UPES
End Semester Examination, May 2023

Course: Pattern Recognition and Anomaly Detection   **Semester: VI**
Program: B.Tech.- All Branch   **Time: 03 hrs.**
Course Code: CSAI3011   **Max. Marks: 100**

Instructions: Read the questions carefully.

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	Are Bernoulli distributions parametric and are used for continuous variables? Answer yes or no. Also, support your answer with evidence.	4	CO2
Q 2	Explain the formula for model coefficients (weights) of a linear regression model obtained using maximum likelihood with least squares estimation method.	4	CO1
Q 3	Null hypothesis is the basic assumption that we are trying to prove. – True or False.	4	CO3
Q 4	In least squares solution for weights in linear models for regression, what do we minimize? Explain with formula.	4	CO1
Q 5	When do we say, a machine learning based classification model is "linear"? Discuss briefly	4	CO1

SECTION B
(4Qx10M= 40 Marks)

Q 6	Explain the properties and assumptions of Linear Regression. Find a linear regression equation for the following two sets of data:	10	CO2

X	2	4	6	8
Y	3	7	5	10

Q 7	Explain the following in context to pattern detection: a. Clustering b. Dimensionality reduction c. Feature Extraction d. Classification	10	CO3
Q 8	Explain IBM's Watson AIOps automates for IT anomaly detection and remediation.	10	CO3
Q 9	Explain k-means algorithm and the application of the same for product recommendation system for online marketplace. OR Explain the following in relation to feature extraction: a. Robustness assessment	10	CO1

	b. Information evaluation c. Prognostic performance evaluation d. Redundancy reduction		
	SECTION-C **(2Qx20M=40 Marks)**		
Q 10	(a) Explain t test. Find the t-test value for the following given two sets of values: 8, 3, 1, 6, 5 and 3, 6, 1, 2,7? (b) Clear differentiate between one-tailed and two-tailed test with the help of an example. **OR** In context to neural networks (NNs) applications to real-world problems a) Highlight its key advantage over other models i.e. what makes it so special? b) Discuss the role, an activation function plays in NN models. Can we call them basis function as well? c) How do neural networks learn? Discuss briefly the error backpropagation algorithm briefly with appropriate formulas. d) Define linearly separable datasets. Can multilayer perceptron (type of NNs) separate non-linearly separable datasets? Support your answer.	**20**	**CO2/CO3**
Q 11	What is Novelty Detection? Analyze the following types of point anomaly detection: a. Probability Based b. Distance based c. Reconstruction-based based d. Domain based	**20**	CO1