

Branch Name:	Electrical Engineering
Program Code:	ET403
Course Name:	GENERATION AND TRANSMISSION OF ELECTRICAL POWER
Course Code:	2ET4030303
Pre-requisite Course:	

Course Objectives:

1. Supervise functioning of Thermal power plant, Hydro power plant and Nuclear power plant.
2. Solve problems related to load curve and load duration curve.
3. Apply mechanical and electrical design aspects of various types of conductor, support and insulator to maintain overhead line.
4. Analyze performance of transmission line.
5. Differentiate various types of HVDC transmission system.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)			
Lecture	Tutorial	Practical	Credit	Theory		Practical	
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment
4	-	2	6	60	40	20	30

DETAILS OF COURSE CONTENTS:

Sr No	Topics and Sub-topics	Total Hours	Weightage %
1	Generation of Electrical Power 1.1 Energy conversion process of thermal, hydro and nuclear power plant 1.2 Factors of site selection for thermal, hydro and nuclear power plant 1.3 Schematic diagram of thermal, hydro and nuclear power plant. 1.4 Schematic diagram of different cycles of thermal power plant. 1.5 Major equipment, accessories used in thermal power plant. 1.6 Classification of hydro power plant 1.7 Different schemes and elements of Hydro Power Plant 1.8 Nuclear fission, nuclear fusion and chain reaction 1.9 Nuclear reactor and fuels used 1.10 Nuclear waste in its disposal 1.11 Advantages and disadvantages of thermal, hydro and nuclear power plant. 1.12 Safe practices, environmental effect and precautions for thermal, hydro and nuclear power plant 1.13 Major thermal, hydro and nuclear power plant of Gujarat-state	24	20
2	Variable Load on Power Station 2.1 Types of loads 2.2 Types and importance of load curve 2.3 Terms and factors regarding load curve 2.4 Load duration curve Base load and peak load power plants	04	08

3	Elements of Overhead Transmission Lines 3.1 Single line diagram of typical power supply system. 3.2 Classification of transmission lines 3.3 Comparison between AC & DC and overhead & underground system. 3.4 Effect of system voltage and load power factor and Selection of voltage of transmission. 3.5 Line Conductors: requirements, materials & types of conductors for overhead lines, types of ACSR conductors and features of optical fiber ground wire. 3.6 Line Supports: requirements & types of line supports and classification of transmissions line towers Line 3.7 Line Insulators: requirements, materials, types & failure of line insulators and features of silicon rubber insulators. 3.8 String efficiency and methods of improving string efficiency. 3.9 Sag calculation , spacing between conductors and ground clearance	14	12
4	Performance of Transmission Lines 4.1 Transmission line parameters: effect and representation of line parameters 4.2 Transposition of line conductors 4.3 Classification of transmission lines 4.4 Skin effect, proximity effect, Ferranti effect and corona effects 4.5 Voltage regulation and transmission efficiency 4.6 Performances of short transmission lines. 4.7 Performances of medium transmission lines 4.8 Load dispatch center; grid system in India and it's hierarchy	10	12
5	HVDC Transmission System 5.1 Requirements of EHV transmission system. 5.2 Advantage and limitations of EHV AC transmission system 5.3 Single diagram of HVDC transmission 5.4 Types of HVDC transmission systems 5.5 Merits, demerits and application of HVDC transmission system 5.6 Comparison between HVDC and HVAC transmission systems	04	08

REFERENCE BOOKS:

SR. No.	Title of Books	Author	Publication
1	Principles of Power system	Mehta, V.K.	S. Chand & Co., New Delhi, 2020 ISBN: 978-8121924962
2	Power plant Engineering	Nag, P K	Tata McGraw Hill, New Delhi, 2011 ISBN:978-0-07-064815-9
3	Electrical Power Systems	Uppal S.L.	Khanna publication, New Delhi, 2011 ISBN:978-8174092380
4	Generation and Utilization of Electrical Energy	S. Sivanagaraju	Pearson, New Delhi, 2011 ISBN:978-81-317-33325
5	A course in Power Systems	J.B.Gupta	S K Kataria & sons,2013 ISBN:978-9350143735

List of Open-Source Software/learning website:

1. <https://www.google.com>
2. <https://www.youtube.com>

LIST OF PRACTICAL:

1	Interpret the line diagram of Thermal Power Station (T.P.S.) and main cycles & explain working of T. P. S.
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2	Prepare technical report of visit to a nearby T.P.S./ Prepare a report on thermal power stations in Gujarat by collecting data from Internet
3	Energy conversion process for hydro- power station (HPS) with plant layout and elements of hydro power station
4	Prepare technical report of visit to a nearby H.P.S./ Prepare a report on Hydro power stations in Gujarat by collecting data from Internet
5	Interpret the schematic diagram of Nuclear power station & explain the function of each component.
6	Prepare and interpret load curve for given data/data collected from nearby power station
7	Demonstrate various types of conductors used in overhead transmission lines.
8	Demonstrate different types of line supports employed in transmission system and distribution system.
9	Demonstrate different types of insulators used in overhead transmission and distribution system
10	Calculate sag in overhead transmission line for given data.
11	Determine string efficiency of suspension type insulator for given data.
12	Determine voltage regulation and transmission efficiency of medium transmission line.
13	Prepare technical report on load dispatch center.
14	Prepare report on HVDC transmission systems.
15	Determine voltage regulation and transmission efficiency of short transmission line.

Course Learning Outcomes (CLO):

CLO	Description	Bloom's Taxonomy Level
CLO1	Supervise functioning of Thermal power plant, Hydro power plant and Nuclear power plant.	6 Creating, 2 Understanding
CLO2	Solve problems related to load curve and load duration curve.	2 Understanding, 4 Analyze, 5 Evaluating
CLO3	Apply mechanical and electrical design aspects of various types of conductors, supports and insulators to maintain overhead lines.	3 Applying, 4 Analyze
CLO4	Analyze performance of transmission lines	1 Remembering, 2 Understanding, 4 Analyze
CLO5	Differentiate various types of HVDC transmission systems	2 Understanding, 3 Applying

Mapping of CLOs with Pos & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	H	M	M	M	H	M	M	L		L			M	H	L
CLO2	ML	H			M								H	L	L
CLO3	H	H	M										L		H
CLO4	H	H	M		L			L					M		M
CLO5	H				L				M				L		

H:High, M:Medium, L:Low