

PSG COLLEGE OF ARTS & SCIENCE  
(AUTONOMOUS)  
MSc DEGREE EXAMINATION DECEMBER 2023  
(Third Semester)  
Branch – COMPUTER SCIENCE  
MAJOR ELECTIVE COURSE-II:  
DEEP LEARNING

Time: Three Hours

Maximum: 50 Marks

SECTION-A (5 Marks)

Answer ALL questions

ALL questions carry EQUAL marks

(5 x 1 = 5)

- 1 What is the range of the sigmoid function  $\sigma(x) = \frac{1}{1 + e^{-x}}$  ?  
(i) (-1, 1) (ii) (0, 1)  
(iii)  $(-\infty, \infty)$  (iv) (0,  $\infty$ )
- 2 Which of the following is a variant of gradient descent that uses an estimate of the next gradient to update the current position of the parameters?  
(i) Momentum optimization (ii) Stochastic gradient descent  
(iii) Nesterov accelerated gradient descent (iv) Adagrad
- 3 What is backpropagation in TensorFlow?  
(i) A process of computing the gradient of a neural network  
(ii) A process of initializing the weights and biases of a neural network  
(iii) A process of updating the weights and biases of a neural network  
(iv) A process of measuring the difference between the predicted output and the actual output
- 4 The input image has been converted into a matrix of size 28 X 28 and a kernel/filter of size 7 X 7 with a stride of 1. What will be the size of the convoluted matrix?  
(i) 20x20 (ii) 21x21  
(iii) 22x22 (iv) 25x25
- 5 Suppose you are given the task of building a language translation model to translate text from English to Telugu. Which of the following architectures should the model use?  
(i) many-to-many (ii) many-to-one  
(iii) one-to-many (iv) one-to-one

SECTION - B (15 Marks)

Answer ALL Questions

ALL Questions Carry EQUAL Marks

(5 x 3 = 15)

- 6 a Compare Tanh and sigmoid activation functions.  
OR  
b What is perceptron ? Justify when does the perceptron fails to converge.
- 7 a Produce the difficulties in applying Gradient Descent.  
OR  
b Explain about Delta Rule.

Cont...

- 8 a Illustrate control flow operation in tensorflow with example.  
OR  
b Explain the variable scopes in tensorflow.
- 9 a Illustrate Max pooling in CNN with an example.  
OR  
b Explain the applications of CNN.
- 10 a Explain the shape or dimension of input data for a recurrent neural network.  
OR  
b Illustrate the general layout of a Long Short-Term Memory Network (LSTM) with suitable diagram.

**SECTION -C (30 Marks)**Answer **ALL** questions**ALL** questions carry **EQUAL** Marks

(5 x 6 = 30)

- 11 a Elucidate the concept of a Perceptron with a neat diagram.  
OR  
b Justify why is it important to place non-linearities between the layers of neural networks.
- 12 a Analyze the following variants of Gradient Descent: Stochastic, Batch, and Mini-batch.  
OR  
b Enumerate about Test Sets, Validation Sets, and Overfitting.
- 13 a Enumerate about tensorflow and its types of tensors.  
OR  
b Develop a python code to explain sessions in tensor flow.
- 14 a Assess any two benefits of using convolutional layers instead of fully connected ones for visual tasks.  
OR  
b A convolutional layer in a neural network is composed of three 2x2 filters (with biases) and is applied to an input volume of shape (10, 10, 3) with no image padding and a stride of 2.  
(i) What is the shape of the output volume from the layer?  
(ii) How many learnable parameters are in the layer?
- 15 a Enumerate how the seq2seq model works.  
OR  
b Interpret the architecture of an RNN.

Z-Z-Z

END