

GUJARAT TECHNOLOGICAL UNIVERSITY

MCA INTEGRATED – SEMESTER VIII- EXAMINATION –SUMMER-2025

Subject Code: 2688602

Date: 02/06/2025

Subject Name: Advance Machine Learning

Time:10:30 AM TO 01:00 PM

Total Marks: 70

Instructions:

- 1. Attempt all questions.**
- 2. Make Suitable assumptions wherever necessary.**
- 3. Figures to the right indicate full marks.**
- 4. Use of simple calculators and non-programmable scientific calculators are permitted.**

- Q.1 (a) Answer the following questions. 07**
1. What is the main difference between Machine Learning and Deep Learning?
 2. What is the Vanishing Gradient Problem in deep neural networks?
 3. What is the function of the cv2.imread() and cv2.imwrite() methods in OpenCV?
 4. What is the role of neurons in a Neural Network?
 5. Which library would you use to capture and process video in Python using OpenCV?
 6. Define a Shallow Neural Network.
 7. Describe the process of resizing an image in OpenCV.
- (b) Compare and contrast Machine Learning and Deep Learning, highlighting their similarities and differences. 07**
- Q.2 (a) Define Neural Networks and distinguish them from Shallow Neural Networks. 07**
- (b) What are RNNs and LSTM networks? How do they differ, and what are their applications in time-series prediction and text generation? 07**
- OR**
- (b) Discuss the evolution of CNN architectures for image classification and explain how fine-tuning a CNN improves performance. 07**
- Q.3 (a) Explain the roles of the Generator and Discriminator in GAN and describe how GANs work. 07**
- (b) Outline the key steps involved in training a GAN and discuss the challenges faced during the training process. 07**
- OR**
- Q.3 (a) What are Deep Convolutional GANs (DCGAN)? How do they differ from traditional GANs? 07**
- (b) Compare PIX2PIX and CycleGAN, emphasizing their differences and unique applications in image-to-image translation tasks. 07**
- Q.4 (a) Introduce Reinforcement Learning and explain the key terms: Environment, State, Reward, Policy, and Value, detailing their roles in the learning process. 07**
- (b) Discuss the concept of Sequential Decision-Making and the MDP in the context of Reinforcement Learning. 07**

OR

- Q.4** (a) Provide a brief explanation of Bellman's Equation in the context of decision processes. **07**
(b) Compare Q-learning, SARSA, DQNs, and DDPG, and discuss their real-world applications in Reinforcement Learning. **07**
- Q.5** (a) Discuss the key concepts in Speech and Language Processing, focusing on ambiguity, models, algorithms, and a brief history of the field. **07**
(b) Explain Regular Expressions and Automata, and their roles in text processing and similarity computation. **07**

OR

- Q.5** (a) Explain Part of Speech tagging using Hidden Markov Models also covering sequence tagging and feature extraction techniques. **07**
(b) Provide a brief explanation of sentiment analysis, including a suitable example to illustrate its application. **07**
