

Pandit Deendayal Energy University
Department of Civil Engineering
Assignment 3
Introduction to Artificial Intelligence (24CV201T)

Total Questions: 10

Submission Deadline: 30 October 2026

Submission Format: Handwritten submissions only.

Instructions

1. Answer all questions in your own words.
2. Support your answers with suitable diagrams, examples, or case studies wherever applicable.
3. Do not copy directly from AI tools or websites. Proper references must be provided if external sources are used.
4. Each answer should be approximately **200–400 words** unless otherwise specified.
5. Neat presentation and technical accuracy will be considered during evaluation.

Unit 3 – Machine Learning Workflows and Evaluation

Q21. Describe the complete Machine Learning workflow from data collection to model deployment.

Q22. Explain the importance of data preprocessing. Discuss normalization, scaling, encoding, and data cleaning techniques.

Q23. What is Feature Engineering? Explain how rainfall intensity, runoff coefficient, and NDVI anomaly can be used as engineered features.

Q24. Discuss the importance of separating datasets into training, validation, and testing sets.

Q25. Explain the following regression evaluation metrics:

- RMSE
- MAE
- R^2

Discuss their advantages and limitations.

Q26. Explain the following classification evaluation metrics:

- Accuracy
- Precision
- Recall
- F1 Score

- ROC Curve

Q27. Differentiate between overfitting and underfitting. Explain their causes and possible solutions.

Q28. Discuss the Bias–Variance Tradeoff and its significance in Machine Learning.

Q29. Explain Cross-Validation techniques. Why is k-fold cross-validation preferred over a single train-test split?

Q30. Discuss the importance of proper model evaluation before deploying AI systems in civil engineering applications.