RK UNIVERSITY

SYLLABUS

Course Title	Artificial Intelligence and Fuzzy Logic (Department Elective - II)
Course Code	EPS703
Course Credit	Lecture : 03
	Practical : 00
	Tutorial : 01
	Total : 04

Course Objective

The objective of the course is:
To gain knowledge on Neural Network concepts. To get a clear vision on different types of networks and their features. To acquire knowledge on ANN implementation to power system problems, With fuzzy logic and Genetic Algorithm techniques.

Detailed Syllabus

Sr. No.	Name of chapter & Details	Hours Allotted
	Section – I	
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.	**7**
2	**Introduction to Artificial Neural Network:** Introduction, Neuron Physiology, Artificial Neurons, What is a neural network? Human Brain, Models of Neuron, Knowledge representation, Historical Notes, Artificial Neural Networks supervised Learning, Early Learning Models, Feed-forward Neural Network, Vector and Matrix Notation, Recurrent Neural Network, Elman Back propogation Neural Network, Features of Artificial Neural Networks	**8**
3	**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	**10**
	Section – II	
4	**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	**8**

5	**Fuzzy Geometry:** Linear Measurement , Fuzzy Areas , Fuzzy Rectangle, Fuzzy Circle, Incomplete Restraint, Blending Coplanar Curves, Fairing Solid Sections	**8**
6	**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	**9**

Instructional Method and Pedagogy:

- Lectures will be conducted with the aid of multi-media projector, black board, Transparencies etc.
- Assignments and Exercise will be given to the students for each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
- Self study assignments, seminar from students can be conducted

Students Learning Outcomes:

At the end of the course students will be able

- To enrich the student with clear knowledge on Artificial Neural Network and its applications to power systems.
- To understand the basic concept of Genetic Algorithm and Fuzzy logic with its practical application to the outer world.
- To study the present scenario in case of ANN and fuzzy related problem and its problem solving techniques.

Reference Books/Text book:

1. Artificial Intelligence and Intelligent Systems, OXFORD University Press, New Delhi, 2005- N. P. Padhy
2. Neural network A Comprehension foundation, By. Simon Haykin, Prentice Hall international.
3. Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
4. Fuzzy Logic Applications in Engineering Science, By J. Harris Springer Publications, Zimbabwe.
5. Intelligent Systems and Signal Processing in Power Engineering, Springer
6. Berlin Heidelberg, New York- Abhisek Ukil
7. Overview and Literature Survey of Artificial Neural Networks Applications to Power Systems (1992-2004) A review paper By. R.C.Bansal.
8. Fuzzy Logic With Engineering Applications, By. Timothy J. Ross, Second Edition, John Willy & Sons Ltd.

Additional Resources:

www.sciencedirect.com
www.delnet.nic.in