PRESIDENCY UNIVERSITY
BENGALURU

SET A

SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024

Semester : Semester VII - 2020

Course Code : ECE3051

Course Name : Machine Learning and Deep Learning Using Fpga
Program : B.Tech.

Date : 05-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**   **5 X 2M = 10M**

1. Activation function is used with the neural network at every stage of the manipulations. Exemplify the significance of activation function

(CO4,CO3) [Knowledge]

2. Weights in the neural neteorks are assigned randomly at the start. Justify the significance of weights in ANN?

(CO4,CO3) [Knowledge]

3. The KNN machine learning algorithm is used to the classsify the data samples. The formulation for the KNN algorithm is given by _____

(CO3,CO4) [Knowledge]

4. Activation functions play an integral role in neural networks by introducing nonlinearity. Depict the formulation for the sigmoid activation function

(CO1,CO3,CO2) [Knowledge]

5. The popularity of SVMs is likely due to their amenability to theoretical analysis, their flexibility in being applied to a wide variety of tasks. Depict the SVM formulation with example

(CO1,CO2,CO3) [Knowledge]

6. For the given neural network, Calculate the output of the network (y) for each of the input patterns(x1,x2,x3) : (1,0,0), (0,1,1), (1,0,1) & (1,1,1). Assume the weights as W1 = 2; W2=-4; W3 = 1; and activation function as $\varphi(v) = \begin{cases} 1, & if\ v \geq 0 \\ 0, & Otherwise \end{cases}$
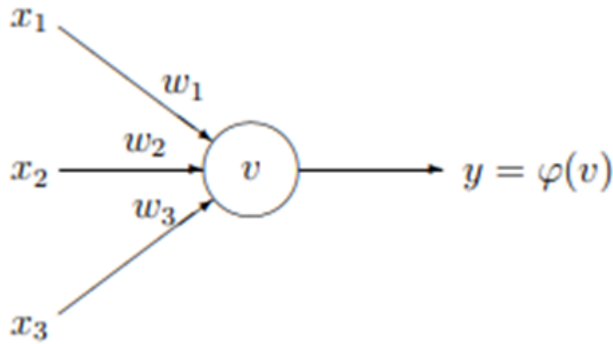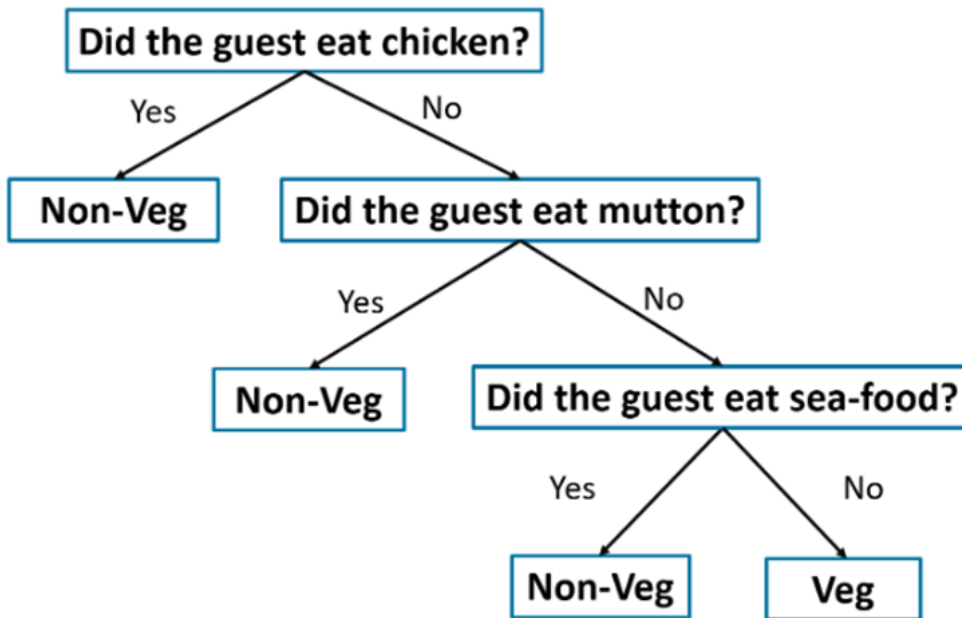

(CO3,CO4) [Comprehension]

7. Develop a Back propagation algorithm for Feed forward neural network consisting of one input layer, one hidden layer and output layer.

(CO4,CO3) [Comprehension]

8. In VHDL , the conditional statement are utilized to check the conditions of any given situations.Develop the VHDL code for the decision tree as given below

(CO2,CO3) [Comprehension]

9. Predict the new instance say {Color = Green, Legs =2 , Height = Tall, Smelly = No} will be "Species M or N" using the Naïve Bayes Algorithm.

No	Color	Legs	Height	Smelly	Species
1	White	3	Short	Yes	M
2	Green	2	Tall	No	M
3	Green	3	Short	Yes	M
4	White	3	Short	Yes	M
5	Green	2	Short	No	H
6	White	2	Tall	No	H
7	White	2	Tall	No	H
8	White	2	Short	Yes	H

(CO3,CO2) [Comprehension]

10. The KNN algorithm is accurate for regression than classification. Predict the decision of Tuhina using the KNN algorithm

| Name	Age	Gender	Decision
Ajay	32	M	Football
Mark	40	M	Neither
Sara	16	F	Cricket
Zaira	34	F	Cricket
Sachin	55	M	Neither
Rahul	40	M	Cricket
Pooja	20	F	Neither
Smith	15	M	Cricket
Laxmi	55	F	Football
Michael	15	M	Football
Tuhina	5	F	?

(CO3,CO2,CO1) [Comprehension]

PART C

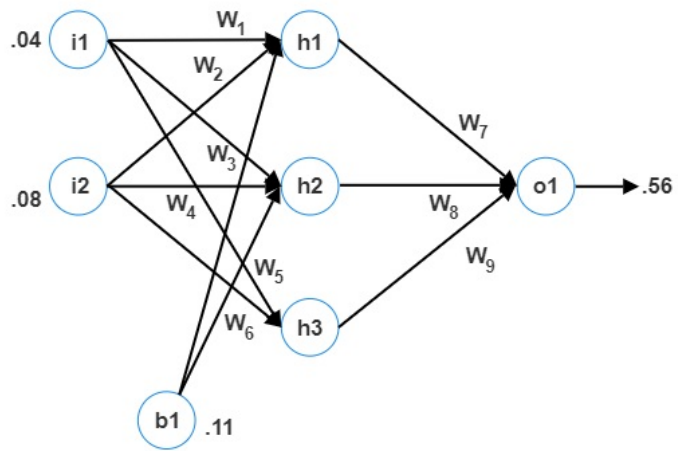**ANSWER ALL THE QUESTIONS**   **2 X 20M = 40M**

11. The behavioral model of the HDL code is useful in the design of condition based classification. Develop the VHDL code for the decision tree classifier as given below using the IF block. Develop the VHDL code for the following decision tree classification using the behavioral model.
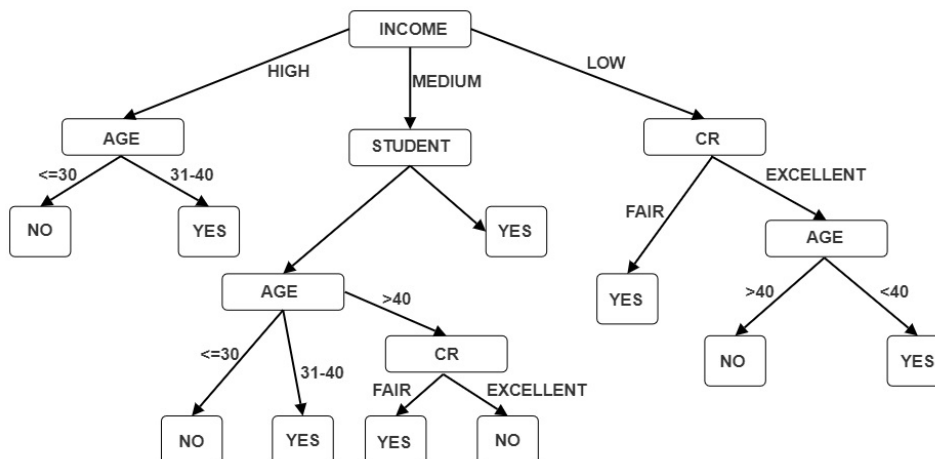
(CO4,CO3) [Application]

12. Iterate the neural network for one complete cycle and calculate the error for the following with W1 = 0.1; W2 = 0.9; W3 = 0.7; W4= 0.6;W5 = 0.3; W6 = 0.2; W7=0.12; W8=0.34 & W9 = 0.78

(CO4,CO3) [Application]