GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Semester: III

Civil (Transportation Engineering)

Subject name: **Soft Computing Techniques(Major Elective - IV)**

Sr.No	Course content
1	**Genetic Algorithms:** Goals of optimization - Comparison with traditional methods - Schemata – Terminology in GA – Strings, Structure, Parameter string - Data Structures – Operators - Coding fitness function – Algorithm - Applications.
2	**Fuzzy Logic:** Concepts of uncertainty and imprecision – Sets - Concepts, properties and operations on Classical sets & Fuzzy Sets - Classical & Fuzzy Relations - Membership Functions - Fuzzy Logic – Fuzzification - Fuzzy Rule based Systems – Fuzzy propositions - Applications.
3	**Artificial Neural Networks:** Basics of ANN; Models of a Neuron – Topology: Multi Layer Feed Forward Network (MLFFN), Radial Basis Function Network (RBFN), Recurring Neural Network (RNN) – Learning Processes: Supervised and unsupervised learning. Error-correction learning, Hebbian learning; Single layer perceptrons - Multilayer perceptrons - Least mean square algorithm, Back propagation algorithm Applications.
4	**Hybrid Systems:** Fuzzy neural systems – Genetic Fuzzy Systems – Genetic Neural Systems.

Practical:

(Work in Computation lab.)

1. Problems based on GA and its applications in transportation.
2. Problems based on Fuzzy logic and its applications in transportation.
3. Problems based on ANN and its applications in transportation.
4. Problems based on hybrid systems and its application in transportation.

Reference Books:

1. Timothy J.Ross, Fuzzy Logic with Engineering Applicatios, McGraw-Hill
2. Simon Haykin, Neural Netwroks, PrenticeHall
3. J.M. Zurada, .Introduction to artificial neural systems., Jaico Publishers
4. H.J. Zimmermann, Fuzzy set theory and its applications., III Edition, Kluwer Academic Publishers, London.
5. Suran Goonatilake, Sukhdev Khebbal (Eds), .Intelligent hybrid systems., John Wiley & Sons, New York, 1995
6. Goldberg, D. E, Genetic algorithm in search, optimization and machine learning,Addison-Wesley, Reading Mass.
7. Kalyanmoy Deb, Optimization for Engineering Design – Algorithms and examples, PHI, New Delhi, ISBN-81-203-0943-x.