 3 x 3 image. Apply padding and then apply max pooling and average pooling on after padding image with stride=1. Filter will be of size 3 x 3.		CO4	Ap
c)	Draw a RNN mathematical model for the word 'The India is my home country'.		CO5	Ap
Q.3	Solve any two questions out of three. (10 marks each)	20		
a)	Explain various regularization techniques such as L1 and L2 regularization, dropout, early stopping, batch normalization, data augmentation.		CO2	U

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b)	Explain how adding noise to the input helps a denoising autoencoder learn robust features. What are the main applications of denoising autoencoders?		CO3	U
c)	Describe the typical architecture of a CNN. Explain the role of pooling layers in a CNN and the different types of pooling (e.g., max pooling, average pooling).		CO4	U
Q.4	Solve any two questions out of three. (10 marks each)			
a)	What is gradient descent, and how is it used in the context of optimizing neural networks? Write advantages and disadvantages of stochastic gradient descent (SGD).	20	CO2	U
b)	Explain the architecture of recurrent neural networks (RNN). What are different types of architecture?		CO5	U
c)	What are deep fakes, and how are they generated using GANs? Discuss the technological advancements that have enabled the creation of realistic deep fakes.		CO6	U
