

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2023

M.Tech-II Semester (CSE/IT/ECE/CE)

COURSE CODE(CREDITS): 22M11CI212(3)

MAX. MARKS: 35

COURSE NAME: Deep Learning Techniques

COURSE INSTRUCTORS: Dr. Abhilasha Sharma

MAX. TIME: 2 Hours

Note: (a) All questions are compulsory.

(b) Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems.

- Q 1) a). Explain with example how does the learning rate affect the training of the Neural Network? 3 (CO1)
b). What is the difference between Forward propagation and Backward Propagation in Neural Networks? 2 (CO1)
- Q 2) a). What are the problems associated with the Convolution operation and how can one resolve them? 3 (CO3)
b). Explain the significance of "Parameter Sharing" and "Sparsity of connections" in CNN. 2 (CO3)
- Q 3) a). How does a Recurrent Neural Network differ from a feed-forward network in terms of its structure and operation? 3 (CO3)
b). Explain what the vanishing gradient problem. How is it related to recurrent neural networks? 2 (CO3)
- Q 4) a). What is a Long Short-Term Memory (LSTM) Cell? How Does An LSTM Cell Address the Vanishing Gradient Problem? 2 (CO3)
b). What is the difference between Convolutional Neural Networks (CNN) and Recurrent Neural Networks (RNN) and in which cases would use each one? 3 (CO3)
- Q 5) a). Why do we use a Pooling Layer in a CNN? 2 (CO2)
b). Explain the terms "Valid Padding" and "Same Padding" in CNN. 3 (CO2)

Q 6)

Suppose we have a perceptron having weights corresponding to the three inputs (X1,X2,X3) have the following values:

5 (CO4)

$$w_1 = 2 ; w_2 = -4; \text{ and } w_3 = 1$$

and the activation of the unit is given by the step-function:

$$\phi(v) = 1 \text{ if } v \geq 0; \text{ otherwise } 0$$

Calculate the output value 'y' of the given perceptron for each of the following input patterns:

Pattern	P1	P2	P3	P4
X1	1	0	1	1
X2	0	1	0	1
X3	0	1	1	1

Q 7)

Let us consider a Convolutional Neural Network having three different convolutional layers in its architecture as –

5 (CO3)

- Layer-1: Filter Size – 3 X 3, Number of Filters – 10, Stride – 1, Padding – 0
- Layer-2: Filter Size – 3 X 3, Number of Filters – 20, Stride – 2, Padding – 0
- Layer-3: Filter Size – 5 X 5, Number of Filters – 40, Stride – 2, Padding – 0

If we give the input a 3-D image to the network of dimension 39 X 39, then determine the dimension of the vector after passing through a fully connected layer in the architecture.