EE401: POWER SYSTEM PRACTICE AND DESIGN
CREDITS = 5 (L=3, T=0, P=2)

Course Objective:

To explain basic concepts of practice and design for generation, transmission and distribution.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				
L	T	P	C	Theory		Practical		Total Marks
				ESE	CE	ESE	CE	
3	0	2	5	70	30	30	20	150

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Elements of Power Station Practice:** Flow Diagram; Main components of a thermal power plant – boiler plant, turbines, control room, electrostatic precipitators, coal and ash handling plants, circulating water system; Combined Cycle Power Plants – flow diagram.; Hydro-electric Power Plants – Classification, arrangement and layout, types of water turbines, discharge and specific speed.	10
2	**Electrical Packages of a Power Plant:** Generator, Exciter, Bus-duct, Generator Transformer, Auxiliary Transformers and Motors, Batteries, Instrumentation and Control Equipment, Neutral Grounding Equipment, 6.6 kV and 415 V switchgear, Switchyard equipment's.	08
3	**Design of EHV Transmission Line:-** Requirements and specifications, selection of voltage, choice of conductors, spacing of conductors, corona, radio and television interference, insulation coordination, insulators, surge impedance loading, Main considerations of mechanical design, sag-tension relation, stringing of transmission lines. Transmission towers.	07
4	**Design of Distribution Systems:** AC 3-phase 4-wire distribution, Types of primary distribution systems, Types of secondary distribution systems, Voltage drop in AC distributors, Kelvin's law, Limitations of Kelvin's Law, General design considerations, Load Estimation, Design of Primary Distribution, Sub-stations, Secondary distribution design, Economical design of distributors, Design of Secondary network, Lamp Flicker.	06

Unit No.	Topics	Teaching Hours
5	**Substation Design:** Classification, Terms and Definitions, Stresses on Substation Equipment, Clearances, Maintenance zones, Designing a sub-station layout; Design of 66/11 kV distribution substation; selection and specification of main equipment's.	08
6	**SF6 Gas Insulated Sub-stations (GIS):** Introduction, Applications of GIS, Range of Ratings, Demerits of GIS, Configuration of GIS, Circuit Arrangement and Single-line diagram of GIS, Design aspects, Earthing switches in GIS.	06
	TOTAL	**45**

List of References:

1. Bhuvanesh Oza and Vijay Makwana, "*Modern Power Generation Practice*", Bharti Prakashan, 2007
2. P. M. Reynolds (Editor), "*Modern Power Station Practice – volumes A to D*", Third Edition, Elsevier, 1990
3. B. R. Gupta, "*Power System Analysis and Design*", Sixth Edition, S. Chand & Sons, 2011
4. R. S. Dahiya and Vinay Attri, "*Sub-Station Engineering Design, Concepts & Computer Applications*", Katson Publications, 2013
5. S. Rao, "*Electrical Substation Engineering & Practice: EHVAC, HVDC & SF_6 - GIS* ", Khanna Publishers, 2003
6. Rakosh Das Begamudre, "*Extra High Voltage A.C. Transmission Engineering*", 4th Edition, New Age International, 2011

Course Outcomes (COs):

At the end of this course students will demonstrate the ability to:

1. Appreciate the principles of design of power thermal, hydro and combined cycle power plants.
2. Understand the functions and applications of electrical packages of a power plant.
3. To theoretically design the EHV transmission line.
4. Understand the substation layout and design a distribution substation.
5. Understand and design a GIS.
6. Design a town electrification scheme and an industrial distribution systems.