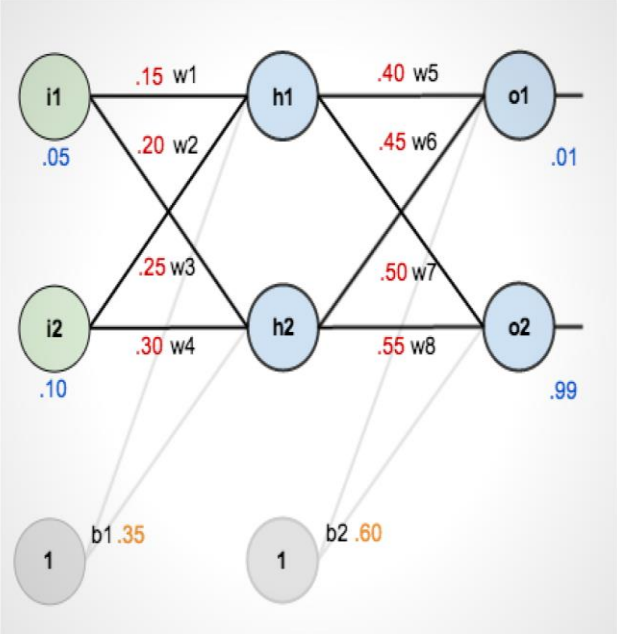
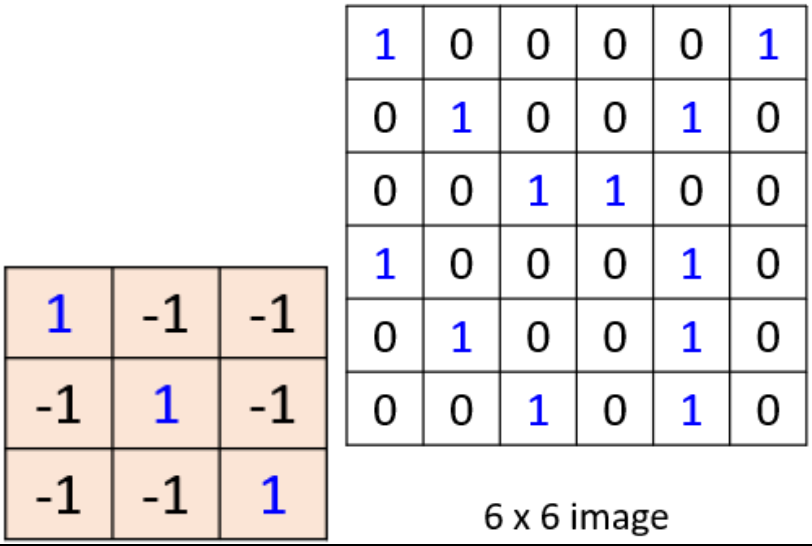
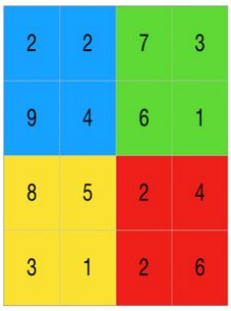
Subject: Deep Learning **Subject Code: R20A6610**

(Question Bank)

Academic Year 2023-24

Unit I	
S. No.	**Questions**
1.	What is Deep learning? Why the usage of Deep Learning is growing? Give some applications of Deep Learning.
2	Consider the following neural network with the input, output and weight parameters values shown in the diagram. The activation values in each neuron are calculated using the sigmoid activation function. Now, answer the following: (a) For the given inputs as shown in the diagram, compute the output of the hidden layer and output layer neurons. (b) Compute the error in the network with the initialized weight parameters shown in the diagram. (c) Update the weight parameter for w8 using backpropagation algorithm in the first iteration. Consider learning rate as 0.05.  i1=0.05, i2=0.10 w1=0.15, w2=0.20 w3=0.25, w4=0.30 b1=0.3 w5=0.4. w6=0.45 w7=0.5, w8=0.55 b2=0.6 01=0.01, 02=0.99
3	Consider a simple neural network of your choice. (a) compute the output of the hidden layer and output layer neurons. (b) Compute the error in the network with the initialized weight parameters. (c) Update the weight parameters using backpropagation algorithm in the first iteration. Consider learning rate as 0.001.
4	Explain is the gradient descent algorithm? What are its limitations?
5	Write down the difference among Gradient Descent, Stochastic gradient descent (SGD) and Mini-batch SGD.
6	Write the difference between Feed Forward Neural Network and Deep Feed Forward Network with suitable diagram.

7	Give an example of learning XOR/XNOR function to explain a fully functioning feed forward network.
8	Explain Back propagation using an example.
9	List and explain the various activation functions used in modelling of artificial neuron. Also explain their suitability with respect to applications.
10	What is the difference between single layer perceptron and multi-layer perceptron?
Unit II	
S. No.	**Questions**
1.	Write down about the basic architecture of CNN using a suitable diagram.
2.	Given below are an original image and a filter of size 3 x 3. What will be the output feature map after applying the convolution operation with stride 1? 
3.	Apply min, max, average pooling with pool size (filter size) 2x2 and stride 1 on the image below and show the output. 
4.	Find out the output y1, y2 and y3 obtained after applying the Softmax function corresponding to the inputs z1=91, z2=-17 and z3=111.
5.	Which padding technique will ensure the input size=output size?
6.	Discuss various popular CNN architectures
7.	Explain about the CNN architecture called VGG

8.	Explain about the CNN architecture called GoogleNet.
9.	Explain about the CNN architecture called ResNet.
10.	Explain about the CNN architecture called AlexNet.
11.	Explain the various padding techniques in deep learning.
12.	Explain about the Dropout technique.
13.	Explain about the Batch Normalization technique.
14.	Explain about the data augmentation technique.
UNIT III	
S. No.	**Questions**
1.	What is the difference between a Feedforward Neural Network and Recurrent Neural Network?
	What is the basic concept of Recurrent Neural Networks (RNNs) and how are they applied in sequential data analysis?
2.	Can you provide some real-world applications where RNNs have been successfully used for sequential data analysis? Or List out some applications of Recurrent Neural Network (RNN).
3	What are some potential challenges or limitations associated with using RNNs in practical applications, and how can they be mitigated? Or What are the issues faced while training in Recurrent Neural Networks?
4.	Can you explain the Back Propagation Through Time (BPTT) algorithm and its significance in training RNNs? Or Explain in details about BPTT.
5.	What is the Vanishing Gradient Problem in the context of RNNs, and how does it affect the training process?
6.	What are Long Short Term Memory (LSTM) Networks, and how do they differ from traditional RNNs in handling sequential data?
7.	What are Gated Recurrent Units (GRUs), and what advantages do they offer over standard RNNs and LSTMs?
8.	What is the concept of Bidirectional LSTMs, and how do they improve the modeling of sequential data?
9.	How do Bidirectional RNNs differ from Bidirectional LSTMs, and when would you choose one over the other for sequential data analysis?
10.	What are the limitations of BPTT?

11.	Explain in details about Bidirectional RNN.
12.	Explain in details about Bidirectional LSTM.
13.	Explain in details about Gated Recurrent Unit.
14.	Explain in details about Gradient clipping. Or, explain in detail how gradient clipping handles the problem of exploding gradients.
15.	Explain about Vanishing gradient problem? What are the probable solutions to overcome Vanishing Gradient problem?
16.	Explain about Exploding gradient problem? What are the probable solutions to overcome Exploding Gradient problem?
Unit IV	
S. N.	Questions
1.	
1.	What is the fundamental concept behind generative models, and how do they differ from discriminative models?
2.	Can you explain the principles and core idea behind Generative Adversarial Networks (GANs) and how they operate? Or What is the architecture of GANs, including the roles of the generator and discriminator networks in the training process?
3.	What are some of the key challenges in training and stabilizing GANs?
4.	Can you provide examples of applications where Generative Adversarial Networks (GANs) have been used to generate realistic data or enhance existing datasets? Or Discuss various applications of GANs. Or How do GANs contribute to the field of computer vision, and what are some specific use cases in image generation and manipulation?
5.	Compare between discriminative and generative models.
6.	What are the limitations of GANs explain in details.
7.	What are the different types of GANs?
8.	Define GAN? What are the pros and cons of GAN?

UNIT V	
1.	What is the fundamental concept behind autoencoders in the context of neural networks?
2.	Explain the basic architecture of an autoencoder, highlighting its key components.
3.	How do autoencoders contribute to data compression and feature learning?
4.	Describe the role and function of the encoder in an autoencoder.
5.	What is the purpose of the decoder in the context of autoencoders?
6.	How does the structure of the decoder relate to the reconstruction of input data?
7.	Explain the training process of an autoencoder for data compression and reconstruction.
8.	Compare and contrast autoencoders and Generative Adversarial Networks (GANs) in terms of their primary objectives.
9.	What is the concept behind Encoder-Decoder GANs, and how do they combine elements of both autoencoders and GANs?
10.	How does the shared latent space in Encoder-Decoder GANs contribute to controlled data generation?
11.	Provide examples of applications where Encoder-Decoder GANs might be particularly useful.
12.	Write down about advantages of ED-GANs.
13.	Write down elaborately about the various applications of Autoencoders.