


Name:			
Enrolment No:			
UNIVERSITY OF PETROLEUM AND ENERGY STUDIES End Semester Examination, Dec 2023			
Course: Pattern recognition and Anomaly detection Program: B. Tech Course Code: CSAI4004P		Semester: VII Time : 03 hrs. Max. Marks: 100	
Instructions: Attempt all Questions.			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	What is pattern recognition? How patterns are extracted from the input data while developing a model.	4	CO1
Q2	What is Statistical Significance? How is strength of evidence measured.	4	CO1
Q3	Highlight the distinctions between a T-test and a Z-test, focusing on their applications, assumptions, and the type of data they are suited for.	4	CO1
Q4	Discuss the criteria for selecting a loss function during model development, considering factors such as the nature of the task, model goals, and characteristics of the dataset.	4	CO2
Q5	Define the following terms: a) stride b) epochs	4	CO3
SECTION B (4Qx10M= 40 Marks)			
Q6	Explain in detail about the working of gradient descent algorithm. Also write the pseudo code of the gradient descent.	10	CO1
Q7	Define the core concept of an autoencoder. Elaborate on the various applications of autoencoders, demonstrating a comprehensive understanding in specific contexts.	8+2	CO2
Q8	Describe the diverse anomaly detection techniques in machine learning, highlighting their methods and applications in detecting unusual patterns or outliers in data.	10	CO3
Q9	What is transfer learning? How can you use transfer learning with predefined VGG model to create an autoencoder that takes a grey level image and converts it into color image. OR Describe the characteristics of a sigmoid neuron, including its activation function, output range, and how it processes input to produce an output.	10	CO3

SECTION-C
(2Qx20M=40 Marks)

Q10	a) You are given a neural network that does the coffee roasting classification task, given the temperature(T) and time(t) in minutes as the input, In the network there are two hidden layers h1 (consisting of 5 neurons), h2(3 neurons). write down the vectorized output after every hidden layer showing how weights are learnt. b) Build the above model using Tensorflow, showing how input is read, layers are added to the model and explain various operations while learning the weights of the given input.	10+10	CO2
Q11	a) With the help of examples explain K-Nearest neighbor algorithm. b) What is logistic regression. Derive the logistic loss function. OR a) What are Convolutional Neural networks, explain various phases of CNN. Justify your answer with appropriate figures. b) What is SVM (Support Vector Machine) algorithm. Explain with example how SVM can be used for anomaly detection.	10+10	CO3