

Q.P. Code : 790702

(3 Hours)

[Total Marks : 80

- N.B. :** (1) Question No.1 is compulsory.
 (2) Solve **any three** out of **five** remaining questions.



1. (a) Define Support, Core, Crossover points, Normality and Convex Fuzzy sets. 5
 (b) What are the types of neural processing? 5
 (c) State differences between derivative based and derivative free optimization techniques? 5
 (d) What are the features of hybrid system? Why is it required? 5
2. Design a fuzzy controller for a train approaching or leaving a station. The inputs are the distance from the station and speed of the train. The output is the amount of brake power used. Use four descriptors each for inputs and output and design using mamdani fuzzy model. Derive set of rules for control action and defuzzification. The design should be supported by figures. Prove that if the train is at a short distance with great speed the brake power required would be very high and vice versa. 20
3. (a) Four steps of Hebbian learning of a single neuron network is implemented starting with $w^1 = [1 \ -1]$ at the rate $= 1$, using the inputs given below :
 $X_1 = [1, -2]$ $X_2 = [0, 1]$ $X_3 = [2, 3]$ $X_4 = [1, -1]$
 Find final weights for binary continuous activation function. 10
 (b) Explain Error Back Propagation training algorithm with flow chart. 10
4. (a) How is LVQ working as a classifier? With a neat flow explain the working of LVQ? 10
 (b) What are the steps in Genetic Algorithm? Explain examples the uniform crossover, tournament selection and mutation. 10
5. (a) What are the types of Fuzzy Inference Systems? Explain each with appropriate diagrams. 10
 (b) Explain ANFIS architecture with a neat diagram. 10

TURN OVER

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6. Write short notes on **any four** :

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- (a) Fuzzy extension principle
- (b) Flowchart of Single Discrete Perceptron Algorithm (SDPTA)
- (c) Kohonen Learning Algorithm
- (d) Newton's Method in derivative based optimization
- (e) CANFIS

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Course: B.E. (Sem VII) ALL BRANCH

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Instead of inputs

$X1=[1,-2]$ $X2=[0,1]$ $X1=[2,3]$ $X1=[1,-1]$

please read the inputs as

$X1=[1,-2]$ $X2=[0,1]$ $X3=[2,3]$ $X4=[1,-1]$
