NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
B.Tech
SEM: VI - THEORY EXAMINATION (2023 - 20**24)**
Subject: Deep Learning

Time: 3 Hours   **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*
*1. This Question paper comprises of **three Sections -A, B, & C.** It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*
2. Maximum marks for each question are indicated on right -hand side of each question.
3. Illustrate your answers with neat sketches wherever necessary.
4. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.
6. No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.

SECTION-A   20

1. Attempt all parts:-

1-a.   Which of the following is a common loss function used in ANNs for binary   1
          classification? (CO1)

   (a)   Mean Absolute Error (MAE)

   (b)   Mean Squared Error (MSE)

   (c)   Binary Cross-Entropy

   (d)   Categorical Cross-Entropy

1-b.   What is the purpose of the backpropagation algorithm in ANN training? (CO1)   1

   (a)   To update the weights and biases based on the prediction error

   (b)   To initialize the weights and biases of the network

   (c)   To determine the number of hidden layers and neurons

   (d)   None of the above

1-c.   What is the advantage of using convolutional layers in a CNN? (CO2)   1

   (a)   They can capture local spatial patterns in the input data

   (b)   They can handle sequential data

   (c)   They can generate synthetic data

   (d)   They can handle variable-length inputs

1-d.   _____ is well suited for perceptual tasks. (CO2)   1

   (a)   Recurrent neural networks

   (b)   Convolutional neural networks

(c) Reinforcement Learning

(d) Feed-forward neural networks

1-e.   Which technique is used to recognize and understand text in images or videos? (CO3)   1

(a)   Motion detection

(b)   Optical character recognition (OCR)

(c)   Feature extraction

(d)   Image stitching

1-f.   Which concept is used to represent the transformation from a 3D scene to a 2D image? (CO3)   1

(a)   Perspective projection

(b)   Affine transformation

(c)   Euler angles

(d)   Homography

1-g.   What is the purpose of the time step parameter in an RNN? (CO4)   1

(a)   To determine the number of recurrent layers in the network

(b)   To adjust the learning rate during training

(c)   To specify the length of the input sequence

(d)   None of the above

1-h.   Which layer type is typically used to capture sequential dependencies in an RNN? (CO4)   1

(a)   Input Layer

(b)   Output Layer

(c)   Hidden Layer

(d)   Activation Layer

1-i.   Autoencoders are trained using. (CO5)   1

(a)   Feed Forward

(b)   feed back

(c)   Back Propagation

(d)   They do not require Training

1-j.   _____ is a recommended Model for Pattern Recognition in Unlabeled Data. (CO5)   1

(a)   CNN

(b)   Auto encoder

(c)   Shallow Neural Networks

(d)   RNN

2. Attempt all parts:-

2.a.   Describe the impact of overfitting on model performance. (CO1)   2

2.b.	What does the term "filter" or "kernel" refer to in CNNs? (CO2)	2
2.c.	Discuss the importance of Edge Detection. (CO3)	2
2.d.	Write down vanishing gradient phenomenon in RNNs.(CO4)	2
2.e.	Outline some popular loss functions used in autoencoders. (CO5)	2

SECTION-B 30

3. Answer any <u>five</u> of the following:-

3-a.	Compare and contrast grid search and random search for hyperparameter tuning. When would you choose one over the other? (CO1)	6
3-b.	Differentiate between R-Square and Adjusted R-Square in context of linear regression model. (CO1)	6
3-c.	What do you mean by pooling? Differentiate between average pooling and max pooling. (CO2)	6
3-d.	Analyze the impact of increasing the number of convolutional layers in a CNN on model complexity and potential for overfitting. (CO2)	6
3.e.	Describe the basic idea behind the inception networks used for image classification. (CO3)	6
3.f.	Elaborate various types of Recurrent Neural Networks (RNNs). (CO4)	6
3.g.	How can Neural Networks be used to create Autoencoders? (CO5)	6

SECTION-C 50

4. Answer any <u>one</u> of the following:-

4-a.	Discuss the importance of activation functions in artificial neural networks. Explain various types of activation functions used in artificial neural networks. (CO1)	10
4-b.	Describe how the chain rule is used in backpropagation to calculate the gradients for updating weights. You are training a simple neural network with one hidden layer, How would you implement the backpropagation algorithm to update the weights and biases? (CO1)	10

5. Answer any <u>one</u> of the following:-

5-a.	Give a step wise procedure for training a Convolutional Neural Networks (CNNs). (CO2)	10
5-b.	You are comparing the performance of two CNN architectures for image classification. Describe some metrics you could use to evaluate their effectiveness. (CO2)	10

6. Answer any <u>one</u> of the following:-

6-a.	How does You Look Only Once (YOLO) object detection algorithm works? Explain in detail. (CO3)	10
6-b.	Elaborate the applications of image processing in real-time object detection and recognition. (CO3)	10

7. Answer any <u>one</u> of the following:-

7-a. Illustrate the architecture of a typical Recurrent Neural Networks (RNNs) with the help of a diagram. (CO4)   10

7-b. Explain the working of bi directional Recurrent Neural Networks (RNNs) along with its applications. (CO4)   10

8. Answer any <u>one</u> of the following:-

8-a. Describe regularization drop out and batch normalization along with their advantages. (CO5)   10

8-b. Discuss different types of autoencoders along with their advantages and disadvantages. (CO5)   10