2019

Time : 3 hours

Full Marks : 80

The figures in the right-hand margin indicate marks.

*Answer **all** questions.*

1. (a) Write down the four Advantages of Neural Network and four advantages of Fuzzy logic models. Also write down four disadvantages of Neural Network and four disadvantage of fuzzy logic models. 8

   (b) What does Kolmogorov theorem states ? Write down the Error (Risk). Function for Multilayer Perceptron and Radial Basis Function Network. 8

OR

   (c) Explain Union, Intersection, complement operations, law of excluded middle, Cartesian product of fuzzy set. 8

(d) Determine the gradient vector and the Hessian Matrix for the following error functions : 8

(i) $E(w) = 3x_1 w_2^2 + 4e^{\wedge}(w_1 w_2)$

(ii) $E(w) = \ln(w_1^2 + w_1 w_2 + w_2^2)$

2. (a) Difference between fuzzification and defuzzfication. Discuss different defuzzfication methods. 8

(b) Explain Membership function, fuzzy set, fuzzy if-then Rules. Explain folloiwng terms Core, Boundary, Support in term of Fuzzy Logic. 8

OR

(c) Explain Mamdani model and Takagi model for FIS. 8

(d) Explain Max-min Composition and Max-product composition. 8

3. (a) Explain Biological Neural Network in terms of Axon, Synapse, Dendrites, Synaptic Gap. 8

(b) Explan Gradient Descent Method. Explain Radial Basis Function Network (RBFN) in brief. 8

OR

(c) Explain Backpropagation Training Algorithm in brief, and discuss applications of it. 8

(d) Explain Feature map. Discuss Kohonen Self Organization Map (KSOM) in brief. 8

4. (a) With regards to simulated annealing, what is the probability of accepting the following moves ? Assume the problem is trying to maximise the objective function : 8

Current Evaluation	Neighbourhood Evaluation	Current Temperature
16	15	20
25	13	25
76	75	276
1256	1378	100

(b) What do you mean by Recurrent neural network ? Draw and explain the Recurrent neural network. 8

OR

(c) Describe the idea behind the simulated annealing algorithm making reference to its origins as an optimisation methodology. 8

(d) Show a simulated annealing algorithm. Outline the simulated annealing cooling schedule, describing the various components. 8

5. (a) Write down four different types of encoding techniques used in Genetic Algorithm. 8

(b) Write short notes on Roulette Wheel Selection, Random selection, Tournament Selection, Boltzman Selection. 8

OR

(c) Discuss Crossover operation in GA and its types. 8

(d) Explain the terms individual, gene, fitness, population associated with Genetic Algorithm. 8