Name of Faculty	:	Faculty of Engineering & Technology
Name of Program	:	Master of Technology (M. Tech)
Course Code	:	1MPS06
Course Title	:	Artificial Intelligence in Power System
Type of Course	:	Open Elective (OE)
Year of Introduction	:	2023-24

Prerequisite	:	Artificial Intelligence
Course Objective	:	This course gives a detailed understanding of Artificial Intelligence & Neural networks and the application of AI to the power system field of Electrical Engineering.
Course Outcomes	:	At the end of this course, students will be able to:
	CO1	**To Apply** meta-heuristic techniques for solving optimization problems.
	CO2	**To Understand** ANN and fuzzy logic.
	CO3	**To Analyse** AI techniques for applications related to Power system.
	CO4	**To Apply** AI techniques for electrical engineering applications.

Teaching and Examination Scheme

Teaching Scheme (Contact Hours)			Credits	Examination Marks				
				Theory Marks		Practical Marks		Total Marks
L	**T**	**P**	**C**	**SEE**	**CIA**	**SEE**	**CIA**	
3	2	0	4	70	30	30	20	150

Legends: ***L****-Lecture;* ***T****–Tutorial/Teacher Guided Theory Practice;* ***P*** *– Practical,* ***C*** *– Credit,* ***SEE*** *– Semester End Examination,* ***CIA*** *- Continuous Internal Assessment (It consists of Assignments/Seminars/Presentations/MCQ Tests, etc.))*

Course Content

Unit No.	Topics	Teaching Hours	Weightage	Mapping with CO
1	**Introduction:** Overview and historical perspective, advantages and disadvantages of AI, need for human intervention, data analytics and present trends.	03	15%	CO1
2	**Artificial Neural Network:** Introduction to artificial neural networks, basic models and activation functions, learning in neural networks, single layer and multi-layer feed-forward and feedback neural networks,	06	20%	CO2

	backpropagation algorithm, factors affecting the performance of artificial neural network			
3	**Fuzzy Logic:** Introduction, fuzzy Sets, operations and properties of fuzzy sets, membership functions, fuzzy relations, fuzzy logic and rule-based system, defuzzification methods, fuzzy logic modelling and controller design.	06	20%	CO2
4	**Meta-heuristic Techniques:** Genetic Algorithm (GA) - Introduction, fitness function, reproduction, crossover, mutation, Particle Swarm Optimization (PSO) - Introduction, principle, velocity updating, parameter selection, binary version, recent techniques.	06	20%	CO1
5	**AI Applications in Power Systems**: Forecasting, economic load dispatch, fault identification and classification, fault diagnosis, load frequency control, reactive power control, MPPT algorithms, motor drive applications, power quality	09	25%	CO3, CO4

Suggested Distribution of Theory Marks Using Bloom's Taxonomy						
Level	Remembrance	Understanding	Application	Analyse	Evaluate	Create
Weightage	**20**	**25**	**20**	**20**	**10**	**05**

NOTE: This specification table shall be treated as a general guideline for the students and the teachers. The actual distribution of marks in the question paper may vary slightly from the above table.

Suggested List of Experiments/Tutorials

Sr. No.	Name of Experiment/Tutorial	Teaching Hours
1	To learn ANN implementation using the software.	02
2	To learn fuzzy logic implementation using software	02
3	To perform load forecasting using ANN	02
4	To carry out load frequency control using fuzzy logic	02
5	To execute fault identification and classification using ANN	02
6	To carry out economic load dispatch using soft computing techniques	02
7	To perform fuzzy logic-based control of induction motor drive	02
8	To perform soft computing technique based MPPT	02
9	To analyse the performance of ANN-controlled power quality improvement devices	02

Major Equipment/ Instruments and Software Required

Sr. No.	Name of Major Equipment/ Instruments and Software
1	Python Programming
2	Raspberry pi
3	MATLAB
4	C++

Suggested Learning Websites

Sr. No.	Name of Website
1	https://www.artbreeder.com/
2	Wix ADI

Reference Books

Sr. No.	Name of Reference Books
1	S. Rajasekaran and G.A.V. Pai, Neural Networks, Fuzzy logic, Genetic Algorithm: Synthesis and applications, PHI Publication
2	N.P. Padhy, Artificial Intelligence and Intelligent System, Oxford University Press.
3	B Kosko. Neural Networks and Fuzzy Systems; Prentice-Hal