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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

TEST-1

Fall Semester: 2021 - 22

Course Code: ECE 322

Course Name: Deep Learning and Applications

Program & Sem: B. Tech. & VI Semester

Date: 26th April 2022

Time: 1.30 PM to 2.30 PM

Max Marks: 30

Weightage: 15%

Instructions:

- (i) Read the all questions carefully and answer accordingly.
- (ii) Draw diagrams wherever necessary.
- (iii) Use of non-programmable scientific calculator is permitted.

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(3Qx 2M= 6M)

1. The perceptron is a basic building block in neural networks. The multilayer perceptron can classify input into two or more categories. What are the limitations of single layer perceptron which leads to use of multilayer perceptron. (C.O.No.1) [Knowledge]

2. Training is an important step in the neural network operation. Explain is the concept of training in neural networks. (C.O.No.1) [Knowledge]

3. The Artificial Neural Networks (ANN) and Deep Neural Networks (DNN) are popularly used terms in machine learning. Differentiate between ANN and DNN (any four points).

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

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries SIX marks.

(2Qx6M=12M)

4. Back propagation is an important concept in the Deep Neural Networks (DNN). Considering yourself as a design engineer, explain the importance of back propagation in minimization of loss function (error in output). (C.O.No.2) [Comprehension]

5. During the training of neural network, the batch size for training and upgrading the weight values plays significant role. Suggest suitable algorithm which reduce the training time and also reduce the processing complexity. Elaborate your suggested algorithm.

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

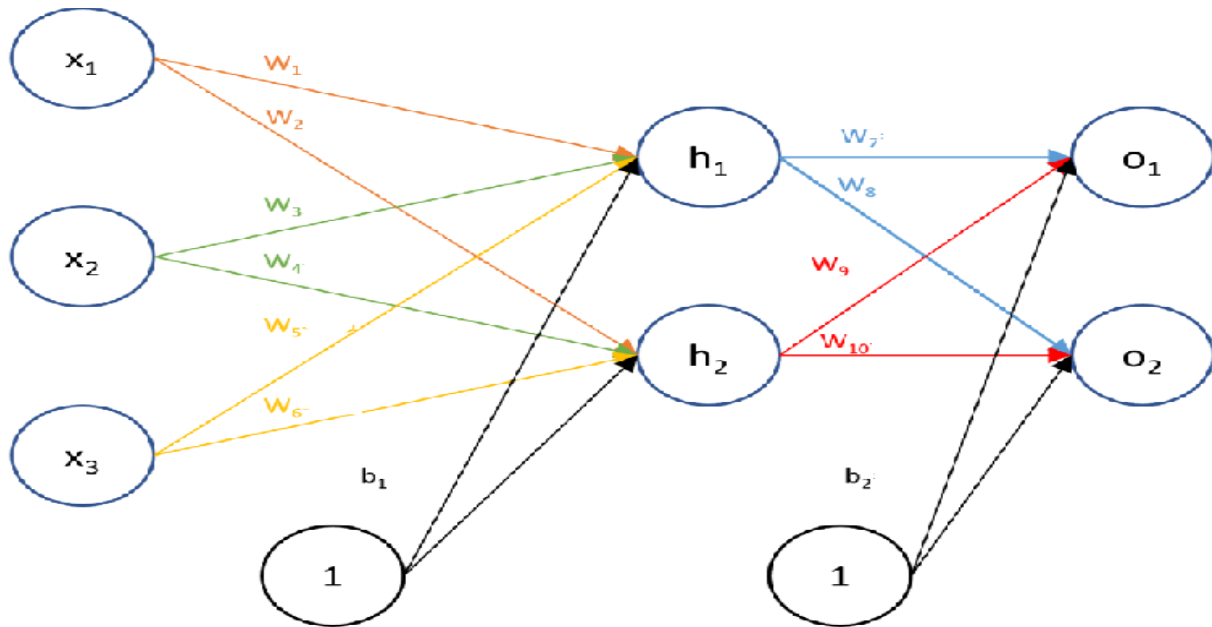
Part C [Problem Solving Questions]

Answer the Question. The question carries TWELVE marks.

(1Qx12M=12M)

6. The neural network operations contain two steps namely forward pass and backward pass. For the given neural network, calculate forward propagation and backward propagation (only one pass). The required values of weights and bias are as follows.

$W_1 = 0.5, W_2=0.3, W_3=0.5, W_4=0.7, W_5=0.9, W_6=0.85, W_7=0.45, W_8=0.35, W_9=0.75, W_{10}=0.25,$
 $b_1=1, b_2=1, x_1=1, x_2=4, x_3=5, t_1=12, t_2=6.5.$



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



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**PRESIDENCY UNIVERSITY
BENGALURU**

SCHOOL OF ENGINEERING

TEST-02 EXAMINATION

Fall Semester: 2021 - 22

Course Code: ECE 322

Course Name: Applications of Deep Learning

Program & Sem: B. Tech. & 6th Semester

Date: 1st June 2022

Time: 01:30 PM to 02:30 PM

Max Marks: 30

Weightage: 15%

Instructions:

- (i) *Read the all questions carefully and answer accordingly.*
- (ii) *Draw diagrams wherever necessary.*
- (iii) *Use of non-programmable scientific calculator is permitted.*

Part A [Memory Recall Questions]

Answer all the Questions. Each question carries TWO marks.

(3Qx 2M= 6M)

- 1) The training is an important process in design of neural network. The over fitting of a network can cause affect the accuracy during real time applications. Explain the concept of over fitting in neural networks with suitable example. [02 M] (C.O.No.1) [Knowledge]
- 2) PixelNet is CNN architecture designed for various classification applications. Write short note on PixelNet. [02 M] (C.O.No.1) [Knowledge]
- 3) The Convolutional Neural Networks are widely used for classification activities in various areas like agriculture, biomedical, surveillance, etc. Compare CNN and ANN with respect to following points. [02 M] (C.O.No.2) [Knowledge]
- a) No of layers
b) Classification accuracy
c) Width and Height
d) Training time

Part B [Thought Provoking Questions]

Answer both the Questions. Each question carries SIX marks.

(2Qx6M=12M)

- 4) The transfer learning is very popular technique in the process of neural network based application development. From the designer's point of view, justify the use of transfer learning over development of network from scratch. [06 M] (C.O.No.3) [Comprehension]
- 5) The Convolutional Neural Network (CNN) consists of Convolutional Layer with multiple filters and pooling layers. The RELU layer is used to introduce non-linearity in the network architecture. Justify, what is the need of introducing non-linearity in neural network?

[06 M] (C.O.No.2) [Comprehension]

Part C [Problem Solving Questions]

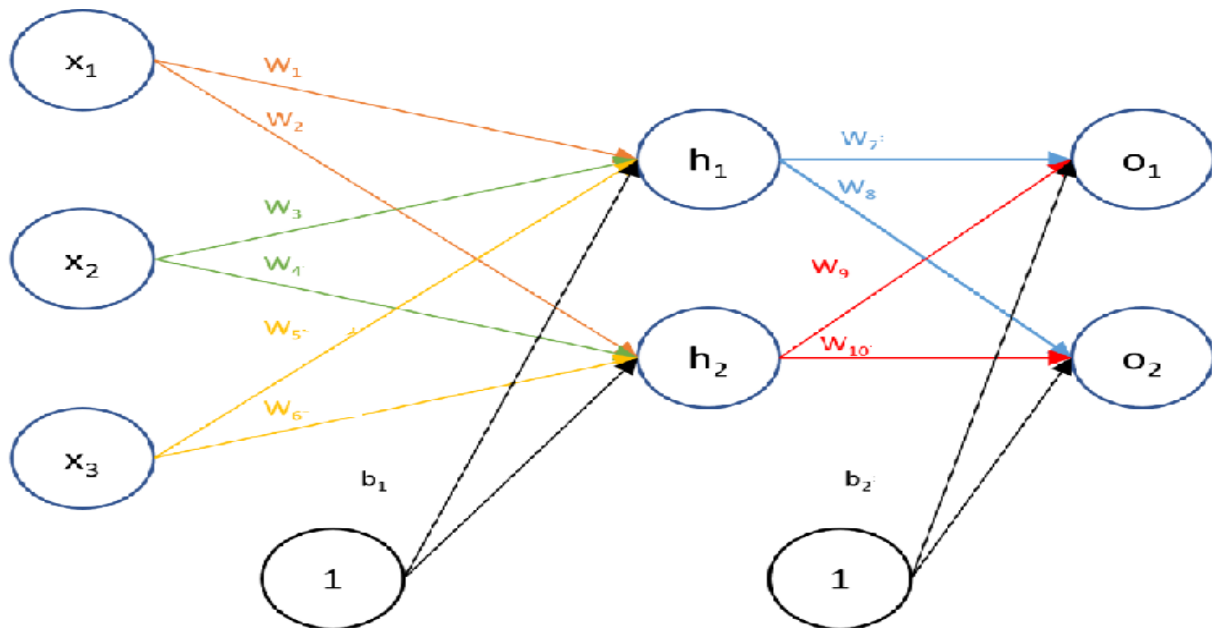
Answer both the Questions. Each question carries TWELVE marks.

(2Qx06M=12M)

6) Mr. John is working on model development for traffic image classification. As a designer elaborate stepwise, how Mr. John will develop CNN model for the required application? What are the various factors Mr. Sam should consider in the development? [06 M] (C.O. No. 3) [Application]

7) The neural network operations contain two steps namely forward pass and backward pass. For the given neural network, calculate forward propagation and final error in predicted output using the 'Tanh' activation function. The required values of weights and bias are as follows.

$W_1=0.3, W_2=0.5, W_3=0.45, W_4=0.75, W_5=0.85, W_6=0.9, W_7=0.5, W_8=0.35, W_9=0.65, W_{10}=0.65,$
 $b_1=1, b_2=1, x_1=1, x_2=4, x_3=5$



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

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PRESIDENCY UNIVERSITY
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SCHOOL OF ENGINEERING

ENDTERM EXAM

ODD Semester: 2021-22

Course Code: ECE 322

Course Name: Deep Learning and Applications

Programme & SEM: B. Tech & 6th semester

Date: 30th June 2022

Time: 09:30 AM to 12:00 PM

Max Marks: 100

Weightage: 50%

Instructions:

- (iv) *Read Questions carefully and answer accordingly*
- (v) *Scientific and Non- programmable calculators are permitted*

PART A (Memory Recall Questions)

Answer the following Questions each question carries SIX Marks

[5Q x 6M = 30M]

1. During the training of neural network, the batch size for training and upgrading the weight values plays significant role. Suggest suitable algorithm which reduce the training time and also reduce the processing complexity. Elaborate your suggested algorithm.
(C.O.No.3) [Knowledge]
2. As the size of neural network increases the error in predicted output also increases. As a designer how will justify this and suggest suitable remedy to reduce output error value in network.
(C.O.No.2) [Knowledge]
3. DenseNet is CNN architecture designed for various classification applications. Write short note on PixelNet.
(C.O.No.2) [Knowledge]
4. The Convolutional Neural Network (CNN) consists of Convolutional Layer with multiple filters and pooling layers. The RELU layer is used to introduce non-linearity in the network architecture. Justify, what is the need of introducing non-linearity in neural network?
(C.O.No.1) [Knowledge]
5. The transfer learning is an alternative technique for deep learning based application design. Write note on transfer learning.
(C.O.No.2) [Knowledge]

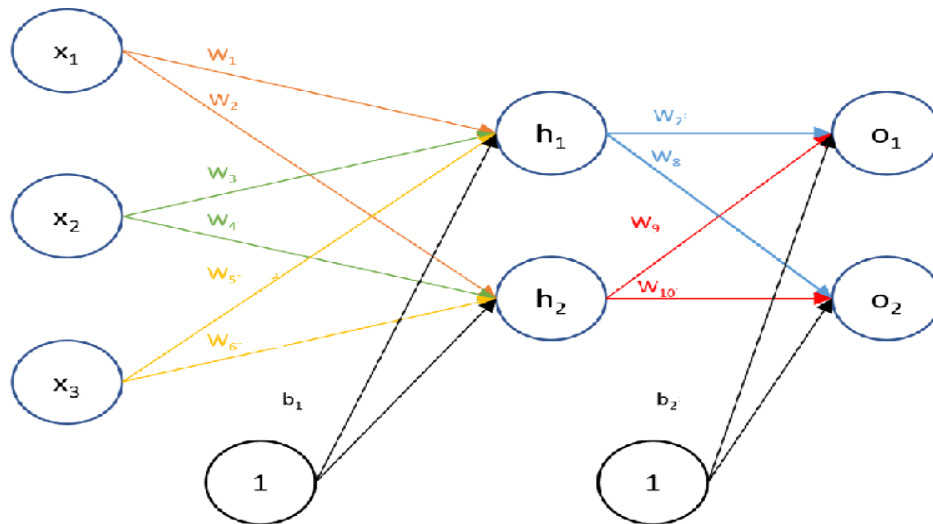
PART B (Thought Provoking Questions)

Answer the following Questions each question carries TEN Marks

[4Q x 10M = 40M]

6. The neural network operations contain two steps namely forward pass and backward pass. For the given neural network, calculate forward propagation and final error in predicted output using the 'Sigmoid' activation function. The required values of weights and bias are as follows.

$W_1= 0.35, W_2=0.65, W_3=0.75, W_4=0.65, W_5=0.25, W_6=0.8, W_7=0.55, W_8=0.30, W_9=0.60, W_{10}=0.85, b_1=1, b_2=1, x_1=2, x_2=2, x_3=4$



(C.O.No.3) [Comprehension]

7. Mr. Brown is working on model development for flower image classification. As a designer elaborate stepwise, how Mr. Brown will develop CNN model for the required application? What are the various factors Mr. Brown should consider in the development?
(C.O.No.4) [Comprehension]
8. The under fitting or over fitting of model leads to reduction in testing accuracy. What is the importance of optimal fitting of model in application development? From the designer's point of view, how to avoid over fitting and under fitting?
(C.O.No.4) [Comprehension]
9. During the training of neural network, the batch size for training and upgrading the weight values plays significant role. Suggest suitable algorithm which reduce the training time and also reduce the processing complexity. Elaborate your suggested algorithm.
(C.O.No.3) [Comprehension]

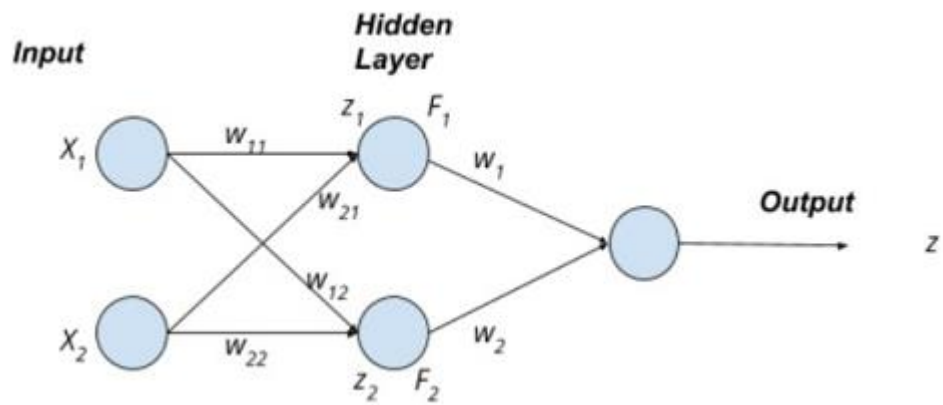
PART C (Problem Solving Questions)

Answer the following Questions each question carries TEN Marks

[3Q x 10M = 30M]

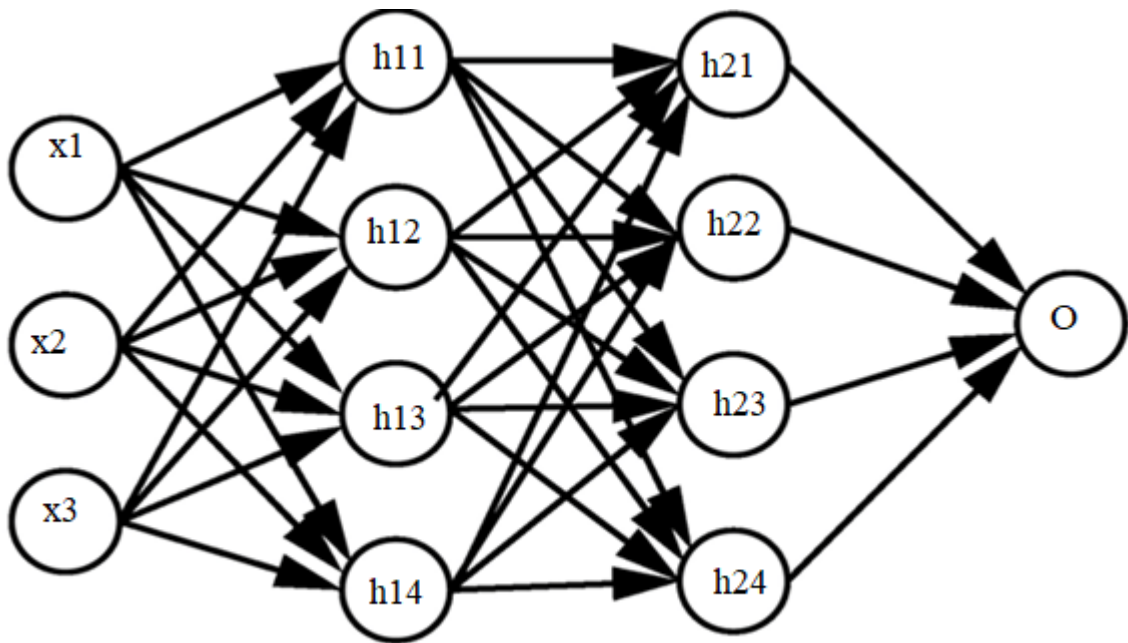
10. The neural network operations contain two steps namely forward pass and backward pass. For the given neural network, calculate forward propagation and backward propagation (only one pass). The required values of weights and bias are as follows.

$W_{11}=0.5, W_{12}=0.75, W_{21}=0.45, W_{22}=0.6, W_1= 0.25, W_2=0.3, X_1=2, X_2=3, \text{ bias value}=1, \text{ target output}= 1.5$ for calculation.



(C.O.No.3) [Application]

11. Dropout is an important remedy to avoid the overfitting in neural networks. Consider the following neural network and apply dropout to 10% neurons in h1 and h2 layer. Calculate the forward propagation for one pass using "Tanh" activation.



(C.O.No.4) [Application]

12. Mr. Sam is working on model development for medical image classification. As a designer elaborate stepwise, how Mr. Sam will develop CNN model for the required application? What are the various factors Mr. Sam should consider in the development? Explain the importance of Convolutional Layer in this design.

(C.O.No.4) [Application]