**Question Bank: Deep Learning**

**Unit 3
Convolutional Neural Networks (CNNs)**

**Introduction to CNN**

1. What is a Convolutional Neural Network (CNN), and how does it differ from a traditional feedforward neural network?
2. Explain two real-world applications of CNNs in computer vision.
3. Why are CNNs considered more efficient than fully connected networks for image-related tasks?

**CNN Architecture Overview**

1. Describe the general architecture of a CNN model.
2. What are the main components of a CNN pipeline, from input to output?
3. How does feature extraction in CNNs differ from handcrafted feature extraction methods?

**The Basic Structure of a Convolutional Network**

1. Define convolution operation in the context of CNNs. Provide a simple numerical example.
2. What is the role of filters (kernels) in CNNs?
3. Explain the concept of receptive field in convolutional networks.

**Padding, Strides, and Typical Settings**

1. What is padding in CNNs, and why is it used? Compare "valid" and "same" padding.
2. Define stride. How does increasing stride affect the output size?
3. List some typical settings for kernel size, stride, and padding in standard CNN architectures.

**ReLU Layer**

1. What is the ReLU activation function, and why is it preferred in CNNs?
2. Compare ReLU with sigmoid and tanh activation functions in terms of efficiency and gradient issues.

**Pooling Layer**

1. What is the purpose of pooling layers in CNNs?
2. Differentiate between max pooling and average pooling.
3. How does pooling contribute to translation invariance?

**Fully Connected Layers**

1. Explain the role of fully connected (dense) layers in CNNs.
2. Why are fully connected layers usually placed at the end of the CNN architecture?

**Interleaving between Layers**

1. Explain how convolution, activation, and pooling layers are interleaved in CNN architectures.
2. Provide an example sequence of layers for a simple CNN model.

**Local Response Normalization (LRN)**

1. What is Local Response Normalization in CNNs?
2. How does LRN improve the generalization of CNN models?
3. Compare LRN with Batch Normalization in terms of purpose and effectiveness.

**Training a Convolutional Network**

1. Outline the main steps involved in training a CNN, from forward pass to backpropagation.