8E1961

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B.Tech. VIII Sem. (Main/Back) Examination, April/May - 2025
Artificial Intelligence and Data Science
8AID4 - 01 Deep Learning and Its Applications

Time : 3 Hours **Maximum Marks : 70**

Instructions to Candidates:

Attempt all Ten questions from Part A, Five questions out of seven questions from Part B and Three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205).

PART - A
(Answer should be given up to 25 words only)

All questions are compulsory. **(10×2=20)**

1. Define the term "Deep Learning" and its significance in Artificial Intelligence.
2. What is the curse of dimensionality in machine learning?
3. Write two activation functions in neural networks.
4. What is the difference between supervised and unsupervised training of neural networks?
5. Define the concept of "Backpropagation" in neural networks.
6. What are Restricted Boltzmann Machines (RBMs)?
7. What is the purpose of parameter sharing in CNNs?
8. Define Bidirectional Recurrent Neural Networks (BRNNs).
9. Explain the concept of stochastic gradient descent.
10. Differentiate between regularized and stochastic autoencoders.

PART - B
(Analytical / Problem Solving Questions)

Attempt any Five questions. **(5×4=20)**

1. Given a dataset with high dimensionality, explain how you would address the curse of dimensionality using deep learning techniques.
2. Design a simple neural network with three layers for binary classification and explain its working.
3. Analyse the effect of using different activation functions on a neural network's performance, explain with example.
4. Solve for the updated weights using backpropagation for a single-layer perceptron with given inputs, weights, and target outputs.
5. Given a sequence prediction problem, propose how you would implement an RNN to solve it.
6. Explain how dropout regularization can prevent overfitting in deep learning models with an example.
7. Design a simple autoencoder for dimensionality reduction and explain its components.

PART - C
(Descriptive / Analytical / Problem Solving / Design Questions)

Attempt any Three questions. **(3×10=30)**

1. Describe the architecture and working of Convolutional Neural Networks (CNNs) and their applications in computer vision tasks.
2. How an unsupervised neural network is trained, explain in details with example?
3. Compare AlexNet and ResNet architectures in terms of design principles and performance on image recognition benchmarks.
4. Propose a deep learning pipeline for speech recognition, detailing each step from pre-processing to LSTM model evaluation.
5. Discuss Autoencoders, their types and applications in anomaly detection task with examples.