

**B. E. COMPUTER SCIENCE AND ENGINEERING FOURTH YEAR SECOND SEMESTER
(Old)- 2017**

Sub: Soft Computing(ELECT-II)

Time: 3 hours

Full marks:100

Answer any 5 questions

- | | | | |
|----|----|--|-----------|
| 1. | a. | What is the difference between Incremental mode and Batch mode gradient descent search? | 3 |
| | b. | What is the significance of the forgetting factor in Hebb's law? Derive the generalized Hebbian learning algorithm. | 2+8 |
| | c. | What is competitive learning? How does the BAM work? | 2+5 |
| 2. | a. | Describe the algorithm of Bee colony optimization techniques with an application? | 10 |
| | b. | What are the basic principles of PSO algorithm? | 5 |
| | c. | "BFO algorithm may stuck at local minima."- True or False? Validate your argument appropriately. | 5 |
| 3. | a. | How does a multilayer neural network learn? Derive the back-propagation training algorithm. Demonstrate multilayer network learning of the binary logic function Exclusive-OR. | 3+9
+8 |
| 4. | a. | What are pros and cons of tournament selection of genetic algorithm? | 4 |
| | b. | When will you use n point crossover against single point crossover? | 2 |
| | c. | What do you mean by elitism selection properties? | 5 |
| | d. | In GA, why crossover probability is set to a high value and mutation probability to a low value? | 4 |
| | e. | What are the difference between Bacteria foraging optimization Bee colony optimization? | 5 |

5. a. Why Fuzzy systems are popularly used to build expert system compared to rule based AI system? 5
- b. Define fuzzy set "near 5" based on the following information 5
 - S = [0:1:10];
 - G = [0.0 0.1 0.3 0.5 0.8 1 0.8 0.5 0.3 0.1 0];
- c. Two fuzzy relations are given by 10

		y1	y2
R	x1	6	3
=	x2	0	0.
		2	9

		Z1	Z2	Z3
S=	Y	1	0.	0.
	1	0.	5	3
	Y	8	0.	0.
	2	4	7	

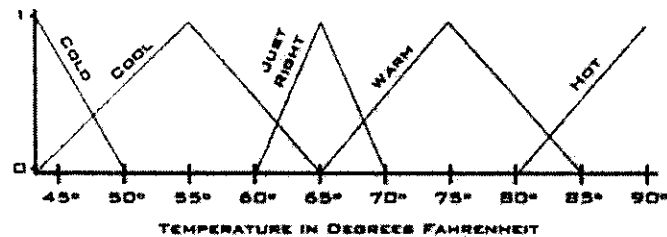
Obtain fuzzy relations $R \circ S$ as Max-Product composition and Max -Min composition between these two fuzzy relations.

6. a. Briefly describe the different types of Fuzzy membership function? 10
- b. Given the following set of data vectors (F-feature, X-data point) 10

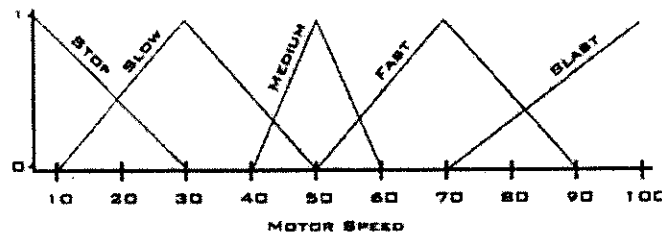
	X1	X2	X3	X4
F1	1	5	2	9
F2	1	7	2	8

Partition the dataset into two cluster using fuzzy c-means clustering.

7. a. Design Fuzzy motor speed controller for air conditioner using the following input, output fuzzy set and the corresponding rules. 12



Input Fuzzy Set



Output Fuzzy Set

Rules:

- If temperature is cold then motor speed stop
- If temperature is cool then motor speed slows
- If temperature is just right then motor speed is medium
- If temperature is warm then motor speed is fast
- If temperature is hot then motor speed blasts

- b. From the developed system derive the speed of motor when temperature is 63 degree Fahrenheit. 8