| Roll No | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|

# PRESIDENCY UNIVERSITY
# BENGALURU

**SET B**

## SCHOOL OF ENGINEERING
## END TERM EXAMINATION - JAN 2024

**Semester :** Semester V - 2021
**Course Code :** ECE3031
**Course Name :** Applications of Deep Learning
**Program :** B.Tech.

**Date :** 10-JAN-2024
**Time :** 9:30AM - 12:30 PM
**Max Marks :** 100
**Weightage :** 50%

**Instructions:**
*(i) Read all questions carefully and answer accordingly.*
*(ii) Question paper consists of 3 parts.*
*(iii) Scientific and non-programmable calculator are permitted.*
*(iv) Do not write any information on the question paper other than Roll Number.*

### PART A

**ANSWER ALL THE QUESTIONS** **4 X 5M = 20M**

1. Deep learning is a more preferred in many applications over machine learning due to several advantages of it. Explain why deep learning is superior over machine learning. Also state any two limitations of deep learning.

(CO1) [Knowledge]

2. The single layer perceptron can be used for linear and less complex but cannot be used for non-linear applications. Justify this statement with necessary diagram. Also mention the modification neds ti be done in signle perceptron to handle non-linear and complex datasets.

(CO2) [Knowledge]

3. Simple perceptron can not handle multiclass classification situations due to Ex-OR problem in percpetron. Explain what modifications are needed in simple perceptron to make capable of handling multiclass situations.

(CO2) [Knowledge]

4. The size of neural network is represented using width and depth and network. Explain the significance of width and depth of the network with suitable diagrams.

(CO1) [Knowledge]

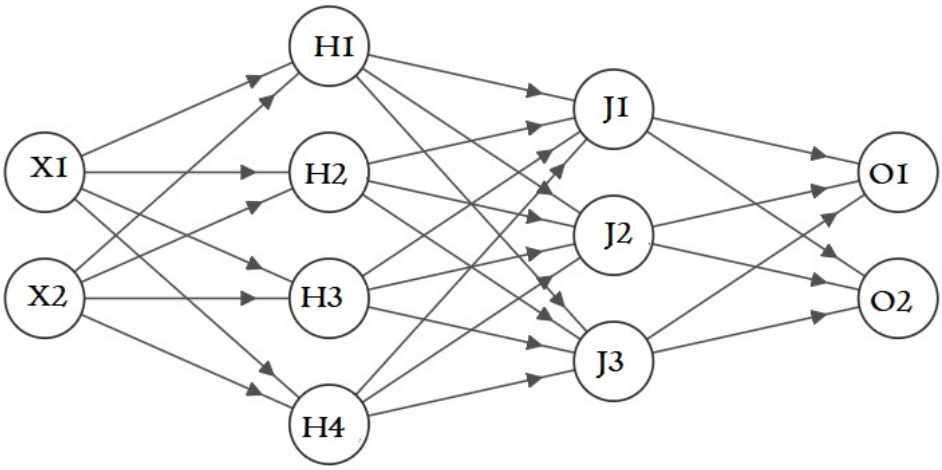
## PART B

**ANSWER ALL THE QUESTIONS** **5 X 10M = 50M**

**5.** Visual Geometry Group (VGG) is created several Convolotional Neural Networks (CNN) such as VGG 16/19 for image processing applications. Compare the VGG 16/19 with AlexNet and GoogleNet with respect to any ten parameters.

(CO2) [Comprehension]

**6.** Backward and forward propagation are the two important stages in the neural network operation. Perform the forward propagation of one iteration using sigmoid activation function for thhe given network. (Assume necessary values)




| | | | |
|---|---|---|---|
| X1=1.2 | X2=1.5 | | |
| W11=0.12 | W12=0.21 | W13=0.31 | W14=0.4 |
| W21=0.13 | W22=0.22 | W23=0.32 | W24=0.41 |
| WH11=0.14 | WH12=0.23 | WH13=0.33 | B1=0.5 |
| WH21=0.15 | WH22=0.24 | WH23=0.34 | B2=1 |
| WH31=0.16 | WH32=0.25 | WH33=0.35 | B3=0.5 |
| WH41=0.17 | WH42=0.26 | WH43=0.36 | |
| WJ11=0.18 | WJ12=0.27 | WJ21=0.37 | WJ22=0.45 |
| WJ31=0.19 | WJ32=0.28 | | |

(CO2) [Comprehension]

**7.** Convolutional Neural Network consists of mainly convolutional layer, RELU layer, pooling layer and fully connected layers. The convolutional layer is an important layer in CNN which consists of various ftypes of filters. Explain the role of filters in CNN with necessary diagrams and also explain how accuracy of the network can be improved by adjusting the filters.

(CO3) [Comprehension]

**8.** The remote sensing reserach center team is developing a CNN based system to identify various categories of land such as barren land, crops, lake and many more. The INSAT-01 images are provided as training dataset. As a neural network design engineer, write briefly about steps in this application development, training and testing process, performance analysis of the designed network.

(CO3) [Comprehension]

**9.** The CNN are more accurate and precise compared to the simple neural networks for image processing applications. Explain the need of pooling layer while handling large size images during the training and validation process. Also comment on effect of pooling layer on classification accuracy.

(CO4) [Comprehension]

## PART C

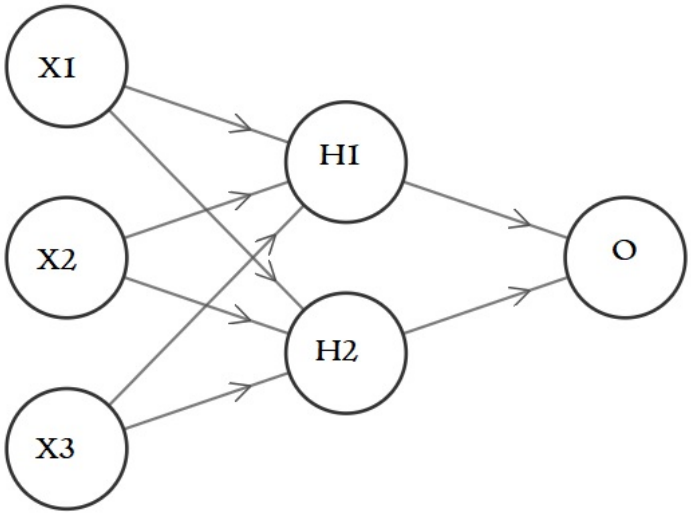
**ANSWER ALL THE QUESTIONS** **2 X 15M = 30M**

**10.** Confusion matrix is used for analysis of CNN operation. It represents the performance of the network for each class. For the below given confusion matrix, compute classwise accuracy, precision (positive and negative), recall (positive and negative), F1 score (pistive and negative). Also comment on the suitability of the network for further utilization.

| | | Predicted Values | | | |
|---|---|---|---|---|---|
| | | Class 1 | Class 2 | Class 3 | Class 4 |
| Actual Values | Class 1 | 100 | 20 | 10 | 10 |
| | Class 2 | 90 | 40 | 15 | 05 |
| | Class 3 | 115 | 30 | 05 | 10 |
| | Class 4 | 132 | 03 | 10 | 05 |

(CO4) [Application]

**11.** The error berween prediction and actual values of neural network output can be reduced using backward propagation process. Perform one forward and backward pass of neural network opertion without any activation function. Use the below given network and parameter values. (Assume suitable values).




| | | |
|---|---|---|
| X1=2 | X2=1 | X3=3 |
| W11=0.55 | W12=0.35 | WH1=0.15 |
| W21=0.21 | W22=0.26 | WH2=0.34 |
| W31=0.37 | W32=0.25 | B1=1 |
| B2=0.5 | T=1 | α=0.1 |

(CO3) [Application]