

Total No. of Questions : 8]

SEAT No. :

PE-2183

[Total No. of Pages : 3

[6584]-82

B.E. (Computer Engineering)

DEEP LEARNING

(2019 Pattern) (Semester - VIII) (410251)

Time : 2½ Hours]

[Max. Marks : 70

Instructions to the candidates :

- 1) Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) Assume suitable data if necessary.

Q1) a) List the main steps involved in training a Convolutional Neural Network (CNN) for image classification? Why normalization is important before training a CNN. [6]

b) Given an input of size 64×64 , a kernel size of 5×5 , stride = 2, and 'same' padding : [6]

i) What will be the size of the output feature map?

ii) How does padding help retain the spatial size?

c) What are Convolutional Neural Networks (CNNs) primarily used for in deep learning? List at least four real-world applications. [6]

OR

Q2) a) What is Interleaving Between Layers in CNN? Why is Interleaving Important? Explain the role of each interleaving layer? [6]

b) What is the ReLU activation function? Write its mathematical expression and describe how it transforms the input $x = [-3, -2, -1, 0, 2, 5, 8]$. [6]

c) Explain how input data flows through a typical CNN architecture from the raw image to the final output layer? [6]

Q3) a) How is the computational graph of an RNN different from that of a feedforward neural network? [6]

b) List the types of Recurrent Neural Network (RNN) and explain Long Short-Term Memory (LSTM) three gates? [6]

c) What is Encoder-Decoder architecture, and how does it work in sequence-to-sequence learning? [6]

P.T.O.

OR

Q4) a) What are limitations of Bidirectional RNNs, and how do they differ from standard RNNs? [6]

b) Explain any Seven Challenges of Long-Term Dependencies? [6]

c) How Echo State Networks Differ from Traditional RNNs? [6]

Q5) a) What is a Boltzmann Machine? Describe its structure and components. [6]

b) List at least five real-world applications of Generative Adversarial Network (GANs) and describe any one in detail. [6]

c) Describe the difference between generative and discriminative phases in Deep Belief Networks (DBNs). [5]

OR

Q6) a) What is the role of the discriminator in a Generative Adversarial Network (GAN)? What are the inputs and outputs of a discriminator network? [6]

b) Explain the following Term: [6]

i) Deep Belief Network

ii) Deep Generative Model

c) Discuss the role of GANs in anomaly detection. How do they help identify outliers in data? [5]

Q7) a) What is dynamic programming in the context of reinforcement learning? How does it differ from traditional Dynamic Programming (DP) in computer science? [6]

b) Define the terms: state, action, reward, and policy in the context of Reinforcement Learning (RL). [6]

c) What is a Markov Decision Process (MDP)? Define its components. [5]

OR

- Q8)** a) How does the recurrent layer in a Deep Recurrent Q-Networks (DQRN) help in decision-making over sequences? [6]
- b) What is Q-learning? How does it differ from other reinforcement learning algorithms? [6]
- c) How can the game of Tic-Tac-Toe be formulated as a reinforcement learning problem? [5]

