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GANDHI INSTITUTE OF ENGINEERING AND TECHNOLOGY UNIVERSITY, ODISHA, GUNUPUR

(GIET UNIVERSITY)

Ph.D. (First Semester) Examinations, June – 2025

23SPPECS1011/23WPPECA1011/23WPPECS1011 – Machine Learning

(CSE/CSA)

Time: 3 hrs Maximum: 70 Marks

The figures in the right hand margin indicate marks.

Answer *ANY FIVE* Questions. (14 x 5 = 70 Marks) **Marks**

1.a. Evaluate a simple linear regression model on the following data using 3-fold cross-validation. 8

Observation	Feature(X)	Target(Y)
1	1.0	2.0
2	2.0	4.1
3	3.0	6.1
4	4.0	7.9
5	5.0	10.2

b. Explain List-Than-Eliminate algorithm 6

2. Explain multi-layer perceptron model with a neat diagram. 14

3.a. Design a SVM model on a data set with 2 features X_1 and X_2 8

Data Point	**X_1**	**X_2**	**Class Y**
A	2	2	1
B	4	4	1
C	4	0	-1
D	0	0	-1

b. Discuss about unbiased learner and bias, variance trade off. 6

4. Write candidate elimination algorithm. Apply the algorithm to obtain the final version space for training example. 14

Tom enjoys his favorite water sports

Example	Sky	AirTemp	Humidity	Wind	Water	Forecast	EnjoySport
1	Sunny	Warm	Normal	Strong	Warm	Same	Yes
2	Sunny	Warm	High	Strong	Warm	Same	Yes
3	Rainy	Cold	High	Strong	Warm	Change	Yes
4	Sunny	Warm	High	Strong	Cool	Change	Yes

5.a. Discuss necessary measure required to select the attributes for building a decision tree using ID3 algorithm. 7

b. Distinguish between PCA and Kernel PCA. 7

6.a. Distinguish between Markov Model and hidden Markov Model. 7

b. Why it is necessary to estimate the accuracy of hypothesis. Explain procedure to estimate difference in error between two learning methods. 7

7. Write and explain decision tree for the following transactions. 14

Tid	Refund	Marital Status	Total income	Cheat
1.	Yes	Single	125K	No
2.	No	Married	100K	No
3.	No	Single	70K	No
4.	Yes	Married	120K	No
5.	No	Divorced	95K	Yes
6.	No	Married	60K	No
7.	Yes	Divorced	220K	No
8.	No	Single	85K	Yes

8.a. Explain how back propagation algorithm is implemented for multilayer feed forward network. 7

b. Design a polynomial regression model of degree 2 for the following data 7

x: 3 4 5 6 7 y: 3 3 6 3 4

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