

# SPPU-BE-COMP-CONTENT – KSKA Git

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  $64 \times 64$ , a kernel size of  $5 \times 5$ , 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]

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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 Network 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

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- 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]

