Printed Page:-04 Subject Code:- ACSAI0613 Roll. No: NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA (An Autonomous Institute Affiliated to AKTU, Lucknow) **B.Tech** SEM: VI - THEORY EXAMINATION (2024 - 2025.) **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. 20 **SECTION-A** 1. Attempt all parts:-1-a. Choose the common loss function used in ANNs for binary classification? 1 (CO1,K1) Mean Absolute Error (MAE) (a) Mean Squared Error (MSE) (b) **Binary Cross-Entropy** (c) Categorical Cross-Entropy (d) What is the purpose of the backpropagation algorithm in ANN training? (CO1, 1-b. 1 K1) To update the weights and biases based on the prediction error (a) To initialize the weights and biases of the network (b) (c) To determine the number of hidden layers and neurons None of the above (d) 1-c. Which layer type is typically used to extract local features in a CNN? (CO2, K2) 1 Activation Layer (a) Pooling layer (b) Fully connected layer (c) **Convolution Layer** (d) 1-d. The input image has been converted into a matrix of size 28×28 and a kernel/filter 1 of size 7×7 with a stride of 1. What will be the size of the convoluted matrix?

(a) 2 22*22 (b) (c) 20*20 25*25 (d) 1-e. Which technique is used to detect and track objects in a sequence of 1 frames? (CO3, K1) **Optical Flow** (a) **Template Matching** (b) Harris Corner Detection (c) Scale Invariant Feature Transform (SIFT) (d) 1-f. Which metric is commonly used to evaluate the performance of object detection 1 algorithms? (CO3, K2) Precision (a) (b) Recall (c) F1 Score (d) All of the above What is the purpose of the time step parameter in an RNN? (CO4, K2) 1 1-g. To determine the number of recurrent layers in the network (a) To adjust the learning rate during training (b) To specify the length of the input sequence (c) None of the above (d) Music Generation and Image Captioning are the examples of (CO4, K1) 1-h. 1 One-to -one RNN (a) One-to-Many RNN (b) Many-to-One RNN (c) (d) Many-to-many RNN 1-i. De-noising and Contractive are examples of _____ (CO5, K1) 1 Autoencoder (a) **Convolution Neural Networks** (b) ANN (c) **Recurrent Neural Networks** (d) Which of the following model contains internal memory? (CO5, K1) 1 1-j. **Convolutional Neural Networks** (a) Capsule Neural Networks (CapsNots) (b) (c) ANN

(d) Autoencoder

(CO2, K3)

2. Attempt all parts:-

2.a.	Describe the impact of overfitting on model performance. (CO1, K2)	2
2.b.	Briefly explain advantages of using CNN over ANN. (CO2, K2)	2
2.c.	Comment on the need of padding. (CO3, K2)	2
2.d.	List some applications of Long Short Term Memory (LSTM) networks. (CO4, K1)	2
2.e.	List some popular loss functions used in autoencoders. (CO5, K1)	2
SECTIO	<u>N-B</u>	30
3. Answe	r any <u>five</u> of the following:-	
3-a.	Demonstrate k-fold cross validation along with it's advantages. (CO1, K2)	6
3-b.	Discriminate R-Square with Adjusted R-Square in context of linear regression model. (CO1, K3)	6
3-с.	Analyze the impact of increasing the number of convolutional layers in a CNN on model complexity and potential for overfitting. (CO2, K4)	6
3-d.	Illustrate the concept of hyperparameter tuning in context of Convolutional Neural Networks (CNNs). (CO2, K2)	6
3.e.	Demonstrate the basic idea behind the inception networks used for image classification. (CO3, K3)	6
3.f.	Elaborate various types of Recurrent Neural Networks (RNNs). (CO4, K2)	6
3.g.	Explain how Autoencoders can be used for Anomaly Detection? (CO5, K3)	6
SECTIO	<u>N-C</u>	50
4. Answe	r any <u>one</u> of the following:-	
4-a.	How Gradient Descent algorithm and delta rule is applied in context of Artificial Neural Networks (ANNs). (CO1, K3)	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, K2)	10
5. Answe	er any <u>one</u> of the following:-	
5-a.	Explain the step wise procedure for training a Convolutional Neural Networks (CNNs). (CO2, K2)	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, K3)	10
6. Answe	r any <u>one</u> of the following:-	
6-a.	Describe the loss function of You Look Only Once (YOLO) algorithm. How the algorithm detects objects in real time?(CO3, K3)	10
6-b.	How does You Look Only Once (YOLO) object detection algorithm works? Explain in detail. (CO3, K3)	10
7. Answe	r any <u>one</u> of the following:-	
7-a.	Explain the working of bi directional Recurrent Neural Networks (RNNs) along with its applications. (CO4, K2)	10

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7-b.	Illustrate various components of Recurrent Neural Networks (RNNs) with the help of a diagram. (CO4, K2)	10
8. Answe	er any <u>one</u> of the following:-	
8-a.	Discuss the general architecture of Autoencoders along with different ways to constrain the network. (CO5, K2)	10
8-b.	Discuss the need of dimensionality reduction. Differentiate between an Autoencoder and Principal Component Analysis (PCA) in terms of	10

Dimensionality Reduction. (CO5, K3)

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