Printed Page:- 04 **Subject Code**:- **ACSAI0613 / ACSAIH0613**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: VI - THEORY EXAMINATION (2023 - 2024)

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. A single iteration over the entire training set is called as an (CO1) 1

(a) Epoch

(b) clock

(c) cycle

(d) None of the above

1-b. The complexity of ANN is dependent upon (CO1) 1

(a) Number of Neurons

(b) Number of Nodes

(c) Number of Anodes

(d) Number of Layers

1-c. Which layer type is typically used to extract local features in a CNN? (CO2) 1

(a) Activation Layer

(b) Pooling layer

(c) Fully connected layer

(d) Convolution Layer

1-d. What is the purpose of the stride parameter in a convolutional layer? (CO2) 1

(a) To reduce the model complexity

(b) To determine the size of the receptive field

(c) To adjust the learning rate during training

(d) To control the step size of the convolution operation

1-e. Which technique is used to detect and track objects in a sequence of frames? (CO3) 1

(a) Optical Flow

(b) Template Matching

(c) Harris Corner Detection

(d) Scale Invariant Feature Transform (SIFT)

1-f. Which metric is commonly used to evaluate the performance of object detection algorithms? (CO3) 1

(a) Precision

(b) Recall

(c) F1 Score

(d) All of the above

1-g. Which activation function is commonly used in the recurrent layers of an RNN? (CO4) 1

(a) ReLU (Rectified Linear Unit)

(b) Sigmoid

(c) Softmax

(d) Tanh (Hyperbolic Tangent)

1-h. Outputs of RNN depends on (CO4) 1

(a) Prior elements within the sequence

(b) Prior elements outside the sequence

(c) All the above

(d) None of the above

1-i. For document classification and summarization, it is important to look at the important sentences and important words. What kind of “attention” mechanism is required for encoding? (CO5) 1

(a) Hierarchical

(b) Sequential

(c) Non Sequential

(d) Unordered

1-j. Which of the following is correct about Encoders and Decoders in Autoencoders? (CO5) 1

(a) Number of nodes per layer increases with each subsequent layer in the encoder

(b) Number of nodes per layer decreases with each subsequent layer in decoder

(c) Number of nodes per layer decreases with each subsequent layer in encoder and decoder

(d) All of the above

2. Attempt all parts:-

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

2.b. Evaluate the size of a feature map, given that the image size is 32x32, filter size is 5x5, stride is 1, and no padding. (CO2) 2

2.c. Comment on the need of padding. (CO3) 2

2.d. Briefly define the term "backpropagation through time" in the context of RNNs. (CO4) 2

2.e. List the applications of autoencoders. (CO5) 2

SECTION B **30**

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

3-a. Discuss Mean Absolute Error, Mean Square Error and Root Mean Square Error in context of linear regression model. (CO1) 6

3-b. Outline various measures to determine the accuracy of a classification model. (CO1) 6

3-c. Discuss some of the applications of Convolutional Neural Networks (CNNs). Why CNN is most preferred for the image data? (CO2) 6

3-d. Discuss the concept of hyperparameter tuning in context of Convolutional Neural Networks (CNNs). (CO2) 6

3.e. Differentiate among the detection, recognition and identification of objects. (CO3) 6

3.f. How Recurrent Neural Network differs from Feed Forward Neural Network? (CO4) 6

3.g. Describe the approach used in Denoising Autoencoders. (CO5) 6

SECTION C **50**

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

4-a. Discuss Gradient Descent algorithm and delta rule in context of Artificial Neural Networks (ANNs). (CO1) 10

4-b. State the motivation behind the design of modern Artificial Neural Networks (ANNs). Illustrate the architecture of ANN with the help of a diagram. (CO1) 10

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

5-a. Illustrate various components of a Convolutional Neural Network (CNN) with the help of block diagram. (CO2) 10

5-b. You are building a system for image classification. How could you leverage Convolutional Neural Networks (CNNs) to achieve this task? (CO2) 10

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

6-a. Mention some advantages of deep learning over traditional machine learning algorithms for image recognition and other tasks that require understanding of image (e.g., object detection). (CO3) 10

6-b. Describe the loss function of You Look Only Once (YOLO) algorithm. How the algorithm detects objects in real time?(CO3) 10

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

7-a. Give the structure of Long Short Term Memory (LSTM) networks along with its applications. (CO4) 10

7-b. Illustrate various components of Recurrent Neural Networks **(**RNNs) with the help of a diagram. (CO4) 10

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

8-a. Discuss the general architecture of Autoencoders along with different ways to constrain the network. (CO5) 10

8-b. Discuss the need of dimensionality reduction. Differentiate between an Autoencoder and Principal Component Analysis (PCA) in terms of Dimensionality Reduction. (CO5) 10