

GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Master of Technology				Branch/Spec.	Electrical (Renewable Energy)			
Semester	II				Version	1.0.0.0			
Effective from Academic Year			2025-2026		Effective for the batch Admitted in			July 2025	
Course Code	3EE21PE9		Course Name		Deregulation and Grid Code				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:

Course Outcomes

On successful completion of the subject, students should be able to:

CO1	Understand deregulations in power systems and need key components of it.
CO2	Demonstrate the issues in the Deregulated system.
CO3	Analyse various ancillary service of existing electricity markets.
CO4	Compare role of various market entities in different market mechanisms

Theory syllabus

Unit	Content	Hrs
1	Introduction to Deregulation: Fundamentals of restructured power systems, Current global trends, Benefits of a competitive electricity market, Role of the Independent System Operator (ISO). Market equilibrium, Load elasticity, Characteristics of a perfectly competitive market, Comparison of various market models, Social welfare maximization and the framework of standard market design.	10
2	Challenges of the Deregulated System: Strategies for optimal bidding, Techniques for risk assessment and hedging, Methods for power tracing and approaches to transmission planning and pricing, Availability-based tariff (ABT) mechanism and various aspects of congestion management including its classification and mitigation strategies.	10
3	Global Deregulated Market: Global electricity reform experiences, The PJM model, Progress toward standard market design, Recent restructuring trends, Developments in India, The role of distributed generation and IT applications in restructured power markets.	07
4	Grid Codes: Broad classification of grid code requirements, Indian Electricity Grid Code, Electricity act 2003 and amendments, National Electricity Policy, Deviation settlement mechanism, Retail competition.	09
5	Global Scenario: Global Grid Code, Grid code for solar SPV system, Grid code for wind energy system.	09

Practical content

Practicals, assignments, and tutorials are based on the above syllabus.

Text Books

1.	Mohammad Shahidehpour, Muwaffaq Alomoush, “Restructured electrical power systems: operation, trading and volatility,” Marcel Dekker.
2.	Indian Electricity Grid Code, Central Electricity Regulatory Commission.

Reference Books

1.	Lorrin Philipson, H. Lee Willis, “Understanding electric utilities and de-regulation,” Marcel Dekker Pub.
2.	Lei Lee Lai, “Power System restructuring and de-regulation,” John Wiley and Sons, UK.
3.	Edward Kahn “Electric Utility Planning and Regulation,” American Council for Energy-Efficient Economy
4.	Fred I Denny and David E. Dismukes, “Power System Operations and Electricity Markets,” CRC Press.
5.	Electricity Act 2003 and National Policies – www.powermin.nic.in .

ICT/MOOCs Reference

1.	https://nptel.ac.in/courses/108/101/108101005/
2.	https://www.youtube.com/watch?v=ufrsQyMXyPc&t=17s

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