**Unit – 3**

**4 marks**

1. Define the architecture of a simple RNN with a diagram.
2. Briefly describe how information flows through time steps in RNNs.
3. How does LSTM prevent the vanishing gradient problem?
4. Differentiate between cell state and hidden state in LSTM.
5. How does GRU differ from LSTM in structure?
6. Write the update gate equation in GRU and explain its significance.
7. How are RNNs used in time-series forecasting?
8. How are RNNs applied in language modelling?

**8 marks**

1. Describe the process of backpropagation through time with an example. What are its main challenges?
2. Compare the learning process of feedforward networks and RNNs.
3. Describe how input, forget, and output gates function in LSTM.
4. Explain the internal architecture of an LSTM cell with a neat diagram.
5. Explain the architecture and working of a GRU unit with equations.
6. Discuss how GRUs manage the vanishing gradient problem.
7. Explain how sequence-to-sequence models can be used in multivariate time-series forecasting.
8. Discuss the use of bidirectional RNNs in text classification.
9. Describe different types of attention mechanisms (e.g., additive vs multiplicative).
10. Explain the architecture of the Transformer model introduced in "Attention is All You Need".

**Unit – 4**

**4 marks**

1. What is the basic architecture of an autoencoder?
2. Define the reparameterization trick used in VAEs.
3. Differentiate between the roles of generator and discriminator.
4. List two challenges when applying GANs to image generation.
5. Mention two methods to improve GAN training stability.

**8 marks**

1. Discuss how autoencoders can be used for dimensionality reduction.
2. Compare autoencoders and VAEs in terms of generative capability.
3. Explain the architecture and working of a Variational Autoencoder.
4. Discuss the minimax game formulation of GANs with a mathematical representation.
5. Explain how style transfer differs from texture synthesis, with examples.
6. Explain the concept of mode collapse and techniques to mitigate it.
7. Describe how conditional GANs (cGANs) are used for image generation.

**Unit – 5**

**4 marks**

1. What is hyperparameter tuning in deep learning?
2. Define L1 and L2 regularization.
3. Why is model explain ability important in deep learning?
4. List two challenges in deploying models on edge devices.
5. What is the black-box problem in deep learning

**8 marks**

1. Describe the effect of tuning batch size, learning rate, and number of epochs.
2. Discuss the use of Bayesian optimization in hyperparameter tuning.
3. Describe how regularization affects model performance and generalization.
4. Discuss the trade-off between accuracy and interpretability in deep learning models.
5. Describe how explainability techniques improve trust in AI systems.
6. Describe the steps involved in deploying a deep learning model to a cloud service.
7. Analyse privacy and accountability issues in deep learning–based decision systems.