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Printed Page:-4 **Subject Code:- AMICA0711**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
MCA Integrated
SEM: VII - THEORY EXAMINATION (2025 - 2026)
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. The range of R^2 (coefficient of determination) is:(K1,CO1) 1

(a) $-\infty$ to $+\infty$
(b) 0 to 1
(c) –1 to 1
(d) Only positive values

1-b. p-value in regression is used to test:(K3,CO1) 1

(a) Feature scaling
(b) Statistical significance of predictors
(c) Normalization of data
(d) Residual normality

1-c. The operation at the core of CNNs is:(K1,CO2) 1

(a) Convolution
(b) Pooling
(c) Regularization
(d) Normalization

1-d. Max pooling selects:(K1,CO2) 1

(a) Maximum value in filter region
(b) Minimum value in filter region
(c) Average of values
(d) Random value

1-e. Using a larger stride results in:(K2,CO3) 1

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(a) Smaller output map
(b) Larger output map
(c) Same output
(d) No change

1-f. Object detection differs from classification because:(K2,CO3) 1

(a) It predicts location + class
(b) It predicts only class
(c) It ignores features
(d) It predicts only pixels

1-g. In RNN, the hidden state at time t depends on:(K2,CO4) 1

(a) Current input only
(b) Current input + previous hidden state
(c) Output only
(d) Loss value

1-h. Example of sequence generation is:(K2,CO4) 1

(a) Text completion
(b) Image resizing
(c) Feature extraction
(d) Clustering

1-i. The central layer of an autoencoder is called:(K1,CO5) 1

(a) Bottleneck
(b) Decoder
(c) Encoder
(d) Regularizer

1-j. Batch normalization is usually applied after:(K3,CO5) 1

(a) Each layer
(b) Loss function
(c) Pooling
(d) Epoch end

2. Attempt all parts:-

2.a. Differentiate between precision and recall in classification.(K2,CO1) 2

2.b. Mention any two applications of CNN in computer vision.(K1,CO2) 2

2.c. Explain in short why edges are important in computer vision.(K2,CO3) 2

2.d. Define sampling in RNN context.(K1,CO4) 2

2.e. Apply the idea of PCA and autoencoder to compare them on a small dataset.(K3,CO5) 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i) Explain the working of k-fold cross-validation with k = 5 using a simple dataset 6

example.(K3,CO1)

3.a.(ii)	Analyse the effect of using sigmoid vs ReLU activation functions in a multilayer network.(K4,CO1)	6

3.b. Answer any one of the following:-

3.b.(i)	Explain how CNN is applied in image classification with a practical dataset example.(K3,CO2)	6
3.b.(ii)	Compare CNN and traditional ML classifiers (like SVM) on CIFAR-10 in easy points.(K3,CO2)	6

3.c. Answer any one of the following:-

3.c.(i)	Analyse the trade-off between accuracy and computation when using large stride values.(K4,CO3)	6
3.c.(ii)	Analyse the role of 1×1 convolution in reducing parameters in Inception.(K4,CO3)	6

3.d. Answer any one of the following:-

3.d.(i)	Analyse how temperature parameter affects sequence sampling.(K4,CO4)	6
3.d.(ii)	Analyse the difference between GRU and simple RNN for handling long dependencies.(K4,CO4)	6

3.e. Answer any one of the following:-

3.e.(i)	Construct a stacked autoencoder with two hidden layers and explain.(K3,CO5)	6
3.e.(ii)	Demonstrate semi-supervised learning using stacked autoencoders with few labels.(K3,CO5)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Compare k-fold cross-validation with simple train-test split, and explain which one is better for deep learning.(K5,CO1)	10
4-b.	Compare Sigmoid, Tanh, and ReLU activations in simple words and say where each works better.(K5,CO1)	10

5. Answer any one of the following:-

5-a.	Explain how pooling reduces size and makes CNN faster.(K5,CO2)	10
5-b.	Show how visualizing feature maps helps understand CNN learning.(K5,CO2)	10

6. Answer any one of the following:-

6-a.	Compare the effect of larger strides vs smaller strides in CNN. Which is better and why?(K5,CO3)	10
6-b.	Compare bounding box and classification output in an object detection task.(K5,CO3)	10

7. Answer any one of the following:-

7-a.	Evaluate why BPTT often suffers from vanishing gradients and suggest a simple fix.(K5,CO4)	10
7-b.	Compare vanishing gradient vs exploding gradient in simple words.(K5,CO4)	10

8. Answer any one of the following:-

8-a.	Compare undercomplete and overcomplete autoencoders with one example each.(K5,CO5)	10

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8-b.	Evaluate the role of reconstruction error in training autoencoders.(K5,CO5)	10