Course Code   : 15-EM52H2
Course Title   : **Fuzzy logic and Neural Networks**
Course Structure   : 3-0-0
Credits   **: 3**

SYLLABUS:
UNIT I :
INTRODUCTION TO FUZZY LOGIC PRINCIPLES
Basic concepts of fuzzy set theory – operations of fuzzy sets – properties of fuzzy sets – Crisp relations – Fuzzy relational equations – operations on fuzzy relations – fuzzy systems – propositional logic – Inference – Predicate Logic – Inference in predicate logic – fuzzy logic principles – fuzzy quantifiers – fuzzy inference – fuzzy rule based systems – fuzzification and defuzzification – types.
UNIT -2:
ADVANCED FUZZY LOGIC APPLICATIONS
Fuzzy logic controllers – principles – review of control systems theory – various industrial applications of FLC adaptive fuzzy systems – fuzzy decision making – Multiobjective decision making – fuzzy classification – means clustering – fuzzy pattern recognition – image processing applications – systactic recognition – fuzzy optimization – various

UNIT -3: INTRODUCTION TO ARTIFICIAL NEURAL NETWORKS
Fundamentals of neural networks – model of an artificial neuron – neural network architectures – Learning methods – Taxonomy of Neural network architectures – Standard back propagation algorithms – selection of various parameters – variations Applications of back propagation algorithms.

UNIT -4:
OTHER ANN ARCHITECTURES
Associative memory – exponential BAM – Associative memory for real coded pattern pairs – Applications adaptive reasonance theory – introduction – ART 1 – ART2 – Applications – neural networks based on competition – kohenen self organizing maps – learning vector quantization – counter propagation networks – industrial applications.
UNIT 5: RECENT ADVANCES
Fundamentals of genetic algorithms – genetic modeling – hybrid systems – integration of fuzzy logic, neural networks and genetic algorithms – non traditional optimization techniques like ant colony optimization – Particle swarm optimization and artificial immune systems – applications in design and manufacturing.

TEXT BOOKS:
1. S.Rajasekaran.G.A.Vijayalakshmi Pai "Neural Networks, fuzzy logic and genetic algorithms", prentice hall of India private limited, 2003
2. Timothy J.Ross, "Fuzzy logic with engineering applications", McGraw Hill, 1995
3. Zurada J.M. "Introduction to artificial neural systems", Jaico publishing house, 1994

REFERENCES:
1. Klir.G, Yuan B.B. "Fuzzy sets and fuzzy logic prentice Hall of India private limited, 1997.
2. Laurance Fausett, "Fundamentals of neural networks", Prentice hall, 1992
3. Gen, M. and R. Cheng "Genetic algorithm and engineering design", john wiley 1997