

GYANMANJARI INNOVATIVE UNIVERSITY

GYANMANJARI INSTITUTE OF TECHNOLOGY

M.Tech.-Mid Semester Examination (MSE)-S2026

Enrollment No.: _____

Subject Code: METAI12510

Date: 18-03-2026

Subject Name: Deep Learning

Semester: 02

Time: 10:30 AM To 12:30 PM

Total Marks: 60

Instructions:

1. Question No. 1 is compulsory.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

| | Marks |
|---|-------|
| Q.1 (a) Explain the four branches of machine learning with suitable real-world examples. Also compare supervised and unsupervised learning. | 10 |
| (b) Describe the universal workflow of a machine learning project. Explain how overfitting and underfitting occur and discuss methods to handle them. | 10 |
| Q.2 (a) Define tensors and explain their role in neural networks. Illustrate how tensor operations enable forward propagation. | 10 |
| OR | |
| (a) Explain gradient-based optimization and backpropagation. Demonstrate how a neural network learns using a simple example of binary classification. | 10 |
| (b) Explain convolution and max-pooling operations in Convolutional Neural Networks (CNNs). How do they help in feature extraction? | 10 |
| OR | |
| (b) You are given a small image dataset for classification. Design a strategy using transfer learning with a pre-trained CNN. Explain feature extraction and fine-tuning steps. | 10 |
| Q.3 (a) Explain one-hot encoding and word embeddings. Compare their advantages and limitations in text processing. | 10 |
| (b) Define pattern recognition and explain different paradigms of pattern recognition with examples. | 10 |
| OR | |
| Q.3 (a) Describe the architecture and working of LSTM networks. How do they overcome the limitations of traditional RNNs? Explain with a practical use case. | 10 |
| (b) Explain metric and non-metric proximity measures. Illustrate how distance measures influence classification decisions in pattern recognition systems. | 10 |