

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY	
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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

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Assignments and tutorials are based on the above syllabus.

Text Books					
1.	Mathematics	NCERT	Class 10	9788175181480	100
2.	Science	NCERT	Class 10	9788175181497	100
3.	Social Science	NCERT	Class 10	9788175181503	100
4.	English	NCERT	Class 10	9788175181510	100
5.	Hindi	NCERT	Class 10	9788175181527	100
6.	Arts & Culture	NCERT	Class 10	9788175181534	100
7.	Physical Education	NCERT	Class 10	9788175181541	100
8.	Information Technology	NCERT	Class 10	9788175181558	100
9.	Environmental Studies	NCERT	Class 10	9788175181565	100
10.	Health & Physical Education	NCERT	Class 10	9788175181572	100
11.	Mathematics	NCERT	Class 11	9788175181589	100
12.	Science	NCERT	Class 11	9788175181596	100
13.	Social Science	NCERT	Class 11	9788175181603	100
14.	English	NCERT	Class 11	9788175181610	100
15.	Hindi	NCERT	Class 11	9788175181627	100
16.	Arts & Culture	NCERT	Class 11	9788175181634	100
17.	Physical Education	NCERT	Class 11	9788175181641	100
18.	Information Technology	NCERT	Class 11	9788175181658	100
19.	Environmental Studies	NCERT	Class 11	9788175181665	100
20.	Health & Physical Education	NCERT	Class 11	9788175181672	100
21.	Mathematics	NCERT	Class 12	9788175181689	100
22.	Science	NCERT	Class 12	9788175181696	100
23.	Social Science	NCERT	Class 12	9788175181703	100
24.	English	NCERT	Class 12	9788175181710	100
25.	Hindi	NCERT	Class 12	9788175181727	100
26.	Arts & Culture	NCERT	Class 12	9788175181734	100
27.	Physical Education	NCERT	Class 12	9788175181741	100
28.	Information Technology	NCERT	Class 12	9788175181758	100
29.	Environmental Studies	NCERT	Class 12	9788175181765	100
30.	Health & Physical Education	NCERT	Class 12	9788175181772	100

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

Reference Books
1. <i>Mathematics for Class 10</i> by R.D. Sharma 2. <i>Mathematics for Class 10</i> by IIT Foundation Series 3. <i>Mathematics for Class 10</i> by Laxmi Publications 4. <i>Mathematics for Class 10</i> by Arihant Publications 5. <i>Mathematics for Class 10</i> by Oswaal Publications 6. <i>Mathematics for Class 10</i> by Pearson Education 7. <i>Mathematics for Class 10</i> by Cengage Learning 8. <i>Mathematics for Class 10</i> by McGraw-Hill Education 9. <i>Mathematics for Class 10</i> by Houghton Mifflin Harcourt 10. <i>Mathematics for Class 10</i> by Macmillan/McGraw-Hill

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_source=ss
2.	https://nptel.ac.in/courses/108105019?utm_source=ss
3.	https://onlinecourses.nptel.ac.in/noc23_ee128/preview?utm_source=ss
4.	https://archive.nptel.ac.in/courses/108/101/108101040/?utm_source=ss
5.	https://onlinecourses.nptel.ac.in/noc24_ee41/preview?utm_source=ss

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