QP Code: RD17001075 Reg. No | | | | | | | | | | | AR 17

GIET MAIN CAMPUS AUTONOMOUS GUNUPUR – 765022

B. Tech Degree Examinations, December – 2020

(Seventh Semester)

BELPE 7031 / BEEPE 7031 – NEURAL NETWORKS & FUZZY LOGIC

(EE and EEE)

Time: 2 hrs Maximum: 50 Marks

The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions) (1 x 10 = 10 Marks)

Q.1. Answer ***ALL*** questions [CO#] [PO#]

a. Synapses in biological neuron are analogous to _____ in artificial neuron. CO1 PO3

(i) Input (ii) Output

(iii) Weight (iv) Summation

b. Learning refers to CO1 PO3

(i) Updation of input (ii) Updation of weights

(iii) Updation of target (iv) Updation of activation functions

c. The mathematical basis for the back propagation algorithm is CO2 PO4

(i) Activation functions (ii) Feed forward

(iii) Newton Raphson (iv) Gradient descent

d. The network in which the output of a neuron is fed back into itself as input is CO2 PO4

(i) Recurrent network (ii) Back propagation

(iii) Reinforcement (iv) Reverse network

e. There are several versions of the discrete Hopfield net. The type of input vectors described by Hopfield initially is CO3 PO4

(i) Discrete samples (ii) Bipolar

(iii) Binary (iv) Patterns

f. If crisp refers to (0,1) then fuzzy refers to CO4 PO3

(i) Between 0 to 1 (ii) Between 0 to -1

(iii) (1,0) (iv) (-1,+1)

g. Fuzzification is carried out by CO4 PO3

(i) Inferencing (ii) Pointers

(iii) Aggregators (iv) Membership functions

h. In GA, the strategy to ensure that the best chromosomes are not lost in the search process through generations is CO4 PO3

(i) Elitism (ii) Tabu search

(iii) Selection (iv) Convergence

i. If speed is high then apply brake. In this rule, speed is high refers to CO5 PO4

(i) Antecedent (ii) Consequent

(iii) Self organizing (iv) Inferencing

j. ANFIS refers to CO5 PO4

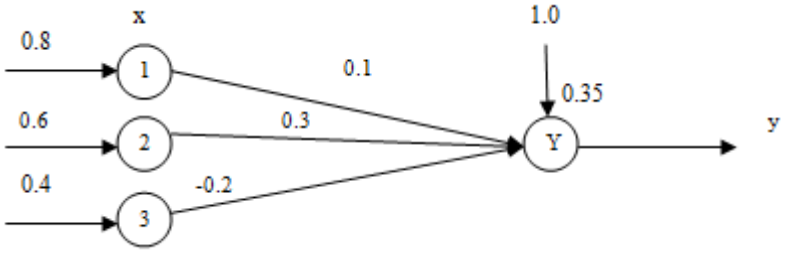
(i) Adaptive neuro fuzzy inference system (ii) Artificial neural and fuzzy inference system

(iii) Aggregation neural fuzzy (iv) Association of neural fuzzy

interfering system interconnected system

PART – B: (Short Answer Questions) (2 x 5 = 10 Marks)

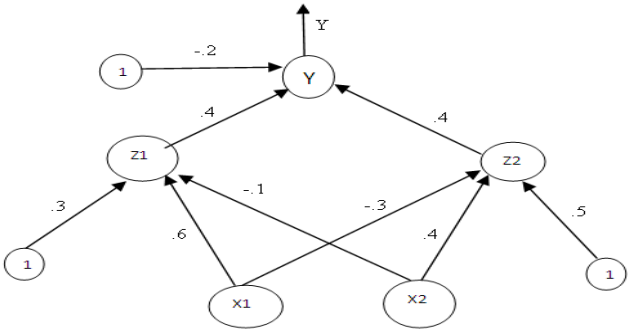
Q.2. Answer ***ALL*** questions	[CO#]	[PO#]
a. Sketch and mark the parts of a biological neuron.	CO1	PO3
b. Compare supervised and unsupervised learning and provide an example for each.	CO1	PO3
c. Illustrate the fundamental block diagram of neural network based controller.	CO3	PO3
d. Evaluate the output of the neuron y for the network shown in figure using binary sigmoid activation function.	CO5	PO3



e. Recall the properties of classical sets.	CO5	PO4	

PART – C: (Long Answer Questions) (6 x 5 = 30 Marks)

Answer ***ANY FIVE*** questions	Marks	[CO#]	[PO#]
3. Formulate the expression for the weight updating and explain the standard error back propagation algorithm used for feed forward networks.	(6)	CO1	PO3
4. Using back propagation network calculate the new weights for the network shown in the figure. It is represented with the input pattern [0,1] and the target output is 1. Use learning rate= .25 and identity activation function.	(6)	CO1	PO4



5. Write the application algorithm of discrete Hopfield network.	(6)	CO2	PO4
6. Perform a case study for the process identification and control of dynamical systems using neuro controller.	(6)	CO3	PO4
7. For a DC Shunt motor the membership functions for series resistance (Rse) and armature current (Ia) is given by μRse(%se) = {0.3/50 + 0.7/60 + 1.0/100 + 0.2/120} μIa(%a) = {0.2/20 + 0.4/40 + 0.6/60 + 0.8/80 + 1.0/100 + 0.1/120} and the membership function for (N) in motor speed(rpm)	(6)	CO4	PO4

μN(rpm) = {0.33/500 + 0.67/100 + 1.0/1500 + 0.15/1800}

a) Using max-min composition, find T = R o S

b) Using max-product composition, find T = R o S

8.	Write the step by step implementation procedure for GA.	(6)	CO5	PO4
9.	With necessary steps explain the fuzzy logic controller designed for image processing.	(6)	CO4	PO4
10.	A factory process control operation involves two linguistic (atomic) parameters consisting of pressure and temperature in a fluid delivery system. Nominal pressure limits range from 400 psi minimum to 1000 psi maximum. Nominal temperature limits are 130^0F to 140^0F.We characterize each parameter in a fuzzy linguistic terms as follows:	(6)	CO4	PO4

Low temperature= $\left\{\frac{1}{131}+\frac{0.8}{132}+\frac{0.6}{133}+\frac{0.4}{134}+\frac{0.2}{135}+\frac{0}{136}\right\}$

High temperature= $\left\{\frac{0}{134}+\frac{0.2}{135}+\frac{0.4}{136}+\frac{0.6}{137}+\frac{0.8}{138}+\frac{1}{139}\right\}$

High pressure= $\left\{\frac{0}{400}+\frac{0.2}{600}+\frac{0.4}{700}+\frac{0.6}{800}+\frac{0.8}{900}+\frac{1}{1000}\right\}$

Low pressure= $\left\{\frac{1}{400}+\frac{0.8}{600}+\frac{0.6}{700}+\frac{0.4}{800}+\frac{0.2}{900}+\frac{0}{1000}\right\}$

Compute the following membership functions: a) Temperature not very low, b) Temperature not very high ,c) Temperature not very low and not very high ,d) Pressure is slightly high (Hint:0.5), e) Pressure fairly high (Hint:2/3), f) Pressure not very low or fairly low.

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