GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Master of Technology			Branch/Spec.	Electrical (Electrical Power System)
Semester	II			Version	1.0.0.1
Effective from Academic Year		2025-2026		Effective for the batch Admitted in	July 2025
Course Code	3EE21PE3	Course Name		Power System Dynamics	

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:

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Course Outcomes

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

CO1	Understand basic concepts of dynamics of power system and stability.
CO2	Analyze single machine infinite Bus and multimachine system dynamics.
CO3	Assess the stability of power system under various disturbances.
CO4	Analyze sub synchronous resonance and voltage stability.

Theory syllabus

Unit	Content	Hrs
1	**General Stability:** Basic concepts of dynamics and stability, System operating states, State-space representation, Stability of a dynamic system, Linearization.	**07**
2	**Single Machine System:** Small signal stability of single machine infinite bus, System model, Classical generator model, Field winding dynamics, Excitation system, Damper windings, Effect of AVR on small-signal stability of excitation system. , Synchronous machine model, Calculation of initial conditions, System simulation, Consideration of other machine model.	**10**
3	**Analysis of Multimachine System:** Small Signal Analysis with block diagram Representation, Multimachine model, synchronously rotating reference field, Characteristic Equation and Application of Routh-Hurwitz Criterion, Two-axis model, Flux decay model, Classical model, Synchronizing and Damping Torque Analysis, Nonlinear Oscillations, Detailed models: Case studies, Inclusion of Load and SVC dynamics.	**09**
4	**Rotor Angle Stability:** Swing equation, Equal area criteria, Large signal rotor Angle stability, Dynamic equivalents and coherency, Direct method of stability assessment, Stability enhancing techniques, Power system stabilizer.	**07**
5	**Sub-Synchronous Resonance:** SSR in series compensated systems and its mitigation, System design for transient stability.	**06**
6	**Voltage Stability:** Voltage instability and collapse, Continuation power flow, PV curve, Various stability indices, Maximum load ability, Maximum load ability enhancement.	**06**

Practical content

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

Text Books

1.	P.Kundur, “Power System Stability and Control,” McGraw Hill Inc.
2.	EW Kimbark, “Power system stability,” John Wiley & Sons, New York.

Reference books

1.	P. M. Anderson & A. A. Fouad “Power System Control and Stability,” Galgotia, New Delhi.

2.	J Machowski, J Bialek & J. R W. Bumby, “Power System Dynamics and Stability”, John Wiley & Sons.
3.	K R Padiyar, “Power System Dynamics Control and Stability,” BS Publications.
4.	Peter W Sauer, M A Pai, “Power System Dynamics and Stability,” Prentice-Hall.
ICT/MOOCs	
1.	https://nptel.ac.in/courses/108/105/108105133/
2.	https://nptel.ac.in/courses/108/101/108101004/
3.	https://nptel.ac.in/courses/108/106/108106026/

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	0	0	0	0	0	0	0	0	0	0	2	1	2
CO2	3	3	2	2	0	0	0	0	0	2	0	2	3	2	1
CO3	3	3	2	2	0	0	0	0	0	2	0	2	2	2	1
CO4	3	3	2	2	0	0	0	0	0	2	0	2	3	2	1