PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST 1

Winter Semester: 2021 - 22

Course Code: CSE 235

Course Name: Introduction to Deep Learning

Program & Sem: B.Tech (Computer Engineering) & 6

Date: 25 April 2022

Time: 1.30pm to 2.30pm

Max Marks: 30

Weightage: 15%

Instructions:
(i) Read the all questions carefully and answer accordingly

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries 2 marks.   (4Qx 2M= 8M)

1. Define Deep learning. Write any two applications of deep learning.

[2M] (C.O.No.1) [Knowledge]

2. Write any two differences between deep learning and machine learning.

[2M] (C.O.No.1) [Knowledge]

3. Discuss any two weight initialization techniques in brief.   [2M] (C.O.No.1) [Knowledge]

4. Explain any two loss functions for regression in brief.   [2M] (C.O.No.1) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries 4 marks.   (3Qx4M=12M)

5. Given a set of training images of vehicles like truck and car, the task is to design a deep learning model to classify the images into either truck or car. Identify the activation function to be used in the hidden layers and the output layer. Discuss them in detail.

[4M] (C.O.No.1) [Comprehension]

6. When n hidden layers of deep learning model uses sigmoid activation function, n small derivatives are multiplied together. The gradient decreases exponentially as we propagate down to the initial layers. For Initial layers this restricts parameter updation. What is this problem called? Discuss the solutions to overcome this problem.   [4M] (C.O.No.1) [Comprehension]

7. Differentiate the three types of gradient based optimization techniques used in back propagation.   [4M] (C.O.No.1) [Comprehension]

Part C [Problem Solving Questions]

Answer the following Question. The question carries 10 marks.   **(1Qx10M=10M)**

8 Given the following artificial neural network, using ReLu as the activation function in both hidden and output layers, answer the following for 1 epoch.   [10M] (C.O.No.1) [Application]

$i_1 = 10$

$w_1 = 1$

$w_3 = 3$

h_1

O_1

$i_2 = 12$

$w_2 = 2$

Input Layer   Hidden Layer   Output Layer
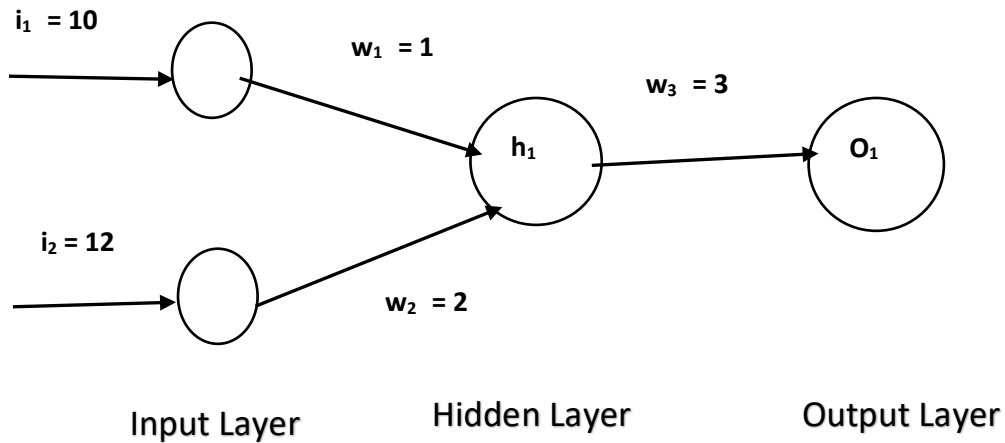
a) Find the predicted output for the inputs $i_1=10$ and $i_2=12$

b) Calculate the error assuming the actual output as 100

c) Update the weights using back propagation. Assume learning rate=0.05

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SCHOOL OF ENGINEERING

TEST 1

Winter Semester: 2021 - 22

Course Code: CSE 235

Course Name: Introduction to Deep Learning

Program & Sem: B.Tech (Computer Engineering) & 6

Date: 31/5/2022

Time: 1.30pm to 2.30pm

Max Marks: 30

Weightage: 15%

Instructions:

(i)   Read the all questions carefully and answer accordingly

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.   (3Qx 2M= 6M)

Q.NO.1. Discuss one to many and many to many Recurrent Neural Network (RNN) with example.
[2M] (C.O.No.1) [Knowledge]

Q.NO.2. Define stride and padding in Convolutional Neural Network. [2M] (C.O.No.1) [Knowledge]

Q.NO.3. Mention any two drawbacks of RNN.   [2M] (C.O.No.1) [Knowledge]

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries FIVE marks.   (2Qx5M=10M)

Q.NO.4. "ANN is not suitable for Sequential Data". Review the statement.
[5M] (C.O.No.1) [Comprehension]

Q.NO.5. Which deep learning supervised model is most suitable for weather forecasting application? Explain its architecture in detail.   [5M] (C.O.No.1) [Comprehension]

Part C [Problem Solving Questions]

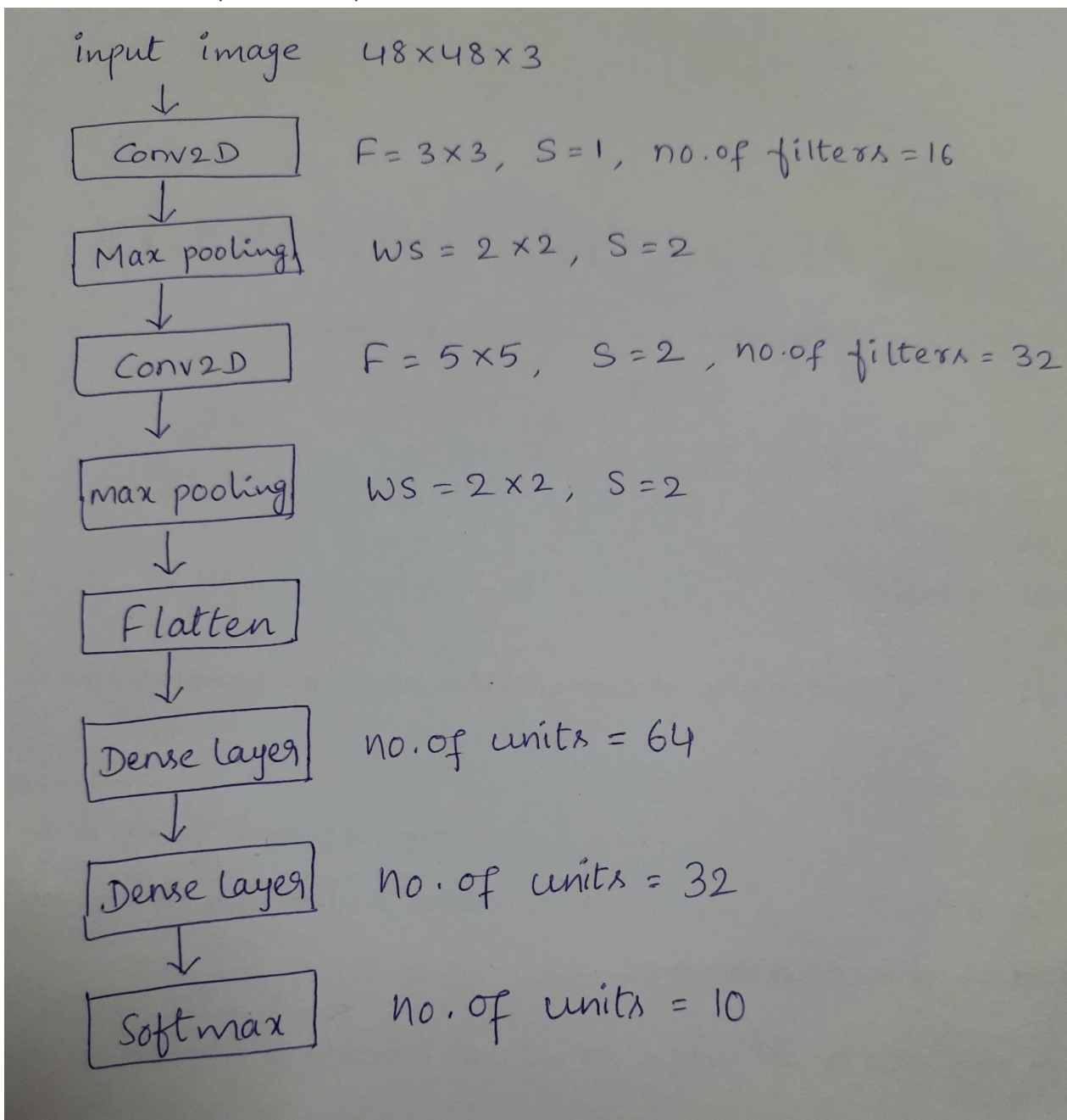**Answer the following Question. The question carries SEVEN marks.   (2Qx7M=14M)**

Q.NO.6. Apply the filter on the given input image and perform convolution operation with stride 1. Show the resulting feature matrix. Also, demonstrate result after applying Relu activation function. Then apply max pooling of window size 2X2 with stride 1 and show the final result.

[7M] (C.O.No.1) [Application]

Input image

2	3	4	6	1
7	2	9	0	3
5	8	6	2	7
9	7	8	5	2
1	0	3	2	4

Filter

1	0	-1
1	0	-1
1	0	-1

Q.NO.7. Calculate the output size and number of parameters of each layer given in the architecture diagram of CNN.   [7M] (C.O.No.1) [Application]

Note: F- filter size,   S- Stride,   WS- window size

input image   48 × 48 × 3
↓

Conv2D   F = 3×3, S = 1, no. of filters = 16
↓

Max pooling   WS = 2 × 2, S = 2
↓

Conv2D   F = 5×5,   S = 2, no. of filters = 32
↓

max pooling   WS = 2 × 2, S = 2
↓

Flatten
↓

Dense layer   no. of units = 64
↓

Dense layer   no. of units = 32
↓

Softmax   no. of units = 10

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF MANAGEMENT

END TERM EXAMINATION

Winter Semester: 2021 - 22

Course Code: CSE 235

Course Name: Introduction to Deep Learning

Program & Sem: BTech & VI Sem

Date: 28th June 2022

Time: 09:30 AM to 12:30 PM

Max Marks: 100

Weightage: 50%

Instructions:

(ii) Read the all questions carefully and answer accordingly.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries FOUR marks. (6Qx 4M= 24M)

1. Write any four differences between deep learning and machine learning.
(C.O.No.1) [Knowledge]
2. Explain the four hyper parameters related to the Autoencoder. (C.O.No.3) [Knowledge]
3. Explain weight initialization techniques. (C.O.No.1) [Knowledge]
4. Discuss in brief Boltzmann machine and Restricted Boltzmann Machine.
(C.O.No.3) [Knowledge]
5. Explain Types of RNN with application for each type. (C.O.No.2) [Knowledge]
6. Write a note on Hopfield Neural network. (C.O.No.3) [Knowledge]

Part B [Thought Provoking Questions]

Answer all the Questions. Each question carries EIGHT marks. (5Qx8M=40M)

7. An essay written in language 'A' has to be translated to language 'B'. Identify a suitable deep learning model for the same. The model should be capable of handling long short term memory. Answer the following questions.
   a. Which deep learning model is suitable for this language translation?
   b. Explain the architecture of this model with a neat diagram. (C.O.No.2) [Comprehension]
8. A physician needs to compress the medical reports of his/her patients which are MRI images. Identify the unsupervised deep learning model that will help the physician to get a compressed representation of his/her patient's reports. Answer all the following with respect to that model.
   a. With a neat diagram explain the architecture of the proposed image compression model
   b. Name the three properties of this model.
   c. List the various types of this model. (C.O.No.3) [Comprehension]
9. Ms. Shreshta would like to develop a deep learning model for face recognition in unconstrained environment. But she does not have sufficient training dataset. She wants to generate more number of training images from the existing face images. (C.O.No.3) [Comprehension]
   a. Suggest her the suitable deep learning model to generate new data
   b. Discuss the architecture of this model with a neat diagram.

10. Given MNIST dataset, the task is to design a deep learning model to classify the handwritten digits.

a. Identify the activation function to be used in the hidden layers and the output layer. Discuss them in detail.

b. Identify the suitable loss function and explain in detail. (C.O.No.1) [Comprehension]

11. Optimization algorithms in deep learning allow neural networks to learn faster and achieve better performance. Differentiate the three types of gradient based optimization techniques used in back propagation. (C.O.No.1) [Comprehension]

Part C [Problem Solving Questions]

Answer all the Questions. Each question carries TWELVE marks. (3Qx12M=36M)

12. Apply the filter on the given input image and perform convolution operation with stride 1. Show the resulting feature matrix. Also, demonstrate result after applying Relu activation function. Then apply average pooling of window size 2X2 with stride 1 and show the final result after flattening.

Input image

3	4	0	5	7	6	2
2	1	8	6	2	9	1
8	9	6	2	8	4	5
4	7	6	3	2	9	1
0	5	3	7	5	7	0
3	2	5	1	6	3	9
5	3	6	7	5	0	8

Filter

1	0	-1
1	0	-1
1	0	-1

(C.O.No.2) [Application]

13. Construct KSOM on the input 111, 110 and 010.

Number of clusters are 2

Learning rate: 0.5

Initial weight matrix: 0.1   0.2
                        0.3   0.4
                        0.5   0.6

Find the cluster to which the pattern 001 belongs to. (C.O.No.3) [Application]

14. Following artificial neural network is trained to recognize the XOR function. Using the weights, bias and the **step function (Z) as the activation function** in hidden and output layers, complete the truth table of the XOR function for each of the four input cases.

Note: consider each of the below case as input and calculate the output of the given neural network.

[x1=1, x2=1

X1=1, X2=0

X1=0, X2=1

X1=0, X2=0]

Step function: if Z>=0, output=1   else 0

(C.O.No.1) [Application]