National University

Of Computer & Emerging Sciences Faisalabad-Chiniot Campus

AI 2002 Artificial Intelligence

Course Instructor

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Time allowed = 40 min	Quiz 6	Total Marks = 30

BCS Section E

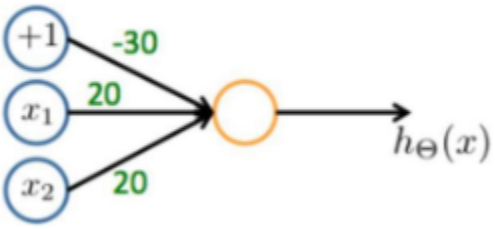
Roll No	Name	Signature

Question No 01: Choose the correct one. **[6]**

1. Which of the following is the correct formula for updating weights in the delta rule?	**2.** In the perceptron feed-forward phase, what is computed?
a) $\Delta w_i = \eta(t - o)x_i$ b) $\Delta w_i = \eta(o - t)x_i$ c) $\Delta w_i = \eta(t * o)x_i$ d) $\Delta w_i = \eta(t / o)x_i$	a) The gradient of the error function b) The weighted sum of inputs plus bias c) The threshold value d) The learning rate
3. What does the learning rate parameter control in gradient descent?	**4.** Which of the following is NOT a phase in the delta rule?
a) The accuracy of the final solution b) The step size in weight updates c) The threshold for activation d) The number of training iterations	a) Feed forward phase b) Error phase c) Update weight phase d) Backpropagation phase
5. if x=[1,1,0], t=1, η=0.5, and initial weights w_0=-0.3, w_1=0.5, w_2=0.5, what is the output of the linear unit?	**6.** **W**hich algorithm is faster and less computationally expensive?
a) 0.2 b) 0.7 c) 0.5 d) -0.3	a) Standard Gradient Descent b) Stochastic Gradient Descent c) Both are equally efficient d) Depends on the dataset size

Question No 02: Consider the following single layer perceptron which takes two binary inputs: x1 and x2 € {0, 1}, and outputs h (x). Given the weights parameters below, which of the following logical functions does'it (approximately) compute? Select only one option and show your working to get any credit. **[14 Marks]**

(A) OR
(B) AND
(C) NAND
(D) XOR



Truth Table For each Gate:

x1	x2	x1 AND x2	x1 OR x2	x1 NAND x2	x1 XOR x2
0	0	0	0	1	0
0	1	0	1	1	1
1	0	0	1	1	1
1	1	1	1	0	0

AND Gate

X1	X2	Output= b + w1x2 + w2x2	Threshold	Perceptron output	Target output
0	0	-30	-30< 0	0	0
0	1	-10	-10 < 0	0	0
1	0	-10	-10 < 0	0	0
1	1	10	10 > 0	1	1

OR Gate

X1	X2	Output= b + w1x2 + w2x2	Threshold	Perceptron output	Target output
0	0	-30	-30< 0	0	0
0	1	-10	-10 < 0	0	1
1	0	-10	-10 < 0	0	1
1	1	10	10 > 0	1	1

NAND Gate

X1	X2	Output= b + w1x2 + w2x2	Threshold	Perceptron output	Target output
0	0	-30	-30< 0	0	1
0	1	-10	-10 < 0	0	1
1	0	-10	-10 < 0	0	1
1	1	10	10 > 0	1	0

Question No 03: **[4 + 6 Marks]**

(a) Draw a multilayer perceptron with three inputs, 2 hidden layers with 3 neurons, and an output layer with 2 neurons.

(b) Write the parameters of above network in matrices form and compute the size of each layer.

Input layer = 3
Hidden layer 1 = (3*3) + 3 = 12
Hidden layer 2 = (3*3) + 3 = 12
Output layer = (3*2) + 2 = 8

Total parameters = 12 + 12 + 8 = 32