# Guru Tegh Bahadur Institute of Technology, New Delhi

# Fundamentals of Deep Learning (Question Bank)

# Course Name: B.Tech (AIML) Semester: 5th SUB CODE: AIML 305

 **Unit-1**

Q1. Explain the concept of Bayesian learning in detail.

Q2. Explain the importance of linear classifiers depicting several linear classifiers.

Q3. Explain the concept of Shallow learning in detail

Q4. Differentiate between the following:

1. Single layer neural network and Multilayer neural network (MLP)
2. Shallow learning and Deep Learning
3. Machine Learning and Deep Learning

Q5. Why optimizers are important in Deep learning? Explain different types of optimizers.

Q6. What is the significance of Adding momentum in Gradient Descent optimization? Explain in detail.

Q7. Explain the problem of overfitting and underfitting in deep learning. What are the ways of handling the problem of overfitting and underfitting?

Q8. Explain the term regularization in context of deep learning. What are the various regularization techniques.?

Q9. Explain the term loss function. Explain different types of loss functions along with their applicability, advantages and disadvantages.

Q10. Explain the term bias and variance in deep learning.

**Unit-2**

Q1. Differentiate between a Biological neuron and Artificial neuron.

Q2. Explain the process of backpropagation in ANN with the help of an example.

Q3. Differentiate between Single layer perceptron and Multilayer Perceptron

Q4. Explain different loss function in deep learning along with their applications, advantages and disadvantages.

Q5. Explain the problem of vanishing gradient descent and exploding gradient descent in deep learning.

Q6. Construct a single layer neural network for implementing OR, AND, NOT gates.

Q7. What is the difference between forward propagation and backward propagation?

Q8. Explain McCulloch-pitts neuron model.

**Unit-3**

Q1. Why activation functions are important in deep learning? Explain different activation functions in deep learning along with their applicability according to the application.

Q2. What is sequential model. What are different sequential models in deep learning?

Q3. Describe the various steps involved in text generation using LSTM?

Q4. What is sequential or time series data. Explain various applications which involves time series data?

Q5. Explain the concept of hyperparameters in context of deep learning. Enlist various model parameters and hyperparameters in deep learning. Why hyperparameter tuning is required? Illustrate with the help of a use case.

Q6. Describe the architecture of Gated Recurrent Unit.

Q7. Explain the characteristics and advantages of the Rectified Linear Unit (ReLU) activation function in the context of Convolutional Neural Networks (CNNs). How does ReLU address the vanishing gradient problem, and what impact does it have on the training of neural networks? Provide an example to illustrate the behavior of the ReLU activation function during the forward pass in a neural network.

Q8. Explain the various advantages of transfer learning. Explain the training process using transfer learning through appropriate example.

Q9. Explain Backpropagation with time.

Q10. Explain how RNNs can be used for natural language processing tasks, such as language modeling and machine translation.

Q11. Define what an autoencoder is and explain its primary purpose in neural network architecture. Explain the differences between a vanilla autoencoder, a denoising autoencoder, and a variational autoencoder (VAE).

**Unit-4**

Q1. Explain the architecture of CNN with various building blocks of CNN.

Q2. Explain VGG16net Architecture, with diagram and trainable params.

 Q3 Explain the advantages of transfer learning.

Q4. Implement and train a Convolutional neural network (CNN) on a hand-written digits image dataset called MNIST and improve model generalization by achieving increased accuracy and decreased loss where model gains good confidence with the prediction.

Q5. List the deep learning applications in Computer Vision. Derive your own use case which has scope in fulfilling societal needs.

Q6. Relate the contributions of deep learning in Natural Language Processing (NLP). Investigate the possible use cases with its usage towards society.

Q7. Summarize the applications of deep learning in healthcare. Identify a novel use case and discuss its scope.

Q8. Compare and contrast AlexNet, VGG-16 , ResNet and Inception Net along with their pros and cons.