Registration no: | | | | | | | | | | |

Total Number of Pages: 03 **M.TECH**

CSPE102

1st Semester Back Examination – 2016-17

COMPUTATIONAL INTELLIGENCE

BRANCH(S): CSE,IT

Time: 3 Hours

Max Marks: 70

Q.CODE:Y882

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

a) State Lukasiewicz implication rule and show that it is same for the following two Rules.

If x is A then y is B

If y is not B then x is not A

b) Given (x,y) $\in$ { 1,2,3 }, define $\mu_{EQUAL}(x,y)$ indicating when

$\mu_{EQUAL}(x,y) = 1, \ when \ x = y$

$\mu_{EQUAL}(x,y) \to 0, when \mid x - y \mid \geq L \arg e \ no$

Evaluate the relational matrix

c) Compute B=f(A), where A={0.2/(-1) ,0.4/(-2), 0.6/1,0.8/2, 0.9/3} and $f(x)=x^2$

d) How McCulloch-Pitts ANN model used to learn AND gate, where weight of the signals are w_1=0.5,w_2=0.5 respectively.

e) Find the slope of sigmoid function at Net=0.

f) Write the learning rule of perceptron model

g) What is the difference between supervised and unsupervised learning

h) Compute the following operation on a fuzzy set A={$0.1/x_1$, $0.5/x_2$, $0.7/x_3$, $0.8/x_4$, $0.9/x_5$} Core(A),Con(A),Dil(A),Support(A),α-cut(A)

i) Compute B=f(A), where A={0.2/(-1) ,0.4/(-2), 0.6/1,0.8/2, 0.9/3} and $f(x)=x^2$

j) Draw a 2-3-1 feed forward ANN and write different activation function used in ANN

Q2 a) Explain with example gradient based optimization technique. (5)

b) List and analyze different training methods employed in RBF networks (5)

Q3 a) How the perceptron model will adjust the weight of neuron for AND-gate and draw the truth table of AND gate using perceptron model (5)

b) What is Adaline and write the training algorithm of the Adaline (5)

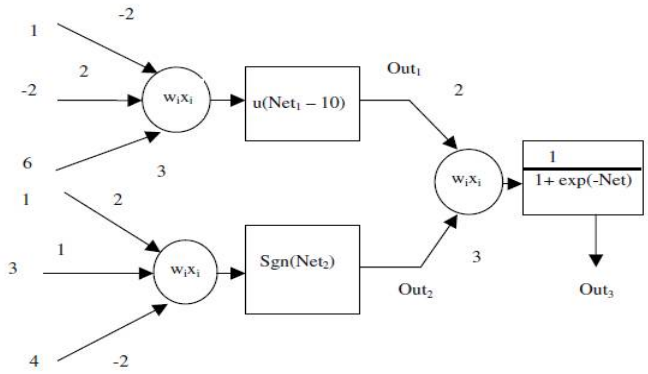
Q4 Derive the feed forward ANN back propagation error for the following cases (10)

a. *When the output layer does not contain the non-Linear function.*
b. *When the output neuron contains the nonlinear type function*

Q5 a) Let $X = \{x_1, x_2, x_3\}, Y = \{y_1, y_2\}$ and $Z = \{z_1, z_2\}$ be three universe of discourses and (5)
$R_1(x,y)$ and $R_2(y,z)$ are two fuzzy relations on $X \times Y$ and $Y \times Z$ respectively. Compute the relation R_3 of a given R_1 and R_2.

$$R_1 = \begin{bmatrix} 0.1 & 0.2 \\ 0.4 & 0.5 \\ 0.7 & 0.8 \end{bmatrix} \text{ and } R_2 = \begin{bmatrix} 0.9 & 0.8 \\ 0.7 & 0.6 \end{bmatrix}$$

b) Find the out_3 value of the ANN. (5)



Q6 a) Show the first cycles of genetic evolution for optimizing the function $y=x^3-27$ in the interval $0 \le x \le 12$ (5)

b) What is Defuzzification ? Explain the different methods for defuzzification with example (5)

Q7 a) Given the following rule (10)

RULE1 : if resistance is EXCESSIVE THEN current-flow is INSIGNIFICANT

RULE2: resistance is VERY-EXCESSIVE

Suppose the membership distribution of EXCESSIVE, INSIGNIFICANT, very excessive resistance is given below respectively

$$\mu_{\text{VERY\_-EXCESSIVE}}(\text{resistance}) = \{0.7/10\text{k}, 0.8/50\text{k}, 0.9/100\text{k}\}$$

$$\mu_{EXCESSIVE}(regis\tan ce) = \{0.8/10k, 0.9/50k, 0.2/100k\}$$
$$\mu_{INSIGNIFICANT}(current) = \{0.9/150mA, 0.4/50mA, 0.6/10mA\}$$

Determine the membership distribution of very insignificant current flow through the device under test using GMP.

Q8 Write short notes on any five (5 x 2)

a) Derivative based optimization method of steepest descent
b) Kohonen's Self organizing network
c) Radial Basis Function Network
d) Adaline and Madaline network
e) Neuro-Fuzzy synergism
f) Fuzzy-GA synergism
g) Reinforcement learning