# Question Bank for Deep Learning

# Unit 1

1. Explain the concept of perceptron and its role in neural networks.
2. Differences between biological neuron and perceptron
3. Explain perceptron learning algorithm
4. What is multilayer perceptron(MLP)? What kinds of problems can be solved using MLP
5. What are activation functions, and why are they necessary in neural networks?
6. Compare and contrast different types of activation functions (Sigmoid, ReLU, Tanh, Softmax).
7. How does forward propagation work in neural networks?
8. Numerical problems on forward propagation
9. Explain the process of backward propagation and its significance in training neural networks.
10. Numerical problems on finding dl/dw (derivative of loss wrt weight)
11. What are computational graphs, and how do they aid in understanding neural network operations?
12. Discuss the significance of weight initialization in neural networks.
13. Define generalization in deep learning and its importance in model performance.
14. What is dropout in neural networks, and how does it prevent overfitting?
15. What is data augmentation? Describe its effect in training neural networks
16. Applications of deep learning
17. Compare and contrast batch gradient descent, stochastic gradient descent (SGD), and mini-batch gradient descent.
18. Explain the advantages and disadvantages of stochastic gradient descent.

# Unit 2

**5 Marks** Questions (Short Answer / Brief Explanations)

1. Explain the architecture of a Convolutional Neural Network (CNN).

2. Differentiate between Fully Connected Layers and Convolutional Layers.

3. What is the role of padding and stride in convolution operations?

4. Explain Max Pooling and Average Pooling with suitable examples.

5. Describe the architecture of AlexNet and its key contributions.

6. What are the main features of VGGNet architecture?

7. Explain the concept of Residual Learning in ResNet.

8. What is DenseNet? How is it different from ResNet?

9. Define Transfer Learning. Mention its advantages in CNN-based models.

10. What are the applications of CNN in Image Recognition?

11. Explain the role of Activation Functions in CNN.

12. Describe the concept of Feature Maps and how they are generated.

13. What is the significance of convolution operation for image data?

14. List and explain any two challenges in training deep CNNs.

**10 Marks** Questions (Long Answer / Detailed Explanations)

1. Explain the working of a Convolutional Neural Network (CNN) in detail with a neat diagram.
2. Describe the difference between Fully Connected Layers and Convolutional Layers. Why are Convolutional Layers preferred for image data?
3. Explain Padding, Stride, and Pooling operations in CNN with suitable diagrams and examples.
4. Discuss in detail the architecture and contributions of AlexNet in the evolution of CNNs.
5. Describe VGGNet architecture. How does it improve performance compared to previous models?
6. Explain ResNet and the concept of Residual Connections. How do they help in training very deep neural networks?
7. Describe DenseNet architecture. Explain how Dense Blocks and connectivity patterns help in improving learning.
8. Write a detailed note on Transfer Learning. How is it implemented in CNN models for image classification tasks?
9. Compare and contrast the architectures of AlexNet, VGGNet, ResNet, and DenseNet.
10. Explain the process of Image Recognition using CNN with an example case study. Include data preprocessing, model training, and evaluation.
11. Discuss different types of Pooling methods and their significance in CNN architectures.
12. Explain the importance of Feature Extraction and Feature Maps in CNN. How do convolutional layers help in feature extraction?
13. What are the major challenges faced in training deep CNN models, and what are the strategies to overcome them?

14. Discuss the role of Transfer Learning in solving real-world image classification problems. Illustrate with an example.