

Examinations Commencing from 22nd November 2021 to 5th January 2022

Program: **Electronics Engineering**

Curriculum Scheme: Rev2016

Examination: BE Semester VII

Course Code: ELXDLO7031 and Course Name: NEURAL NETWORKS & FUZZY LOGIC

Time: 2 hour 30 minutes

Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The value of Logistic sigmoid function used in neural network varies in the range
Option A:	(-1,1)
Option B:	(0,1)
Option C:	(-2,2)
Option D:	(-10,10)
2.	What is the sequence of steps followed in training a perceptron? 1. For a sample input, compute an output 2. Initialize weights of perceptron randomly 3. Go to the next batch of dataset 4. If the prediction does not match the output, change the weights
Option A:	2,1,4,3
Option B:	1,4,3,2
Option C:	1,2,3,4
Option D:	2,3,4,1
3.	Radial Basis Function network uses which of the following function
Option A:	Ramp function
Option B:	Binary Step function
Option C:	Bipolar Step function
Option D:	Gaussian kernel function
4.	Which of the following can be used for clustering of data?
Option A:	Single layer perceptron
Option B:	Multi-layer perceptron
Option C:	Self organizing maps
Option D:	Radial Basis Function

5.	Let R and S be two fuzzy relations defined as follows. Then, the resulting relation, T, which relates elements of universe of X to elements of universe of Z using max-min composition is given by $R = \begin{bmatrix} 0.4 & 1 \\ 0.2 & 0 \end{bmatrix} \quad S = \begin{bmatrix} 0.1 & 0 \\ 0 & 1 \end{bmatrix}$
Option A:	$T = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$
Option B:	$T = \begin{bmatrix} 0.1 & 1 \\ 0.2 & 0 \end{bmatrix}$
Option C:	$T = \begin{bmatrix} 1 & 1 \\ 0.1 & 0 \end{bmatrix}$
Option D:	$T = \begin{bmatrix} 1 & 0.2 \\ 1 & 1 \end{bmatrix}$
6.	The learning rule used for finding the weights of an associative memory neural net is
Option A:	Competitive rule
Option B:	Hebb rule
Option C:	Widrow Hoff rule
Option D:	Perceptron rule
7.	In back propagation network the _____ helps in faster convergence .
Option A:	Weight
Option B:	Hidden layer
Option C:	Momentum factor
Option D:	Bias
8.	Which of the following is a type of unsupervised learning network?
Option A:	Radial Basis Function Network
Option B:	Bidirectional Associative Memory Network
Option C:	Adaline Network
Option D:	Adaptive Resonance Theory Network
9.	Consider two fuzzy sets $A = \{(low, 0.2), (medium, 0.4), (high, 0.6)\}$ $B = \{(low, 0.8), (medium, 0), (high, 1)\}$ $A \cap B$ is determined as
Option A:	$\{(low, 0.2), (medium, 0), (high, 0.6)\}$
Option B:	$\{(low, 0.8), (medium, 0.4), (high, 1)\}$
Option C:	$\{(low, 0.16), (medium, 0), (high, 0.6)\}$
Option D:	$\{(low, 0.4), (medium, 1), (high, 0.006)\}$

10.	The Lambda –cut set for $\lambda=0.6$ for the given fuzzy set $A = \left\{ \frac{1}{20} + \frac{0.3}{30} + \frac{0.6}{40} + \frac{0.9}{50} + \frac{0.4}{60} \right\}$
Option A:	$\left\{ \frac{1}{20} + \frac{0.3}{30} + \frac{1}{40} + \frac{0.9}{50} + \frac{0.4}{60} \right\}$
Option B:	$\left\{ \frac{1}{20} + \frac{0}{30} + \frac{1}{40} + \frac{1}{50} + \frac{0}{60} \right\}$
Option C:	$\left\{ \frac{0}{20} + \frac{1}{30} + \frac{0}{40} + \frac{1}{50} + \frac{0}{60} \right\}$
Option D:	$\left\{ \frac{0.6}{20} + \frac{0.6}{30} + \frac{0.6}{40} + \frac{0.6}{50} + \frac{0.6}{60} \right\}$

Q2. (20 Marks)	
A	Solve any Two 5 marks each
i.	<i>Explain the various learning rules.</i>
ii.	Explain perceptron convergence theorem.
iii.	Explain in brief Fuzzification process.
B	Solve any One 10 marks each
i.	Explain Perceptron Learning Algorithm and develop perceptron network to implement two input OR gate with binary input and bipolar target. Assume the learning rate is 1 .
ii.	Explain with diagram and training algorithm the Kohonen’s Self organized Feature map neural network and its applications.

Q3. (20 Marks)	
A	Solve any Two 5 marks each
i.	<i>What is the importance of bias in an artificial neural network?</i>
ii.	<i>Explain maximum membership principle of defuzzification</i>
iii.	Explain McCulloch-Pitts Neuron model.
B	Solve any One 10 marks each
i.	Explain in detail Adaptive Resonance Theory Networks.
ii.	<i>Design a Fuzzy Logic Controller.</i>

Q4. (20 Marks)	
A	Solve any Two 5 marks each
i.	Differentiate between linearly separable and nonlinearly separable patterns.
ii.	Explain in brief Fuzzification process.
iii.	Compare and contrast BAM and Hopfield networks.
B	Solve any One 10 marks each
i.	<i>Construct an auto associative network to store the vectors $x1=[-1 \ 1 \ 1 \ 1 \ -1]$; $x2=[1 \ -1 \ 1 \ 1 \ -1]$; $x3=[1 \ 1 \ -1 \ -1 \ -1]$. Find weight matrix with no self connection.</i>

	<p>Calculate the energy of the stored patterns using discrete Hopfield network .</p> <p>The test patterns are given as</p> $X1=[1 \ 1 \ 1 \ 1 \ -1]$ $X2=[1 \ -1 \ -1 \ -1 \ -1]$ $X3=[1 \ 1 \ -1 \ -1 \ -1]$
ii.	With neat architecture, explain training algorithm of Adaline network.