

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

End Semester Examination: Nov – Dec 2024

Program: B. Tech (Information Technology)

Scheme: II

Regular Examination: LY

Semester: VII

Course Code: Machine Learning and Deep Learning

Course Name: ITDLC7041

Date of Exam: 28/11/2024

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 <u>any two</u> questions out of three: (05 marks each)	10																		
a)	Explain Random Forest algorithm.		2	U																
b)	Sketch and explain the process of Machine Learning.		1	U																
c)	Demonstrate with an example application how can RNNs be applied on sequential data.		5	A																
Q2	Solve <u>any two</u> questions out of three: (05 marks each)	10																		
a)	Sketch the architecture of a Neural Network for COVID prediction.		3	A																
b)	Apply Max Pooling and Average Pooling on the below Feature Map using Pool Size as 2×2 : <table><tr><td>12</td><td>20</td><td>30</td><td>0</td></tr><tr><td>8</td><td>12</td><td>2</td><td>0</td></tr><tr><td>34</td><td>70</td><td>37</td><td>4</td></tr><tr><td>112</td><td>100</td><td>25</td><td>12</td></tr></table>		12	20	30	0	8	12	2	0	34	70	37	4	112	100	25	12	4	A
12	20		30	0																
8	12	2	0																	
34	70	37	4																	
112	100	25	12																	
c)	Apply Autoencoders for feature extraction from an image and explain.	6	A																	
Q3	Solve <u>any two</u> questions out of three. (10 marks each)	20																		
a)	A survey of 100 customers was conducted by an Electronics Store about likelihood of Laptop purchase, as follows: <table><tr><td></td><td>Children</td><td>Youth</td><td>Adults</td><td>Senior Citizens</td></tr><tr><td>No. of Customers</td><td>12</td><td>45</td><td>24</td><td>19</td></tr></table> It was expected that 25 customers from each age group would be interested in purchasing a Laptop. Apply Kolmogorov-Smirnov Test for Goodness of Fit to find if there is any difference among customers than expected.			Children	Youth	Adults	Senior Citizens	No. of Customers	12	45	24	19	1	U						
	Children		Youth	Adults	Senior Citizens															
No. of Customers	12	45	24	19																
b)	Apply CNN for character recognition (alphabets a to z) and explain its various layers.	4	A																	

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c)	Consider a multilayer feed-forward neural network with architecture 3–2–1. Let the learning rate be 0.9. The initial weight and bias values of the network are given in the table below, along with the first training tuple, $X = (1, 0, 1)$, whose class label is 1. Calculate the net input, output and error of each unit in hidden and output layer once the tuple is fed into the network. Also show updated values of weights and bias after first iteration calculating the error.		3	A																						
	<table><tr><td>w14</td><td>w15</td><td>w24</td><td>w25</td><td>w34</td><td>w35</td><td>w46</td><td>w56</td><td>θ_1</td><td>θ_2</td><td>θ_3</td></tr><tr><td>0.3</td><td>-0.2</td><td>0.5</td><td>0.1</td><td>-0.5</td><td>0.2</td><td>-0.3</td><td>-0.2</td><td>-0.4</td><td>0.2</td><td>0.1</td></tr></table>	w14	w15	w24	w25	w34	w35	w46	w56	θ_1	θ_2	θ_3	0.3	-0.2	0.5	0.1	-0.5	0.2	-0.3	-0.2	-0.4	0.2	0.1			
w14	w15	w24	w25	w34	w35	w46	w56	θ_1	θ_2	θ_3																
0.3	-0.2	0.5	0.1	-0.5	0.2	-0.3	-0.2	-0.4	0.2	0.1																
Q4	Solve <u>any two</u> questions out of three. (10 marks each)																									
a)	Apply LSTM for time-series based rainfall prediction and explain its architecture.	20	5	A																						
b)	Apply GANs for fake currency note detection and explain its architecture.		6	A																						
c)	Apply Naïve Bayes classifier as adapted for Incremental Learning using suitable example.		2	A																						
