K. J. Somaiya Institute of Engineering and Information Technology, Sion, Mumbai
(An Autonomous Institute Permanently Affiliated to the University of Mumbai)

End Semester Exam
November – December 2022

B.Tech. (Information Technology)

Examination: LY - Semester VII
Course Code: ITDLC7041 **Course Name:** Machine Learning and Deep Learning
Date: December 10, 2022 **Duration:** 2.5 Hours **Max. Marks:** 60

Instructions:
(1) All questions are compulsory.
(2) Draw neat diagrams wherever applicable.
(3) Assume suitable data, if necessary.

Ques. No.	Question	Max. Marks	CO	BT Level
Q1.	**Solve any six questions out of eight:**	**12**		
i)	Differentiate Data Mining and Machine Learning.	2	CO1	U
ii)	Explain Generalization Error.	2	CO2	U
iii)	Explain Epoch Updating in Neural Networks.	2	CO3	U
iv)	Explain Activation Function in Neural Networks.	2	CO3	U
v)	Explain the issue with going deeper with CNN.	2	CO4	U
vi)	Explain Strides in context of CNN.	2	CO4	U
vii)	Explain the need of RNN for sequential data.	2	CO5	U
viii)	Explain the role of Discriminator in GANs.	2	CO6	U
Q2.	**Solve any four questions out of six:**	**16**		
i)	Sketch and explain Bias-Variance trade-off.	4	CO1	U
ii)	Sketch and explain Boosting approach of Ensemble-based Learning.	4	CO2	U
iii)	Explain the process of Classification by Backpropagation.	4	CO3	U
iv)	Apply Convolution operation on the below Input Feature Map using the given Convolution Filter and derive the Output Feature Map: Input Feature Map 3 5 2 8 1 9 7 5 4 3 2 0 6 1 6 6 3 7 9 2 1 4 9 5 1 Convolutional Filter 1 0 0 1 1 0 0 0 1	4	CO4	A
v)	Differentiate LSTM and GRU.	4	CO5	A
vi)	Explain types of autoencoders.	4	CO6	U
Q3.	**Solve any two questions out of three:**	**16**		
i)	A candy manufacturing company produces equal number of numbers of red, green, blue, and yellow candies – that is, the population comprises 25% of candies of each color. Considering a random sample of 100 candies, it was found that 35% were red candies, 15% green, 22% blue, and 28% yellow candies. Given 0.05 level of significance, justify if the company's claim is appropriate using Chi-Square Goodness of Fit test.	8	CO1	U

ii)	Consider a Bank collated the data of past customers who defaulted in paying back loans as follows: **Age** | **Income** | **House Owner** | **Credit Rating** | **Defaulted** Youth | High | No | Fair | No Senior | High | Yes | Excellent | No Middle | High | No | Excellent | No Senior | Medium | No | Fair | Yes Senior | Low | No | Fair | Yes Middle | Low | Yes | Excellent | Yes The Bank applies Boosting approach of Ensemble Learning with Decision Trees as base classifier. Assume that the last two instances were misclassified by the 1st trained classifier. Calculate the weights of the instances for training of the 2nd classifier using AdaBoost.	8	CO2	A
iii)	Design a Neural Network for diabetes prediction. Elaborate the possible termination conditions for Neural Network training. Also state the role of bias and learning rate in neural networks.	8	CO3	A
Q4.	**Solve any two questions out of three:**	**16**		
i)	Apply CNN for character recognition (alphabets a to z) and explain its various layers.	8	CO4	A
ii)	Apply LSTM for time-series based stock market prediction and explain its architecture.	8	CO5	A
iii)	Apply GANs for fake currency note detection and explain the architecture of GANs.	8	CO6	A

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