01TR0403: SOFT COMPUTING TECHNIQUES

Objective of the Course: Objectives of introducing this subject at second year level in Masters of civil engineering are:

1. To achieve knowledge of modern computing techniques which can applied for solving the non linear and complex real life problems
2. To be introduced artificial intelligent techniques in solving of transportation real life problem.

Credit Earned: 4

Students learning outcomes:

After successful completion of the course it is expected that student will be able

1. To built knowledge of artificial intelligent technique in transportation problem.
2. To can able to use artificial intelligent techniques such as genetic algorithm, Fuzzy logic and Artificial Neural Network and their hybrid systems.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CSE (M)	Internal (I)	Viva (V)	Term Work (TW)	
3	2	0	4	50	20	30	25	25	150

Detailed Syllabus

Sr No.	Title of the unit	Number of hours
1	**Genetic Algorithms:**	
	Optimization need, comparative study of Traditional methods , schemata, GA Technology – Strings, Structure, parameter string, data structures, operator, coding fitness function, algorithm, application	12
2	**Fuzzy Logic**	
	Uncertainty and impression concepts, properties and operation on classical sets and fuzzy sets, classical and fuzzy relation and membership function, fuzzyfication, fuzzy rule based system, fuzzy propositions and application.	12
3	**Artificial Neural Networks**	
	Models of a Neuron, Topology, Multi layer Feed forward network, radial basis function network, recurring neural network, learning process; Supervised and unsupervised learning, error correction learning, Hebbin learning, single layer perception, multilayer	12

	perception,	
4	**Hybrid System**	
	Fuzzy neural system, Genetic Fuzzy system, Genetic Neural system	06

Suggested lists of Computational Lab.

1. Mass transit system problem solved with GA
2. Formulating trip generation relationship using ANN
3. Formulating Mode choice model using Fuzzy Logic
4. An application of GA or hybrid system in optimum mix design of BC

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	10%	15%	30%	20%	15%

Instructional Method and Pedagogy:

1. Use of Learning Management system like canvas
2. Demonstration through ppt and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

Recommended Study Material:

Reference Book:

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.

Web Resources

1 http://www.iitk.ac.in/kangal/codes.shtml
2 http://lancet.mit.edu/ga/dist/galibdoc.pdf

3. https://books.google.co.in/books?hl=en&lr=&id=W5SAhUqBVYoC&oi=fnd&pg=PR11&dq=SOft+computing+course+&ots=et_2Nvjy_4&sig=jDX-LrGIeD3zc4QUxvcEvC5FrFY#v=onepage&q=SOft%20computing%20course&f=false
4. https://video.search.yahoo.com/search/video?fr=tightropetb&p=nptl+video+on+soft+computing+technique+in+transportation+system#id=3&vid=99b0d81e0365b75957944e3f46d4531f&action=click