

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. SEMESTER: V

Electrical & Electronics Engineering

Subject Name: **Electrical Power Engineering**

Subject Code: **150801**

Teaching Scheme				Evaluation Scheme		
Theory	Tutorial	Practical	Total	University Exam (Theory) (E)	Mid Sem Exam (Theory) (M)	Internal Assessment (I)
4	0	2	6	70	30	50

Sr. No	Course Content
1.	Generation of Electric Power: Introduction of Generating Stations, Brief description of Thermal, Hydro, Nuclear, Gas power plants & other Combined cycle power plant. Schematic arrangement, advantages and disadvantages, choice of site and efficiency and comparison of Thermal, Hydro, Nuclear and Gas power plants. Environmental aspects for selecting sites and locations of Various power plants.
2.	Transmission and Distribution Systems: Electrical Supply System, Typical A.C. Power Supply Scheme, Comparison of DC and AC Transmission, Advantages of High Transmission voltage, Comparison of conductor material in overhead system, comparison of conductor material in Underground system, Elements of Transmission line, Requirement of Satisfactory electric supply.
3.	General Distribution Systems: Classification of Distribution System, Comparison of DC 2-wire and 3-wire systems, AC single phase, three phase and 4-wire systems, primary and secondary distribution systems, concentrated & uniformly distributed loads on distributors fed at one and both ends, ring distribution, voltage drop and power loss calculations, AC Distribution Calculations, Methods of solving AC Distribution Problems.
4.	Overhead Transmission Lines: Types of Conductors, Line parameters; Calculation of inductance and capacitance of single and double circuit transmission lines, three phase lines with stranded and bundle conductors, Generalized ABCD constants and equivalent circuits of short, medium & long lines. Line Performance: regulation and efficiency of short, medium and long lines.
5.	Overhead Line Insulators: Type of Insulators, Potential Distribution over Suspension Insulator String, String

	efficiency, Methods of Improving String efficiency, Preventive Maintenance
6.	Mechanical Design of Transmission Lines: Different types of towers, Conductor Materials, Line supports, Sag in Overhead Lines, sag-tension calculations, sag-template, vibrations & damaging Corona-corona losses, Factors affecting Corona, radio & audio noise, transmission line – communication line interference.
7.	Underground Cables: Construction of Cables, Classification of Cables, Calculations of capacity of cables, Charging current, Stress, Grading, Heating of Cables, Construction and characteristics of HV & EHV cable.
8.	Substations: Classification of sub-stations, Comparison between outdoor and indoor Substations. Transformer sub-stations, Pole-mounted sub-station, Underground substation, symbols for equipment in sub-stations equipment in a transformer substation, Bus bar Arrangement in sub-stations, Terminal and Through Sub- stations, Key diagram of 66/11 kV sub-station, Key diagram of 11 kV/400 V indoor substation.
9.	Tariffs & Load Curves: Definition & different tariffs for domestic, commercial, industrial application, Load curves, Load Duration Curves, Types of Loads, Typical demand and diversity factors, Load curves and selection of Generating Units, Interconnected grid system.
10.	Voltage Control and Power Factor Improvement: Importance of Voltage Control, Location of Voltage Control Equipment, Methods of Voltage Control, Tap Changing Transformer, Power Factor, Causes of Low Power Factor, Advantages of power factor improvement, Methods of improving power factor, the most economical power factor
11.	Introduction to EHV/HVDC transmission: Brief description of both the systems with working & constructional details. Introduction to FACTS.

Reference Books:

1. Wadhwa, C.L., “Electrical Power Systems”, Fourth Edition, 2006, New Age International Publishers, New Delhi.
2. Kothari D.P., Nagrath I.J., “Power System Engineering,” Second Edition, 2007, Tata McGraw Hill Companies, New Delhi.
3. Uppal S.L., “Electrical Power”, Khanna Publishers, New Delhi.
4. Mehta V.K., Mehta R., “Principles of Power System,” Fourth Edition, 2004, S.Chand & Company Ltd, New Delhi.
5. Ray, Subir, “Electrical Power Systems : Concepts, Theory And Practice,” Eastern Economy Editions, PHI Learning Private Ltd. New Delhi.