

M.Sc. (AIML) Sem.-3 (A.T.K.T.) Examination

Deep Learning Fundamentals

Time : 3-00 Hours]

July-2024

[Max. Marks : 100

Instructions:

- Write both the Sections in the separate answer book.
- Both Sections having equal weightage.
- Draw Diagrams wherever necessary.
- Make Assumptions wherever necessary.

SECTION – I

- Q-1 Explain the following activation functions (write respective formulas): (10)
- a. Sigmoid
 - b. Tanh
 - c. ReLU
 - d. Leaky ReLU
 - e. Softmax
- Q-2 Attempt the following: (any two) (20)
- a. Difference between Biological Neuron and Artificial Neuron, in detail with necessary diagrams.
 - b. Why CNN gives better results than Fully Connected Network?
 - c. Explain how neural network can solve XOR problem using a numerical example.
- Q-3 Attempt the following: (any two) (20)
- a. Explain in detail what is a Convolutional Neural Network with the help of a proper labelled architecture.
 - b. Explain RNN using a fully labelled architecture and also explain the vanishing gradient problem in RNN.
 - c. Explain in detail various Optimization techniques used for training deep learning models.

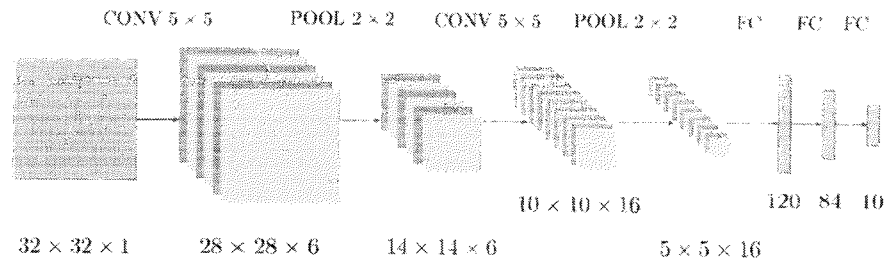
SECTION – II

- Q-4 Explain the following: (10)
- a. Explain any two machine learning tasks.
 - b. What is exploding gradient problem?
 - c. What is model capacity?
 - d. What is VC-dimensionality?
 - e. Brief the concept of generalization.

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- Q-5 Attempt the following: **(any two)** (20)
- What is the purpose of regularization in model training? Explain any three regularization techniques.
 - Explain the functioning of LSTM and how it stores long-term and short-term memories, with the help of a labelled architecture.
 - Explain how GRU helps to overcome the vanishing gradient problem through its architecture.

- Q-6 Attempt the following: **(any two)** (20)
- Write model summary for the following CNN architecture. Also, explain equivariant and invariant properties of CNN.



- Explain ReLu activation function along with its advantages and disadvantages. Also, explain what is dying ReLu and how to solve it.
- Explain how max-pooling is invariant to the transformation of rotation and translation.

