GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Master of Technology		Branch/Spec.	Electrical (Electrical Power System)	
Semester	II		Version	1.0.0.0	
Effective from Academic Year	2025-2026		Effective for the batch Admitted in	July 2025	
Course code	3EE21PE4	Course Name	Power System Optimization		

Teaching scheme						Examination scheme (Marks)			
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	0	0	3	Theory	40	60	100
Hours	3	0	0	0	3	Practical	00	00	00

Pre-requisites:

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Course Outcomes:

On successful completion of the course, the students will be able to:

CO1	Understand the basic concept of optimisation.
CO2	Analyse optimal power flow
CO3	Apply control and compensation schemes on a power system.
CO4	Model economic load dispatch to power transmission loss.

Theory syllabus

Unit	Content	Hrs
1	**Introduction to Optimization and Classical Optimization Techniques Linear Programming:** Definition-Classification of optimization Problems-Unconstrained and Constrained optimization, Standard form, geometry of LPP, Simplex Method of solving LPP, revised simplex method, duality, decomposition principle, and transportation problem	**09**
2	**Non-Linear Problem (NLP):** One dimensional method, Elimination methods, Interpolation methods, Unconstrained optimization Techniques-Direct search and Descent methods, constrained optimization techniques, direct and indirect methods.	**08**
3	**Dynamic Programming:** Multistage decision processes, concept of sub-optimization and principle of optimality, conversion of final value problem into an initial value problem CPM and PERT.	**08**
4	**Evolutionary Optimization Techniques:** Similarities and differences between GAs and traditional methods; Unconstrained and constrained optimization using Genetic Algorithm, real coded GAs, Advanced GAs, global optimization using GA. Concept of multi-objective optimization problems (MOOPs), Multi-Objective Evolutionary Algorithm (MOEA).	**12**
5	**Particle Swarm Optimization and its application in Power systems:** Introduction, Computational implementation of PSO, Improvement to the Particle Swarm Optimization method, Solution of the constrained optimization problem, Finding maximum/minimum of the function using PSO, Implementation of PSO for Unit Commitment.	**08**

Practical content

Assignments and tutorials are based on the above syllabus.

Text Books

1.	Jizhong Zhu, Optimization of Power System Operation, Wiley-IEEE Press.
2.	Kalyanmoy Deb, Optimization for Engineering Design, Prentice Hall.

Reference Books

1.	S. Sivanagaraju, G. Padmanabham, Power System Operation and Control, Pearson.
2.	A. J. Wood, B. F. Wollenberg, Power Generation, Operation and Control, Wiley.

ICT/MOOCS

1.	https://nptel.ac.in/courses/112106064?utm
2.	https://nptel.ac.in/courses/108105019?utm_source
3.	https://onlinecourses.nptel.ac.in/noc23_ee128/preview?utm_source
4.	https://archive.nptel.ac.in/courses/108/101/108101040/?utm_source
5.	https://onlinecourses.nptel.ac.in/noc24_ee41/preview?utm_source

Mapping of CO with PO and PSO:															
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	3	1	0	0	1	0	0	0	1	0	2	3	3	0
CO2	3	3	3	2	0	2	0	1	1	3	1	2	2	2	1
CO3	3	2	2	2	1	1	0	1	1	2	2	2	3	2	2
CO4	3	2	2	2	2	2	0	1	1	2	1	2	2	1	1