


Name: Enrolment No:			
<p style="text-align: center;">UPES End Semester Examination, May 2025</p>			
Course: Pattern Recognition and Anomaly Detection Program: B. Tech AI/ML Specialization (H and NH) Course Code: CSAI3011		Semester: 6 Time : 03 hrs. Max. Marks: 100	
Instructions: <ol style="list-style-type: none"> 1. Attempt all questions. 2. Section A consists of 5 questions of 4 marks each. 3. Section B consists of 4 questions of 10 marks each. 4. Section C consists of 2 questions of 20 marks each. 5. Assume suitable data if required and state assumptions clearly. 			
SECTION A (5Qx4M=20Marks)			
S. No.		Marks	CO
Q 1	Define pattern recognition and explain its computational importance in artificial intelligence and data processing.	4	CO1
Q 2	Differentiate between pattern recognition and anomaly detection with suitable examples.	4	CO1
Q 3	Explain the impact of high dimensionality on pattern recognition models and suggest methods to handle it.	4	CO2
Q 4	Describe the principle of Maximum Likelihood Estimation (MLE) and its application in pattern recognition.	4	CO2
Q 5	List and explain types of anomalies observed in real-world datasets with relevant examples.	4	CO3
SECTION B (4Qx10M= 40 Marks)			

Q 6	Compare various pattern recognition techniques, discussing their advantages, limitations, and practical applications.	10	CO1
Q 7	Analyze the role of confusion matrices and log-loss metrics in evaluating pattern recognition and anomaly detection models.	10	CO2
Q 8	Compare Z-test and T-test in the context of pattern recognition applications. When should each be used?	10	CO3
Q 9	<p>Illustrate the core architecture and operational workflow of an Intrusion Detection System (IDS) in network security.</p> <p style="text-align: center;">OR</p> <p>Explain how deep learning models are employed to detect anomalies in e-commerce systems with appropriate examples.</p>	10	CO3
SECTION-C (2Qx20M=40 Marks)			
Q 10	<p>Develop a strategy for detecting anomalies in satellite imagery time series data for environmental monitoring, covering preprocessing, modeling, and evaluation aspects.</p> <p style="text-align: center;">OR</p> <p>Propose a framework for distributed anomaly detection in cloud computing platforms, highlighting performance trade-offs and scalability issues.</p>	20	CO2
Q 11	Discuss the working of anomaly detection in 5G networks and IoT systems, highlighting their unique challenges.	20	CO3