Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: M.Tech
Sub_Code: 24PC2001

3rd Semester Regular Examination: 2025-26
SUBJECT: Deep Learning
BRANCH(S): CSEDS
Time: 3 Hours
Max Marks: 100
Q.Code: U081

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What is hinge loss in linear machines?
b) Define learning rate.
c) State the importance of optimization in deep learning.
d) What is an epoch in neural network training?
e) Define feature map.
f) State the benefits of skip connections.
g) Define early stopping.
h) How is deep learning used in image denoising tasks?
i) Define generator and discriminator in GAN.
j) How do object detection networks operate?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Explain the structure and working of a linear classifier with an example.
b) Derive the gradient descent update rule for minimizing a loss function.
c) Compare Bayesian learning and frequentist learning approaches.
d) Explain the architecture and learning rule of a multilayer perceptron.
e) Describe the backpropagation algorithm with necessary equations.
f) Explain how autoencoders can be used for dimensionality reduction.
g) Describe the working principle of convolutional layers in CNNs.
h) Compare RMSProp and Adam optimizers.
i) Discuss the advantages of normalization layers in deep networks.
j) Explain how gradient vanishing is mitigated by normalization and skip connections.
k) Compare VAE and GAN in terms of objective functions and output quality.
l) Explain semantic segmentation with CNN-based architectures.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	Design a decision surface for a two-class linear classifier and explain its geometric interpretation.	**(16)**
Q4	Design a deep CNN architecture for image classification, discussing each component in detail.	**(16)**
Q5	Discuss the evolution of optimization techniques from vanilla gradient descent to adaptive optimizers in deep nets.	**(16)**
Q6	Develop an integrated framework combining LSTM and GAN for video sequence prediction.	**(16)**

Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: M.Tech
Sub_Code: 24PC2002

3rd Semester Regular Examination: 2025-26
SUBJECT: Data Fusion
BRANCH(S): CSEDS
Time: 3 Hours
Max Marks: 100
Q.Code: U033

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) Define data fusion and mention its primary objectives.
b) Distinguish between data, information, and intelligence in fusion systems.
c) List different sources of uncertainty in sensor data.
d) Define target tracking in the context of data fusion.
e) Differentiate between single-target and multi-target tracking.
f) Define target classification.
g) Differentiate between classification and recognition.
h) Define probabilistic inference.
i) What is hybrid modeling meant in fusion systems?
j) What are the challenges in nonlinear sensor data fusion?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) Compare Neuro-Probabilist and Neo-Calculist approaches with examples.
b) Explain how probabilistic and possibilistic models differ in handling uncertainty.
c) Describe the characteristics of a good sensor fusion framework.
d) Explain how uncertainty can be represented and managed in data fusion systems.
e) Explain the working principle of a Kalman filter in single-target tracking.
f) Compare single-sensor and multi-sensor tracking systems with examples.
g) Describe the challenges of clutter and false alarms in target tracking.
h) Compare data-driven and model-driven situation assessment techniques.
i) Describe the process of target aggregation and its challenges.
j) Explain the process of probabilistic reasoning in Bayesian networks.
k) Compare centralized and distributed fusion frameworks.
l) Discuss challenges in real-time decision support for hybrid fusion models.

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3	Develop a comparative analysis of Neo-Calculist, Neo-Logistic, and Neo-Possibilist approaches in dynamic decision environments.	**(16)**
Q4	Design a multi-sensor multi-target tracking system using the interacting multiple model (IMM) architecture and explain each phase.	**(16)**
Q5	Develop a complete model-based situation assessment system using Bayesian Belief Networks for threat detection.	**(16)**
Q6	Design a distributed cognitive fusion model incorporating adaptive agents for dynamic decision-making.	**(16)**