

Instructions:

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

SECTION - 1

Q.1 **Attempt the following: (any two)**

[20]

- (a) Why CNN gives better results than Fully connected Network?
- (b) Explain RNN using a fully labelled architecture and also explain the vanishing gradient problem in RNN.
- (c) Explain how neural network can solve XOR problem using a numerical example.

Q.2 (a) Define bias and variance in the context of machine learning models. Also discuss the bias-variance tradeoff and its implications for model performance.

[20]

- (b) Explain the concept of curse of dimensionality. How does it affect machine learning models, particularly deep networks?

OR

Q.2 (a) Describe the architecture and functioning of a vanilla multilayer perceptron (MLP).

[20]

- (b) Discuss the mathematical principles behind back propagation and its importance in training deep networks.

Q.3 Explain the following activation function (write respective formulas):

[10]

- (a) Sigmoid
- (b) Tanh
- (c) ReLU
- (d) Leaky ReLU
- (e) Softmax

(P.T.O)

SECTION -2

N/951-2

- Q.4 **Attempt the following: (any two)** [20]
- (a) Explain the functioning of LSTM and how it stores long-term and short-term memories, with the help of a labelled architecture.
 - (b) What is the purpose of regularization in model training? Explain different regularization techniques.
 - (c) Explain how GRU helps to overcome the vanishing gradient problem through its architecture.
- Q.5 What is pooling? Explain how max pooling is invariant to translation and rotation. [10]
- OR**
- Q.5 What are the challenges of optimization for training deep learning models? [10]
- Q.6 **Attempt the following:** [20]
- (a) Given the following architecture of CNN:
Input image size: 300x300x3
No. of filter: 80
Filter size: 12x12x3
Stride: 3
Padding: 0

Calculate:
 - i. No. of parameters without weight sharing.
 - ii. No. of parameters with weight sharing.
 - (b) Draw and explain the architecture of CNN (labelling all links and nodes).
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