

National Institute of Technology Hamirpur

Computer Science & Engineering

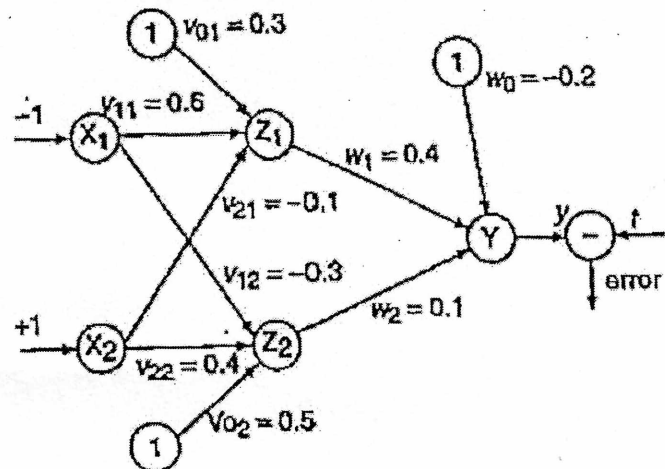
Soft Computing (CS-711)
 B. Tech. (Dual Degree (CSE)), 7th Semester (4th Year)
 Final Exam (December 2022)

Max Marks: 50

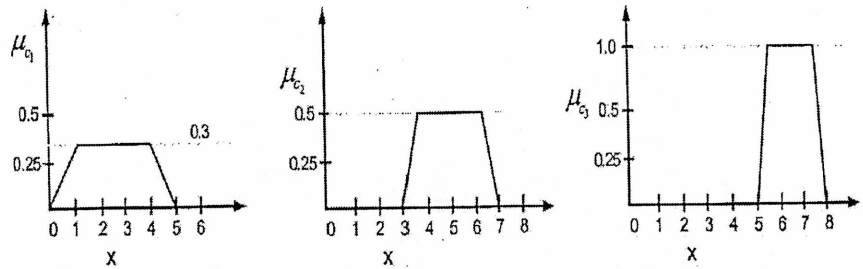
Time: 3 Hours

Note: Attempt all the questions.

- Find the new weights after epoch 1, using back-propagation algorithm for the given network. The network is presented with the input pattern is [-1, 1] and the target output is 1. Use learning rate as 0.25 and bipolar sigmoidal activation function with steepness parameter as 1. (10)



- Consider the three output fuzzy sets as shown in the following plots: (6+4)



Find the crisp value of $C = C_1 \cup C_2 \cup C_3$ using CoG method and CoS method.

- What is the centroid method of defuzzification? Give the difference between various centroid methods of defuzzification.
- Discuss fuzzy inference system (FIS) with a suitable diagram and explain the difference between Mamdani and Sugeno FIS (10)

- Given the fitness function $f(x) = x^2$, calculate the probability of selecting the individuals $x=1$, $x=2$, and $x=3$, using roulette wheel selection. Calculate the probability of selecting the same individuals when the fitness function is $f_1(x) = f(x) + 10$. (5)
- Identify one problem where Genetic Algorithm works poorly as compare to Ant Colony Optimization; support your choice with proper reasoning. (5)
6. For the fuzzy relation R and S as given below. Compare the relation between R and S using (i) max-min composition and (ii) Max product composition. (10)

		y1	y2	y3	y4	y5	y6
x1	0.1	0.4	0.2	0.7	0.6	0.4	
x2	0.2	0.5	0.5	0.5	0.3	0.3	
x3	0.3	0.9	0.2	0.9	0.7	0.7	
x4	0.5	0.7	0.8	0.4	0.8	0.8	
x5	0.8	0.8	0.7	0.3	0.2	0.6	

		z1	z2	z3
y1	0.3	0.1	0.9	
y2	0.5	0.4	0.6	
y3	0.2	0.8	0.7	
y4	0.9	0.6	0.4	
y5	0.8	0.3	0.3	
y6	0.6	0.7	0.1	