GANPAT UNIVERSITY

FACULTY OF ENGINEERING & TECHNOLOGY

Programme	Master of Technology		Branch/Spec.	Electrical (Electrical Power System)	
Semester	I		Version	1.0.0.0	
Effective from Academic Year	2025-2026		Effective for the batch Admitted in	July 2025	
Course code	3EE11PE4	Course Name	HVDC & EHVAC Transmission		

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 course, the students will be able to:

CO1	Understand the basic principles and main parts of HVDC and EHV transmission systems.
CO2	Describe the design rules, insulation methods, and working of EHV transmission systems.
CO3	Understand how converter stations work, how they are controlled, and how reactive power is managed in HVDC systems.
CO4	Apply simulation tools to study transients, overvoltage protection, and power flow in HVDC/EHV systems.

Theory syllabus

Unit	Content	Hrs
1	**Introduction to HVDC Systems:** Comparison with AC systems, Types of DC links, HVDC system components, Economics and recent developments.	**06**
2	**Converter Analysis and Control:** Line-commutated converters, Converter control characteristics, Firing angle (α) control, Constant current control, Extinction angle (γ) control, Harmonic generation and mitigation, Overlap angle and commutation effects, Performance limitations.	**08**
3	**HVDC System Design:** Converter station layout and equipment, AC and DC filters, Reactive power management in HVDC, Multi-terminal DC (MTDC) systems, Control hierarchy: primary, Secondary, Tertiary, HVDC system Protection schemes, Fault analysis and isolation methods.	**08**
4	**EHV Transmission Concepts:** Power handling capacity, surge impedance loading, voltage gradients, electrostatic and electromagnetic effects.	**07**
5	**Insulation Coordination and Overvoltage Protection:** Types of overvoltage's, insulation coordination, surge arresters, EHV testing methods.	**09**
6	**Modeling and Simulation of HVDC/EHV Systems:** Steady-state and transient models, power flow in HVDC grids, simulation tools (e.g., PSCAD/EMTDC, MATLAB-Simulink).	**07**

Practical content

Practicals, assignments and tutorials are based on above syllabus.

Text Books

1.	K.R. Padiyar, HVDC Power Transmission Systems, New Age International.
2.	R.D. Begamudre, Extra High Voltage AC Transmission Engineering, New Age International.

Reference Books

1.	Edward Wilson Kimbark, Direct Current Transmission, Volume I.
2.	C.L. Wadhwa, Electrical Power Systems, New Age International.
3.	M S Naidu, V Kamaraju, " High-Voltage Engineering", McGraw Hill.

ICT/MOOCS

1.	https://arctest.dev.nptel.ac.in/courses/108/104/108104013/
2.	https://archive.nptel.ac.in/courses/108/106/108106160/
3.	https://nptel.ac.in/courses/108108099
4.	https://www.youtube.com/watch?v=w6fCvA-geak
5.	https://onlinecourses.nptel.ac.in/noc20_ee09/preview

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