

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

## Deep Learning and its Applications in Security

Time : 3-00 Hours]

July-2024

[Max. Marks : 100

**Instructions:**

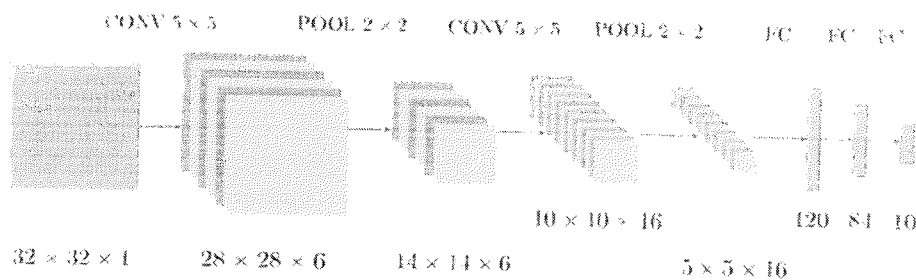
- Write both the Sections in the separate answer book.
- Both Sections having equal weightage.
- Draw Diagrams wherever necessary.
- Make Assumptions wherever necessary.

**SECTION – I**

- Q-1 Explain the following activation functions (write respective formulas): (10)
- Binary step function
  - Sigmoid
  - Tanh
  - ReLU
  - Softmax

- Q-2 Attempt the following: (any two) (20)
- Explain Deep Learning techniques for security and give their solutions to prevent those attacks.
  - Difference between Biological Neuron and Artificial Neuron, in detail with necessary diagrams.
  - Explain in detail what is a Convolutional Neural Network with the help of a proper labelled architecture.

- Q-3 Attempt the following: (any two) (20)
- Explain RNN using a fully labelled architecture and also explain the vanishing gradient problem in RNN.
  - Write model summary for the following CNN architecture. Also, explain equivariant and invariant properties of CNN.



- Explain Regularization and any three techniques of regularization in detail.

## SECTION – II

- Q-4 Explain the following Terms with an appropriate example. (10)
- What is max pooling?
  - What is VC- dimensionality?
  - Brief the concept of generalization.
  - Brief Adam Optimizer.
  - How Machine Learning works in Security?
- Q-5 Attempt the following: **(any two)** (20)
- Explain how LSTM stores long-term and short-term memories using architecture.
  - Explain ReLu activation function along with its advantages and disadvantages. Also, explain what is dying ReLu and how to solve it.
  - Explain how GRU helps to overcome the vanishing gradient problem through its architecture.
- Q-6 Attempt the following: **(any two)** (20)
- Explain how neural network can solve XOR problem using a numerical example.
  - Explain in detail various Optimization techniques used for training deep learning models.
  - What is pooling? Explain the how max pooling is invariant to translation and rotation.
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