

<b>GANPAT UNIVERSITY</b>				
<b>FACULTY OF DIPLOMA ENGINEERING</b>				
Programme	Diploma in Electrical Engineering			
Semester	III	Version	1.0.0.0	
Effective from Academic Year	2026-27	Effective for the batch Admitted in	JULY 2025	
Course code	1EE3102	Course Name	Transmission & Distribution of Electrical Power	

<b>I. TEACHING-LEARNING AND ASSESSMENT SCHEME</b>																			
Course Type	Course code	Course Title	Teaching & Learning Scheme									Examination Scheme							
			Credit				Actual Contact Hrs/week			SLH	Total Learning Hrs/Week	TH			PR			SLA	Total
			CL	TL	LL	Total	CL	TL	LL			CE	SEE	Total	CE	SEE	Total		
DSC	1EE3102	Transmission and Distribution of Electrical Power	3	0	1	4	3	0	2	3	8	40	60	100	30	20	50	20	170

<b>Abbreviation:</b>	<b>CL-</b> Classroom Learning	<b>TL -</b> Tutorial Learning	<b>LL -</b> Laboratory Learning
	<b>SLH -</b> Self Learning Hours	<b>SLA -</b> Self Learning Assessment	<b>CE -</b> Continuous Evaluation
	<b>SEE –</b> Semester End Examination		

<b>II. PRE-REQUISITES</b>
Basic knowledge of Electrical Power Generation.

<b>III. INDUSTRY / EMPLOYER EXPECTED OUTCOMES</b>
The purpose of this course is to help the student to learn about the basic concepts related to electrical engineering.

<b>IV. COURSE LEARNING OUTCOMES</b>
At the end of the course, students will be able to achieve the following course learning outcomes: <b>CO1.</b> To understand transmission and distribution system-O.H and U.G. <b>CO2.</b> To apply modern technology for transmission and distribution of electrical power. <b>CO3.</b> To develop new skills to reduces T & D losses in power system. <b>CO4.</b> To implement new ideas for making T & D system more powerful and efficient. <b>CO5.</b> To Verify prons and cons of new technologies on environment/community.

<b>V. THEORY LEARNING OUTCOMES AND ALIGNED COURSE CONTENT:</b>				
Name of Unit	Theory Learning outcomes (TLO's) aligned to CO's	Learning Content mapped with Theory Learning outcomes (TLO's) & CO's	Marks	Hours
<b>Unit-1 Transmission Line Components</b>	<b>TLO 1.1</b> Single line diagram of power system <b>TLO 1.2</b> State the features of different transmission systems. <b>TLO 1.3</b> State the need for different types of insulators. <b>TLO 1.4</b> State the features of different types of conductors and supports <b>TLO 1.5</b> Explain the criteria for spacing of conductors	<b>1.1</b> Single line diagram of power system <b>1.2</b> Classification of transmission lines. <b>1.3</b> Comparison of different types of transmission systems. <b>1.4</b> Types of conductors-Copper, Aluminium: Solid, stranded and bundled conductors, Line supports. <b>1.5</b> Line insulators – requirements, types, Failure of insulator. <b>1.6</b> String efficiency, methods of improving string efficiency. <b>1.7</b> Spacing between conductors, span length and sag calculation.	<b>14</b>	<b>12</b>
<b>Unit-2 Performance of</b>	<b>TLO 2.1</b> Discriminate between skin effect, proximity effect, Ferranti	<b>2.1</b> Skin effect, proximity effect and Ferranti effect, Corona <b>2.2</b> Transposition of conductors	<b>14</b>	<b>12</b>

<b>Transmission Lines</b>	<p>effect and corona</p> <p><b>TLO 2.2</b> State the effect of efficiency and regulation of a transmission line</p> <p><b>TLO 2.3</b> State the effect of low power factor on the performance</p> <p><b>TLO 2.4</b> Explain the effects of R, L and C on 1-ph and 3-ph transmission line.</p> <p><b>TLO 2.5</b> Differentiate the features of the short, medium (Nominal T and <math>\pi</math> method) and long transmission lines</p> <p><b>TLO 2.6</b> Describe the importance and functions of the load dispatch centre.</p>	<p><b>2.3</b> Losses, efficiency and regulation of line.</p> <p><b>2.4</b> Performance of single phase short transmission</p> <p><b>2.5</b> Effect of load power factor on performance.</p> <p><b>2.6</b> Features of short, medium (Nominal T and <math>\pi</math> method) and long transmission lines.</p> <p><b>2.7</b> Load dispatch Centre</p>		
<b>Unit-3 Extra High Voltage Transmission</b>	<p><b>TLO 3.1</b> State the need for EHV transmission.</p> <p><b>TLO 3.2</b> State the features of HVAC transmission.</p> <p><b>TLO 3.3</b> State the features of HVDC transmission.</p>	<p><b>3.1</b> Advantages of EHV transmission.</p> <p><b>3.2</b> Line diagram of HVAC system, its advantages and limitations.</p> <p><b>3.3</b> Line diagram of HVDC system, its advantages and limitations.</p> <p><b>3.4</b> Comparison of HVDC and HVAC system.</p> <p><b>3.5</b> State the equipment used in HVDC system and its application.</p>	<b>8</b>	<b>5</b>
<b>Unit-4 Distribution System Components</b>	<p><b>TLO 4.1</b> State the need for distribution system.</p> <p><b>TLO 4.2</b> Types of AC distribution system.</p> <p><b>TLO 4.3</b> Importance of distribution system.</p> <p><b>TLO 4.4</b> Main elements of distribution system.</p> <p><b>TLO 4.5</b> Connection schemes for distribution system.</p>	<p><b>4.1</b> Various distribution system.</p> <p><b>4.2</b> Types of AC distribution system with diagram.</p> <p><b>4.3</b> Necessity of distribution system.</p> <p><b>4.4</b> Functions of feeder, distributors and service mains.</p> <p><b>4.5</b> Various methods of connection for distribution system-radial, ring main and interconnected system.</p>	<b>12</b>	<b>8</b>
<b>Unit-5 Substation and Cable</b>	<p><b>TLO 5.1</b> State the need for electrical substations.</p> <p><b>TLO 5.2</b> Factors for site selection and layout of substation.</p> <p><b>TLO 5.3</b> State the features of different types of substation.</p> <p><b>TLO 5.4</b> Equipment used in substation.</p> <p><b>TLO 5.5</b> Construction and working of cable.</p> <p><b>TLO 5.6</b> Advantages and disadvantages of underground cable over overhead line.</p>	<p><b>5.1</b> Working of substation.</p> <p><b>5.2</b> Key points for layout and site selection.</p> <p><b>5.3</b> Types of substation on various bases, GIS substation</p> <p><b>5.4</b> Functions of various equipment used in substation.</p> <p><b>5.5</b> General construction of cable.</p> <p><b>5.6</b> Merits and demerits of U.G. cable over O.H. line.</p>	<b>12</b>	<b>8</b>

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## VI. LABORATORY LEARNING OUTCOME AND ALIGNED PRACTICAL

Sr. No.	Practical/Laboratory Learning Outcome (LLO)	Practical Titles	Relevant COs
1	<b>LLO 1.1</b> Types of Transmission towers.	Prepare a reports on various types of transmission towers with diagram.	CO1
2	<b>LLO 2.1</b> Types of Insulators and bushings.	Prepare a reports on various types of insulators and bushing with diagram.	CO1
3	<b>LLO 3.1</b> Types of cables used in distribution system	Prepare a report on various types of cable used in distribution system by visiting nearby cable supplier	CO5
4	<b>LLO 4.1</b> Load Dispatch Centre.	Prepare technical report on Load Dispatch Centre.	CO2
5	<b>LLO 5.1</b> HVDC lines in Gujarat and India	Prepare a report on HVDC lines in Gujarat and India	CO3
6	<b>LLO 6.1</b> Residential distribution system	Prepare a report on distribution system for residential consumer.	CO4
7	<b>LLO 7.1</b> Substation visit	Prepare a report on substation after visit.	CO5
8	<b>LLO 8.1</b> Instruments/equipment used in substation.	Prepare chart of various instruments/equipments used in substation.	CO5
9	<b>LLO 9.1</b> Blueprint of substation.	Interpret and explain blueprint of substation.	CO5
10	<b>LLO 10.1</b> Pole mounted substation	To draw a sheet of pole mounted substation with necessary parts and ladled it.	CO5
11	<b>LLO 11.1</b> Underground cable and its application	To study about construction of underground cable and its application	CO5
12	<b>LLO 12.1</b> Construction and working of cable	Prepare a report on construction and working of cable after visit.	CO5
13	<b>LLO 13.1</b> Earth tester and meggar.	Use of earth tester and meggar.	CO3

## VII. SUGGESTED MICRO PROJECT / ASSIGNMENTS / ACTIVITIES FOR SELF LEARNING / SKILL DEVELOPMENT (SELF LEARNING)

<ul style="list-style-type: none"> <li>Visit 66 kV distribution sub-station and draw line diagram with equipment specifications</li> <li>Visit 132/220/400kV transmission sub-station and draw line diagram with equipment specifications.</li> <li>Visit Load Dispatch Centre.</li> </ul>
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## VIII. LIST OF INSTRUMENTS / EQUIPMENT / TRAINER BOARD

1	3-phase transmission line trainer
2	11kv pin ,33 kv string insulators
3	Different types of 1-phase and 3-phase armoured and unarmoured cable
4	Megger and earth tester.
5	Samples/demo pieces of various equipment used in substations.

<b>IX. LIST OF REFERENCE BOOKS</b>			
<b>Sr. No.</b>	<b>Title</b>	<b>Author</b>	<b>Publication</b>
1	Electrical Power Transmission and Distribution	Sivanagaraju S. Satyanarayana S.	Pearson Learning, New Delhi, Latest edition
2	A Course in electrical Power	Soni-Gupta-Bhatnagar	Dhanpat Rai, New Delhi, Latest edition
3	Transmission and Distribution of electrical energy	Gupta J. B.	S. K. Khanna, New Delhi, Latest edition
4	Principles of power system	Mehta V. K.	S. Chand and Co., New Delhi,

<b>X. LINK OF LEARNING WEB RESOURCE</b>	
1	<a href="http://www.ntpc.co.in">www.ntpc.co.in</a>
2	<a href="https://www.powergrid.in">https://www.powergrid.in</a>
3	<a href="https://www.electrical4u.com/electrical-engineering-articles/transmission/">https://www.electrical4u.com/electrical-engineering-articles/transmission/</a>
4	<a href="https://energy.gov/sites/prod/files/2013/07/f2/Transmission_Woodall_0.pdf">https://energy.gov/sites/prod/files/2013/07/f2/Transmission_Woodall_0.pdf</a>
5	<a href="https://www.electrical4u.com/performance-of-transmission-line/">https://www.electrical4u.com/performance-of-transmission-line/</a>

<b>XI. SUGGESTED WEIGHTAGE TO LEARNING EFFORTS &amp; ASSESSMENT PURPOSE</b>							
<b>Unit</b>	<b>Unit Title</b>	<b>Aligned COs</b>	<b>Learning Hours</b>	<b>R-Level</b>	<b>U-Level</b>	<b>A-Level</b>	<b>Total Marks</b>
1	Transmission Line Components	CO1	12	4	5	6	14
2	Performance of Transmission Lines	CO2	12	4	5	6	14
3	Extra High Voltage Transmission	CO3	5	4	3	3	8
4	Distribution System Components	CO4	8	4	4	7	12
5	Substation and Cables	CO5	8	4	4	7	12
Grand Total			45	20	21	29	60

<b>XII. COs AND POs AND PSOs MAPPING</b>										
<b>Course outcome (Cos)</b>	<b>Programme Outcomes (POs)</b>							<b>Programme Specific Outcomes (PSOs)</b>		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2	PSO3
CO1	3	2	1	2	3	2	0	3	2	1
CO2	3	1	3	3	0	3	1	2	3	1
CO3	3	3	1	2	0	1	3	3	2	3
CO4	2	2	3	0	1	3	2	1	3	2
CO5	3	1	2	0	3	2	2	3	1	2

**Legends: - 3- High      2-Moderate/Medium      1-Slight/Low      0-None**