Registration No:

Total Number of Pages: 2

M.TECH
CSPE102

1st Semester Regular/Back Examination – 2014
COMPUTATIONAL INTELLIGENCE
BRANCH(S): COMPUTER SCIENCE AND TECHNOLOGY,ELECTRONICS & TELE COMMUNICATION ENGINEERING,ELECTRONICS & COMMUNICATIONS ENGINEERING,COMPUTER SCIENCE AND ENGINEERING

Time: 3 Hours
Max Marks: 70

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: (2x10)

a) Define perceptron learning rule.
b) Differentiate between soft computing and hard computing
c) Why do we use a bias value in a neural network?
d) Compare and contrast BAM and Hop field network.
e) What is LR-type fuzzy numbers?
f) Justify the following statement
"Partial membership is allowed in fuzzy sets".
g) Write a short note on lambda-cut for fuzzy sets.
h) Differentiate between fuzzy-neural hybrid and fuzzy-genetic hybrid system.
i) State generalized modus ponens and generalized modus tollens.
j) What is the difference between crossover and mutation?

Q2 a) Consider a multilayer feed forward back propagation neural net having (i) three inputs (x1= 0.1;x2=0.01, and x3=0.5) and uniform weights [W] of 0.45 for each input-hidden connectors, (ii) two hidden nodes, and (iii) one output node. The connector weights [V] between hidden and output nodes is 20% less than [W]. Assume linear transfer functions in the hidden and input layers and tan-sigmoidal function in the output layer, Target output is 1.0, and learning rate (a) = 0.75, update [W] and [V] values for one epoch. (5)

b) What is ADALINE? Explain the training algorithm used in ADALINE network. (5)

Q3 a) What is associative memory? Hence discuss the applications of associative memory for recognition of characters. (5)

b) Draw the architecture of auto-associative memory network. Explain the testing algorithm adopted to test an auto-associative network. (5)

Q4 a) Define Defuzzification. State the necessity of defuzzification Process. Discuss different methods of defuzzification. (5)

b) Consider a set P={P1, P2, P3,P4} of four varieties of paddy plants, set D={D1,D2,D3,D4} of the various diseases affecting the plants and S={S1,S2,S3,S4} be the common symptoms of the diseases. Let R be a relation on P x D and S be a relation on D x S (5)

	D1	D2	D3	D4
P1	0.0	0.5	0.2	0.8
P2	0.3	0.1	0.3	0.2
P3	0.5	0.0	0.4	0.0
P4	0.8	0.9	0.5	1.0

	S1	S2	S3	S4
D1	1.0	0.9	0.3	0.5
D2	0.9	0.6	0.1	0.8
D3	0.2	1.0	0.5	1.0
D4	0.8	1.0	0.6	1.0

Obtain the association of the plants with the different symptoms of the diseases using max-min composition.

Q5 a) What is Fuzzy Inference System (FIS)? With suitable block diagram, explain the working principle of an FIS. Differentiate between Mamdani FIS and Sugeno FIS. (5)

b) Derive the generalized delta rule. What is necessity of momentum factor in weight updating process? (5)

Q6 a) What is ANFIS? With a suitable block diagram explain its architecture and working principle. (5)

b) Explain the structure and characteristics of an electronic model of a biological neuron. (5)

Q7 a) Maximize the following function for one generation and infer its average fitness compared to the previous generation as. $f(x)=y=x^2+2x$, subject to $0.5<=x<=1.0$ with the following initial solutions of population: (5)

1.11001110011
2.10001111101
3.10111100011
4.10000001110
5.10101000010
6.11100000010

Consider single point crossovers at bit position '6' and 'nil' mutation.

b) What do you understand by 'Tournament Selection' with reference to GA? How does it overcome the demerits of roulette wheel selection? (5)

Q8 Write short notes on any two of the following: (5 x 2)

a) Hebbian learning
b) Inversion and deletion in GA
c) Fuzzy Inference Systems
d) Continuous BAM Vs Discrete BAM.