

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E. Semester: III Electrical Engineering

Subject Name **APPLICATION OF ARTIFICIAL INTELLIGENCE (AI)
TO POWER SYSTEM (POWER GROUP)**

Sr.No	Course content
1.	Artificial Intelligence: History and Applications Introduction, Intelligence, Communication, Learning, Artificial Intelligence, History, Early Works, Importance, Definitions, Programming Methods, Techniques, Progress of Artificial Intelligence, Growth of AI, AI and Industry, AI and the world, Current Trends in Applied AI, Modeling, Simulation and AI, Intelligent Systems, Role of IS, Comparisons with conventional programs, Fundamentals of various IS
2.	Introduction to Artificial Neural Network Introduction, Neuron Physiology, Artificial Neurons, Artificial Neural Networks supervised Learning, Early Learning Models, Feed-forward Neural Network, Vector and Matrix Notation, Recurrent Neural Network, Elman Backpropagation Neural Network, Features of Artificial Neural Networks
3.	Fuzzy Logic Systems Introduction, Foundation of Fuzzy Systems, Representing Fuzzy Elements, Basic Terms and Operations, Properties of Fuzzy Sets, Fuzzification, Arithmetic Operations of Fuzzy Numbers, The alpha cut method, The extension method, Linguistic Descriptions and their Analytical Forms, Fuzzy Linguistic Descriptions, Fuzzy Relation Inferences, Fuzzy Implication and Algorithms, Defuzzification Methods, Centre of Area Defuzzification, Centre of Sums Defuzzification
4.	Genetic Algorithms and Evolutionary Programming Introduction, Genetic Algorithms, Procedure of Genetic Algorithms, Genetic Representations, Initialization and Selection, Genetic Operators, Mutation, The Working of Genetic Algorithms, Evolutionary Programming, The Working of Evolutionary Programming
5.	Application of AI in Power Systems Application of Neural Network and Expert Systems in Voltage Control, Application of ANN for security assessment, Schedule Maintenance of Electrical Power Transmission Networks using Genetic Algorithm, Intelligent Systems for Demand Forecasting

Reference Books:

1. Artificial Intelligence and Intelligent Systems, OXFORD University Press, New Delhi, 2005- N. P. Padhy
2. Understanding Neural Networks and Fuzzy Logic: Basic concepts and Applications, Prentice Hall India Private Limited, New Delhi, 2002- Stamations V. Kartalopoulos
3. Artificial Intelligence Techniques in Power Systems, IEE Power Engineering Series, UK, 1997- Kevin Warwick, Arthur Ekwue and Raj Aggarwal
4. Intelligent Systems and Signal Processing in Power Engineering, Springer Berlin Heidelberg, New York- Abhisek Ukil