2020 (A)

Time: 3 hours

Full Marks: **70**

Candidates are required to give their answers in their own words as far as practicable.

The figures in the right-hand margin indicate full marks.

Answer any **Five** questions.

1. (a) Discuss in detail various types of activation functions used in neural network with the aid of graphical as well as mathematical representation and output. [7]

   (b) Illustrate the different types of defuzzification methods with relevant mathematical expression and diagram. [7]

2. (a) Using McCulloh-Pitts neuron model, design a neural network for 2-input OR functions (take bipolar inputs and targets). [8]

   (b) For derivative-based learning procedure, why a sigmoidal function issued instead of a step function. [6]

3. (a) Design the general scheme for a Fuzzy controller. How different modules are Interconnected? Deployingthe above how will you solvethe problem of stabilizing the Inverted pendulum. [8]

   (b) Define creation of Off springs in detail. Also write down the working principle of Genetic Algorithm and its application? [6]

4. (a) Explain various types of cross-over operators with suitable example. What is the effect of cross over and mutation on exploration and exploitation? [7]

   (b) How genetic algorithm is used in design of fuzzy logic controller? [7]

5. (a) Enumerate and highlight the main features of any two design techniques of hybrid-Genetic algorithm. [6]

   (b) How honey bees' behavior helps in optimization of any problem. [4]

   (c) Implement logical AND function using Hebb Net.(use bipolar inputs and targets) [4]

6. (a) Given two fuzzy sets A= {1/2 + 0.3/4 + 0.5/6 + 0.2/8}, B= {0.5/2 +0.4/4 + 0.1/6 +1/8} Perform Union, Intersection, Difference, Compliment, Algebraic Sum, Algebraic Product, Bounded Sum, Bounded Difference over the sets A and B. [8]

   (b) Explain the discrete bidirectional associative memory network architecture highlighting two layers of interaction between each other. [6]

7. (a) Differentiate the following: [3×3 = 9]

i. Supervise learning and Unsupervised learning
ii. Mamdani and Surgeon Fuzzy Interface Systems.
iii. Soft computing and Hard computing

(b) Explain the characteristics and different classifications of a neuro-fuzzy hybrid system. [5]

8. Write short notes on any two of the following: [7×2 = 14]

(a) Binary Hopfield Network
(b) Adaptive Resonance Theory (ART) Networks.
(c) Delta Learning Rule.
(d) Stimulated Annealing.
(e) ADALINE model