

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		3EE21PE6		Course Name		Power System Transients			
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 subject, students should be able to:									
CO1	Understand electrical transients, Laplace transforms, damping, and three-phase transient behavior.								
CO2	Understand and analyze digital computation methods like matrix approach, Z-transform, and EMTP for lightning and switching transients.								
CO3	Analyze the effects of lightning and switching surges, travelling waves, and wave behavior in transmission lines.								
CO4	Evaluate insulation coordination and protective strategies in AIS/GIS substations using arresters and grounding methods.								
Theory syllabus									
Unit	Content								Hrs
1	Introduction: Fundamental circuit analysis of electrical transients, Laplace transform method of solving simple switching transients, Damping circuits, Abnormal switching transients, Three-phase circuits and transients, Computation of power system transients.								08
2	Computation Techniques of Transients: Principle of digital computation, Matrix method of solution, Modal analysis, Z-transform, Computation using EMTP, Lightning, Switching and temporary over voltages, Physical phenomena of lightning.								08
3	Lightning Surges: Interaction between lightning and power system, Influence of tower footing resistance and earth resistance, Switching: short line or kilometric fault, Energizing transients, Closing and reclosing of lines, Line dropping, Load rejection, Over voltages induced by faults.								08
4	Switching Surges: Switching HVDC line travelling waves on the transmission line, Circuits with distributed parameters Wave equation, Reflection, Refraction, Behavior of travelling waves at the line terminations, Lattice diagrams, Attenuation and distortion, Multi-conductor system and velocity wave.								08
5	Insulation Coordination: Principle of insulation co-ordination in air insulated substation (AIS) and gas Insulated substation (GIS), Coordination between insulation and protection level, Statistical approach.								07
6	Protective Devices: Protection of system against over voltages, Lightning arresters, Substation earthling.								06
Practical content									
Assignments and tutorials are based on the above syllabus.									
Text Books									
1.	Allan Greenwood, "Electrical Transients In Power System," Wiley & Sons Inc. New York.								
2.	Pritindra Chowdhari, "Electromagnetic transients in Power System", John Wiley and Sons Inc.								
Reference Books									
1.	Eiichi Haginomori, "Power System Transient Analysis," Wiley & Sons, Ltd.								

2.	C.S. Indulkar, D.P.Kothari, K. Ramalingam, 'Power System Transients – A statistical approach', PHI Learning Private Limited
3.	Akihiro Ametani," Power System Transient theory and applications", CRC press.
4.	J.L.Kirtley, "Electric Power Principles, Sources, Conversion, Distribution and use," Wiley,
ICT/MOOCs	
1.	https://nptel.ac.in/content/storage2/courses/108105053/pdf/L-10(GDR)(ET)%20((EE)NPTEL).pdf
2.	https://nptel.ac.in/content/storage2/courses/122104013/node14.html
3.	https://freevidelectures.com/course/4573/nptel-power-system-engineering/12

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