QP CODE: 25802998

25802998

Reg No : .....

Name : .....

INTEGRATED MSC DEGREE EXAMINATION, JUNE 2025

Eight Semester

CORE - ICSC8CR1 - ADVANCED DEEP LEARNING TECHNIQUES

INTEGRATED MSC COMPUTER SCIENCE-ARTIFICIAL INTELLIGENCE AND MACHINE LEARNING & INTEGRATED MSC COMPUTER SCIENCE-DATA SCIENCE

2020 Admission Onwards

6200809C

Time: 3 Hours Weightage: 30

Part A (Short Answer Questions)

*Answer any **eight** questions.*

*Weight **1** each.*

1. Give examples of applications where representation learning is crucial.
2. Compare shallow and deep neural networks in terms of complexity and performance.
3. Explain clustering and its role in unsupervised learning.
4. How are convolutional filters initialized in a CNN? Discuss common initialization methods.
5. Compare the architectures of ResNet and AlexNet in terms of depth, layer types, and performance metrics.
6. How does DenseNet address the vanishing gradient problem?
7. Discuss the ethical considerations in using pre-trained models for transfer learning.
8. How does Backpropagation Through Time (BPTT) differ from standard backpropagation in feedforward neural networks?
9. How can bi-directional LSTMs improve the accuracy of sentiment analysis tasks compared to unidirectional LSTMs?
10. How does data augmentation help improve the performance of image classification models?

(8×1=8 weightage)

Part B (Short Essay/Problems)

*Answer any **six** questions.*

*Weight **2** each.*

11. Compare and contrast shallow and deep representations in neural networks.
12. Describe the role of softmax activation function in the output layer of a CNN. When is it used?
13. How does domain adaptation differ from traditional transfer learning techniques?

14. Describe the role of data augmentation in improving transfer learning performance. Provide examples of effective augmentation techniques.

15. What are Recurrent Neural Networks (RNNs), and how do they handle sequential data?

16. Compare and contrast Encoder-decoder sequence-to-sequence architectures with traditional RNN models.

17. Compare and contrast LSTM and Gated Recurrent Unit (GRU) networks in terms of architecture and performance.

18. Discuss the challenges faced in image classification tasks and how deep learning models address these challenges.

(6×2=12 weightage)

Part C (Essay Type Questions)

*Answer any **two** questions.*

*Weight **5** each.*

19. Explain the concept of representation learning in the context of deep learning. How does representation learning contribute to feature extraction and model performance?

20. Illustrate the application of transfer learning in natural language processing tasks. Provide examples of how pre-trained language models are adapted to specific tasks.

21. Discuss the concept of contractive Autoencoders. How does adding a penalty based on the Jacobian matrix of the encoder prevent the model from learning trivial solutions?

22. Compare the performance of LSTM-based classifiers with CNN-based classifiers in handling sequential data inputs.

(2×5=10 weightage)