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Total Number of Pages: 2

**B.Tech**  
**PCIT4401**

**7<sup>th</sup> Semester Regular / Back Examination 2016-17**

**PRINCIPLES OF SOFT COMPUTING**

**BRANCH: CSE**

**Time: 3 Hours**

**Max Marks: 70**

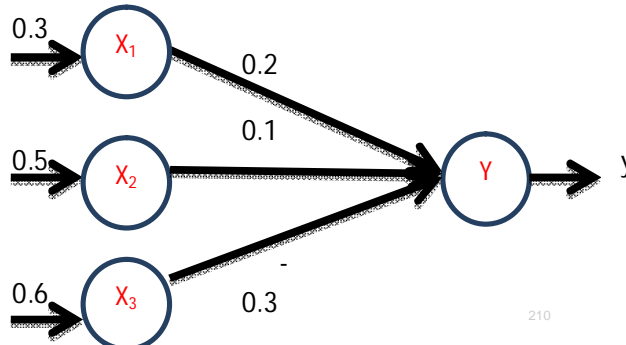
**Q.CODE: Y198**

**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)**

- Name major four applications of ANN.
- Explain the difference between learning and training.
- Define stability and plasticity.
- Why gradient descent method adopted to minimize error?
- Define "over fitting" and "over training"
- What is the activation function used in radial basis function network?
- State Charles Darwin's theory of evolution
- For the following network, calculate the net input to the output neuron.



- Define membership functions and state its importance in the fuzzy logic.
- What are fuzzy measures?

**Q2** What do you mean by objective function? Consider a problem of maximizing the function  $f(x) = x^2$  using genetic algorithm, Where x is permitted to vary between 0 and 31. **(2+8)**

**Q3 a)** Train the network using Hebb rule to store input row vectors  $s = (s_1, s_2, s_3, s_4)$  to the output row vector  $t = (t_1, t_2)$ . Initialize the weight matrix to be zeros. **(5)**

	S1	S2	S3	S4	T1	T2
1 <sup>st</sup>	1	0	1	0	1	0
2 <sup>nd</sup>	1	0	0	1	1	0
3 <sup>rd</sup>	1	1	0	0	0	1
4 <sup>th</sup>	0	0	1	1	0	1

b) Design the neural network with McCulloch-Pitts neuron that implements the basic logic gate operation AND and OR. (5)

Which one you are going to use between the binary and bipolar data? Justify your answer.

Q4 a) Draw the architecture of ART1 network and discuss its training algorithm. (5)

b) List and describe the characteristics of ART network in detail. (5)

Q5 a) With a neat flowchart, explain the operation of genetic algorithm. (5)

b) Compare and contrast traditional algorithm and genetic algorithm. (5)

Q6 a) Train the Heteroassociative memory network to store the input patterns ( s1, s2, s3, s4 ) to the output vectors ( t1, t2). The vector pairs are given in the following table. Also test the performance of the network using its training input as the testing input. (5)

input	S1	S2	S3	S4	T1	T2
1	1	1	0	0	0	1
2	1	1	0	0	0	1
3	0	0	0	1	1	0
4	0	0	1	1	1	0

b) (5)

Consider the following two fuzzy sets:

$A = \{(x_1, 0.3), (x_2, 0.7), (x_3, 1), (x_4, 0.5)\}$

$B = \{(y_1, 0.4), (y_2, 0.9)\}$

Perform the Cartesian Product over these given fuzzy sets.

State the Cartesian product of a relation over classical sets.

Q7 Explain the following Defuzzification methods (10)

I. Centroid method

II. Weight average method

III. Mean- max method

IV. Center of sums

Q8 Write short answer on any TWO: (5 x 2)

a) Max-Min Composition and Max-product Composition

b) Fuzzy Propositions

c) Fuzzy inference system

d) Hybrid system