2063
# M.E. (Information Technology)
## Second Semester
### MEIT-2103: Advanced Soft Computing

Time allowed: 3 Hours

Max. Marks: 50

**NOTE:** *Attempt __five__ questions in all, including Question No. I which is compulsory and selecting two questions from each Section.*

x-x-x

Q1 a) Explain different learning mechanism used in ANN.

(2*5=10)

b) State the relevance of fuzzification. Explain its different types.

c) Differentiate between concex and non-convex fuzzy set.

d) List the stopping condition for genetic algorithm.

e) Using linearly separable concept, draw the decision boundary for logical AND?

## Section-A

Q2a) Suppose you are given the task of modeling a student's marks ($M$) for an exam he has just given. Marks depend upon exam Level ($E$)– denotes the difficulty of the exam and has two values (0 for easy and 1 for difficult) and IQ Level ($I$) –represents the Intelligence Quotient level of the student and is also discrete in nature having two values (0 for low and 1 for high). Additionally, the IQ level of the student also leads to another variable, which is the Aptitude Score of the student ($S$). Now, with marks the student has scored, he can secure admission ($A$) to a particular university. The conditional probability tables are given as follows.

(5)

| $E^0$ | $E^1$ |
|-------|-------|
| 0.7   | 0.3   |

| $I^0$ | $I^1$ |
|-------|-------|
| 0.8   | 0.2   |

|            | $M^0$ | $M^1$ |
|------------|-------|-------|
| $I^0, E^0$ | 0.6   | 0.4   |
| $I^0, E^1$ | 0.9   | 0.1   |
| $I^1, E^0$ | 0.5   | 0.5   |
| $I^1, E^1$ | 0.8   | 0.2   |

|       | $S^0$ | $S^1$ |
|-------|-------|-------|
| $I^0$ | 0.75  | 0.25  |
| $I^1$ | 0.4   | 0.6   |

|       | $A^0$ | $A^1$ |
|-------|-------|-------|
| $M^0$ | 0.6   | 0.4   |
| $M^1$ | 0.9   | 0.1   |

(i) Create a Bayesian network for the student example

(ii) Calculate the probability that in spite of the exam level being difficult, the student having a low IQ level and a low Aptitude Score, manages to pass the exam and secure admission to the university.

b) Describe the applications of soft computing techniques. (5)

Q3) Design and implement OR function with bipolar inputs and targets using Adaline network. .Find the total mean square error of two epochs (10)

Q4) Draw and explain the architecture of Adaptive Resonance Theory? How ART1 differs from ART2.

(10)

**Section-B**

Q5) Consider two fuzzy sets A and B. Express the fuzzy sets into α-cut sets for α=0.4 for the following operations.
A= {0/2+0.8/4+1/6},     B={0.9/2+0.7/4+0.3/6}
(i) Union  (ii) intersection (iii) complement (iv) difference (10)

Q6 a) With the help of necessary block diagram, compare Mamdani and Sugeno fuzzy inference system.

(5)

b) Explain genetic-fuzzy rule based system. (5)

Q7) Describe the working principle of particle swarm optimization. How it solves the problem of exploration and exploitation? (10)

x-x-x