PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST - 1

Even Semester: 2018-19   **Date**: 06 March 2019

Course Code: ECE 401   **Time**: 1 Hour

Course Name: Artificial Neural Networks   **Max Marks**: 40

Programme & Sem: B.Tech (Open Elective) & VIII Sem (Group-I)   **Weightage**: 20%

Instructions:

(i)   ***It is a closed Book test***
(ii)   ***Calculator exchange is not allowed***

Part A

Answer **all** the Questions. **Each** question carries **four** marks.   (3Qx4M=12)

1. Define (a)Neural Networks, (b) Synaptic Weights
2. Draw neat figures showing feed forward and recurrent networks.
3. State the principle of SLP learning with respect to linearly separable spaces (No derivation - only state the theorem). Draw any example pair of classes and boundaries for possible SLP classifiers.

Part B

Answer **both** the Questions. **Each** question carries **six** marks.   (2Qx6M=12)

4. Compare Learning Algorithms and Learning Paradigms. Name 3 Learning Paradigms and 4 Learning Algorithms.
5. State and Explain 4 rules for knowledge

Part C

Answer **both** the Questions. **Each** question carries **eight** marks.   (2Qx8M=16)

6. Write and explain SLP convergence algorithm step by step
7. Take a learning example with 2 inputs – x1 and x2 and create neural network for **AND** gate. Consider Inputs **True = 1; False = 0**. Take w1=5; w2=5; bias input =1; Bias weight (fixed) = (- 5). Write truth table for AND gate and show learning steps to make SLP from AND gate. Consider Learning rate =1.

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

TEST - 2

Even Semester: 2018-19   **Date**: 16 April 2019

Course Code: ECE 401   **Time**: 1 Hour

Course Name: Artificial Neural Networks   **Max Marks**: 40

Program & Sem: B.Tech & VIII Sem (Open Elective) Group-I   **Weightage**: 20%

Instructions:
- (i) *It is a closed Book test*
- (ii) *Calculator exchange is not allowed*

Part A

Answer **all** the Questions. **Each** question carries **four** marks.   (3Qx4M=12)

1. Discuss the suitability of OR and XOR to SLP and MLP, implement both and explain.
2. Draw a 3 input AND SLP implementation and **show** all 8 input combinations and verify
3. Draw any possible implementation and **verify** operation for 2 input NOR gate.

Part B

Answer **both** the Questions. **Each** question carries **eight** marks.   (2Qx8M=16)

4. Draw and MLP of 3 hidden layers. The depth of each layer from input to output side is 7,{6,5,4},3. Derive the Equation for (a) One forward function calculation from i^{th} to j^{th} layer in terms of weight matrix and input matrix; (b) One stage of backward error propagation in terms of weight matrix and output error matrix
5. Calculate the operating truth table of the following network and name the gate it implements. Label each node as per convenience. Assume threshold activation function everywhere.
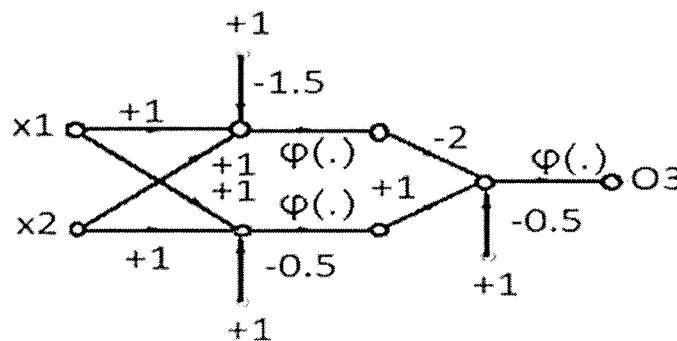
Part C

Answer the Question. **The** Question carries **twelve** marks.   (1Qx12M=12)

6. State Derive SLP Theorem from beginning to end to get expression for N iterations

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

END TERM FINAL EXAMINATION

Even Semester: 2018-19   **Date**: 22 May 2019

Course Code: ECE 401   **Time**: 3 Hours

Course Name: Artificial Neural Networks   **Max Marks**: 80

Program & Sem: **Weightage**: 40%

Instructions: All questions are compulsory. No exchange of calculators allowed.
Decide the depth of the answers as per the marks allotted and time calculation

Part A

Answer all the Questions. Q1 carries 14 and Q2 carries 6 marks. (14+6=20 minutes)

1. Fill in the Blanks   (7Qx2M=14M)

a. ANN resembles the brain in two respects: ___ is acquired by the network from its environment through a learning process, and Interneuron connection strengths, known as ____ ____ are used to store the acquired knowledge.

b. Neural Networks can be defined as ___ with directed graphs or as ___ with probabilistic representations

c. ____ inputs (i.e., patterns drawn) from ____ classes should usually produce widely ____ representations inside the network, and should therefore be classified as belonging to separate class.

d. If a particular feature is important, then there should be a ____ ___ __ involved in the representation of that item in the network. An Example of this is ____

e. SLP can classify ____ problems. Examples of such problems are ____, ____, ____ (any 3)

f. MLP is used to classify ____ problems. Examples are ___ , ____ , ____ . (any 3)

g. Hebbian algorithm is used in ____ learning whereas error correction scheme is used in ____ learning

2. Match the Following   (6Qx1M=6M)

Column A		Column B	
a.	Linearly Separable	i.	Recurrent Network
b.	Email Classifier	ii.	XOR gate
c.	Non Linearly Separable	iii.	4 input NOR gate
d.	Rain Prediction accuracy	iv.	Probabilistic learning
e.	JK Flip FLop	v.	Bayes Theorem
f.	Stochastic Neuron	vi.	MLP System

Part B

Answer all the Questions. Each question carries FIVE marks.(50 minutes)   (4Qx5M=20M)

3. Draw an SLP and write truth table calculation for v and y in (a) 3 Input NAND gate (b) 3 input NOR gate (c) 2 Input AND (d) 2 Input OR gate (no explanations needed)

4. (a) Draw a 2 input SLP for the following table. Assume Initial Synaptic Weights are all zero; True = 1; False = 0; η = 1; Bias = (- 2.5). (b) Will there be any learning at row 1,2,3 and why? (c) Show 3 steps of learning at last row of the given table to get the following function, and name the gate being created.

Input 1 =x	Input 2 = y	Output = Z
O	O	O
O	1	O
1	O	O
1	1	1

5. What is a Learning Algorithm? Name 3 LAs and write a short note on all 3 Learning Algorithms with relevant figures.

6. Explain Learning with teacher paradigm in detail with figures and equations, explaining each symbol used by you.

Part C

Answer all the Questions. Each question carries 7 marks. (70 minutes)   (4Qx7M=28M)

7. Write FA Table with justification of rows; Draw the Neural Network for a full adder and show how it works for carry bit and for sum bit. You can choose any topology and bias.

8. Write truth table for DESIRED outputs of an SR Flip Flop and T Flip Flop. Implement SR Flip Flop using ANN with feedback and prove each row of its truth table with explanations.

9. Explain the concept of minima, slope and gradient. (a) Prove Gradient Descent equation, clearly defining the meaning of each symbol and term you are using (b) Get equation for local gradient global one (c) Show graphically the meaning of the term "Gradient Descent"

10. (a) Derive the equations for Bayes Theorem. (b) Assume the probability of a person actually getting cancer in a population set is 1%; the best clinical test claims a correct prediction rate of 95% whenever actually has patient has and 90% whenever there is no cancer. Calculate the probability that (c)The patient actually has cancer given that the person has been diagnosed with cancer by this test. (d) The patient actually does not have has cancer given that the person has been diagnosed free of cancer by this test.

Question 12 carries 12 marks (30 minutes)

11. 6 training messages are as in table below

Message	Target	Desired
Hi, happy birthday to you	Personal	-1
Sir informed that farewell is postponed due to amcat test	Official	+1
You have a campus interview tomorrow	Official	+1
Mummy has kept a party for my birthday	Personal	-1
Sir mailed that the Amcat test is scheduled tomorrow	?	?

(Ignoring common words like you, that, ...) Words identified are:

Amcat	birthday	campus	farewell	going	hi	happy	informed	interview	kept
mailed	mall	movie	mummy	party	postponed	sir	scheduled	test	tomorrow

Perform learning through first 4 messages and get final weights starting with word present in message =1 and absent = 0. Take learning rate η = 1. All initial weights are zero. Classify the last message

PRESIDENCY UNIVERSITY
BENGALURU

SCHOOL OF ENGINEERING

SUMMER TERM / MAKE UP END TERM EXAMINATION

Semester: Summer Term 2019   **Date**: 25 July 2019

Course Code: ECE 401   **Time**: 2 Hours

Course Name: Artificial Neural Network   **Max Marks**: 40

Program & Sem: B.Tech & CSE/MEC/PET & VII Sem (2015 Batch)   **Weightage**: 40%

Instructions:
    (i)   ***Write legibly***
    (ii)   ***Assume suitable data if necessary***

Part A

Answer **all** the Questions. **Each** question carries **two** marks.   (6Qx2M=12)

1   Explain the concept of supervised and unsupervised learning?

2   For SLP calculate the error and indicate the case when the weight needs to be updated.

    (W1=w2=+5 bw=5 and b=1 assume training data of Nor gate)

3   Explain the batch learning and online learning?

4   Define learning rate with respect to back propagation algorithm and what is its range?

5   Explain the property of functions used in back propagation algorithm?

6   Explain the effect of momentum term used in training of back propagation algorithm.

Part B

Answer **both** the Questions. **Each** question carries **eight** marks.   (2Qx8M=16)

7   Design a X-NOR gate using MLP .

8   Derive the expression to explain the correction $\Delta w_{ji}(n)$ applied to $w_{ji}(n)$ using delta rule in back propagation algorithm.

.

Part C

Answer the Question. **The** Question carries **twelve** marks.   (1Qx12M=12)

9   For the network shown below, find the error at y1 and y2 with the given data

w10 = 0.2, w20 = 0.05, w11 = 0.1, w21 = 0.05, w12 = 0.15, w22 = 0.01, w13 = 0.3, w23 = 0.03, X = [1 2]and Y = [1 0] .