**Question Bank: Deep Learning**

**Unit 5**

**Deep Generative Models & Reinforcement Learning**

**Introduction to Deep Generative Models**

1. What is a generative model? How does it differ from a discriminative model?
2. Explain the role of probability distributions in generative modeling.
3. Give two practical applications of deep generative models in real-world tasks.

**Boltzmann Machine**

1. Describe the architecture and working principle of a Boltzmann Machine.
2. What is the role of stochastic units in a Boltzmann Machine?
3. Explain the limitation of Boltzmann Machines in large-scale learning tasks.

**Deep Belief Networks (DBNs)**

1. What is a Deep Belief Network, and how is it constructed?
2. Differentiate between Restricted Boltzmann Machines (RBMs) and Deep Belief Networks (DBNs).
3. Mention two applications of DBNs in pattern recognition or feature learning.

**Generative Adversarial Networks (GANs)**

1. Explain the two main components of a GAN and their roles.
2. How do GANs learn through the minimax optimization game?
3. Describe two challenges faced in training GANs.
4. List some real-world applications of GANs in industry and research.

**Introduction to Deep Reinforcement Learning**

1. Define deep reinforcement learning. How does it extend traditional reinforcement learning?
2. Explain the significance of deep neural networks in reinforcement learning.
3. Give an example of a real-world system where deep reinforcement learning is applied.

**Markov Decision Process (MDP)**

1. What are the key components of a Markov Decision Process (MDP)?
2. Explain the Markov property in the context of reinforcement learning.
3. Differentiate between deterministic and stochastic policies in MDPs.

**Basic Framework of Reinforcement Learning**

1. Draw and explain the basic framework of reinforcement learning with agent-environment interaction.
2. Define reward, policy, and value function in reinforcement learning.
3. Explain the difference between model-based and model-free reinforcement learning.

**Challenges of Reinforcement Learning**

1. What is the exploration vs. exploitation dilemma in reinforcement learning?
2. Explain the problem of sparse rewards in reinforcement learning.