Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 173101 Date: 27/12/2012

Subject Name: Soft Computing

Time: 10.30 am - 01.00 pm Total Marks: 70

Instructions:

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

Q.1 **(a)** (1) Give the differences between Supervised Learning and Unsupervised learning. **03**

(2) Discuss the following terms: **04**

- Perceptron
- Membership function

(b) Write the need of defuzzification in fuzzy set theory. Enlist and explain different methods of defuzzification in brief. **07**

Q.2 **(a)** Discuss Backpropagation algorithm in detail with proper illustration. **07**

(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. **07**

	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	0.8	0.1	0.8
D3	0.2	1.0	0.5	1.0
D3	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.

OR

(b) Explain Roulette-wheel Selection and Rank Selection with example. **07**

Q.3 **(a)** Plot the following membership function $\mu_A(x)$ for fuzzy set A and find singleton, core, cross-over points and support for the same. Why this fuzzy set A is said to be normal? **07**

$$\mu_A(x) = 0 \quad \text{if } x \le a$$
$$= (x-a) / (b-a) \quad \text{if } a \le x \le b$$
$$= (c-x) / (c-b) \quad \text{if } b \le x \le c$$
$$= 0 \quad \text{if } c \le x$$

Where a = 2, b = 4 and c = 6.

(b) Give the problem statement of travelling salesman problem. Solve the same problem using Genetic Algorithm. **07**

OR

Q.3 **(a)** (1) Explain Lower approximation and Upper approximation in Rough Set Theory with example. **04**

(2) Correct the following statement if incorrect and also give proper **03**

justification.

"XOR problem is linearly separable problem."

(b) (1) Discuss the following terms in brief: **04**

- Offspring generation
- Fitness function

(2) List the differences between cross-over and mutation in genetic algorithm. **03**

Q.4 **(a)** (1) Discuss the following terms of fuzzy set theory in brief with example: **04**

- Fuzzy Relation
- Linguistic Variable

(2) What do you mean by reducts in rough set theory? Explain the same in brief. **03**

(b) Discuss Adaptive Neuro-Fuzzy Inference Systems. **07**

OR

Q.4 **(a)** (1) Enlist and explain the differences between Traditional Algorithm and Genetic Algorithm. **05**

(2) What is meant by conceptual clustering in machine learning? **02**

(b) (1) Write a short note : GA based Weight Optimization **04**

(2) What is Online Intelligent Systems? Discuss in brief. **03**

Q.5 **(a)** Discuss Learning by Observation and Learning by Analogy with respect to Machine Learning. **07**

(b) Elaborate Printed Character Recognition as an application of computational intelligence. **07**

OR

Q.5 **(a)** (1) Discuss Sequence Prediction in machine learning. **04**

(2) What is concept formation in theory of machine learning. **03**

(b) What do you mean by Hybrid System? Enlist and explain types of such systems in brief. **07**

****