

Branch Name:	Electrical Engineering
Program Code:	ET109
Course Name:	Electrical Power System-I
Course Code:	2ET1090501T
Pre-requisite Course:	Fundamental Knowledge of Elements of Electrical Engineering.

Course Objectives:

1. Student will learn about the concepts of power systems.
2. Student aware about the various power system components.
3. Student will Evaluate the transmission line parameters

Teaching and Examination Scheme:

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	3	-	-	3	24	60	16	40	-	-	-	-	100

Course Contents:

Sr. No.	Topic	Total Hours	Weightage (%)
1	Introduction: Present-Day scenario, Single line diagram of power system, Main components of power system, Structure of a power system: bulk power grids and micro-grids.	03	10
2	Variable Load on Power System: Types of loads, Variable load, Load and load duration curves, Connected load, Maximum demand, Average load, Demand factor, Load factor, Diversity factor, plant use factor, Utilization factor, Selection of generating units, Base load and peak load plant, Methods of meeting the load.	05	12
3	Supply System: Various systems of power transmission, Comparison of D.C. and A.C. transmission, Advantages of high transmission voltage, Derivation for volume of conductor materials used for three phase three wire and three phase four wire system, Requirements of satisfactory electric supply.	06	12
4	Economics of Power Generation and Transmission: Economics of generation, Cost of electrical energy, Expressions for cost of electrical energy, Methods of determining depreciation, Importance of high load factor, Economics of transmission, Economic choice of conductor size, Economic choice of transmission voltage.	06	12
5	Mechanical Aspects of Overhead Lines: Main components of overhead lines, Line supports, cross arms, Conductor materials, Types of insulators, Potential distribution over a string of suspension insulators, String efficiency, Methods of improvement of string efficiency, Calculation of sag and tension, Ice & wind effect on sag, Corona.	09	20

6	Transmission Line Constants: Resistance of line, Inductance of conductor due to internal and external flux, Inductance of 1-phase, two-wire line and composite conductor lines, self GMD, Mutual GMD, inductance of 3-phase line with equal and different spacing, With and without transposition, Double circuit line and bundled conductors, Capacitance of 1-phase and 3-phase transmission line with symmetrical and unsymmetrical spacing, Transposition, Skin effect, Proximity effect.	08	17
7	Performance of Transmission Line: Types of transmission line, Voltage regulation of short transmission line, Medium line representation, Performance analysis of long transmission line, ABCD parameter representation, Surge impedance and surge impedance loading, Equivalent T and π representation of long line, Interpretation of long line equation, Ferranti effect.	08	17

Text Books:

1. V. K. Mehta, "Electrical Power System", S.Chand Publication, 2nd edition, 2016.
2. J. B. Gupta, "Electrical Power", S. K. Kataria Publication, 15th edition, 2018.

Reference Books:

1. C. L. Wadhwa, "Electrical Power System", New Age International Publication, 2009.
2. I. J. Nagrath & D. P. Kothari, "Power System Engineering" TMH publication Ltd, 6th edition, 2009.
3. Soni, Gupta, Bhatnagar & Chkraborty, "A Course in Electrical Power", Dhanpat Rai Publication, 2nd edition, 2012.

ICT/MOOCs Reference:

1. <https://www.youtube.com/watch?v=Yg6XsepGCKY>
2. <https://www.youtube.com/watch?v=uy9lZCdkQIM>
3. <https://nptel.ac.in/courses/108105067/2>
4. <https://nptel.ac.in/courses/108105067/4>
5. <https://nptel.ac.in/courses/108105067/5>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the concepts of power systems.	2 Understanding
CLO2	Understand the various power system components.	2 Understanding
CLO3	Estimate the economy involved in power generation & transmission.	4 Analyzing
CLO4	Evaluate the transmission line parameters and analyse the performance of transmission line.	5 Evaluating

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	PSO4
CLO1	H	M	L	L	L		L	L	M			L	L	L	M	L
CLO2	H	H	M	L	L	L	L		M		L	L	M	M	M	L
CLO3	H	M	M	L	M	M	M	L	M		L	M	L	M	H	
CLO4	H	H	H	M	M				M			M	H	L		M

H: High, M: Medium, L: Low