



# C.U.SHAH UNIVERSITY

**FACULTY OF:** - Technology & Engineering  
**DEPARTMENT OF:** -Electrical Engineering  
**BRANCH:** Electrical Engineering  
**SEMESTER:** - V  
**COURSE:-** B.Tech  
**CODE:** - 4TE05EPS1  
**NAME** – Electrical Power System

## Teaching & Evaluation Scheme

Subject Code	Name of the Subject	Teaching Scheme (Hours)				Credits	Evaluation Scheme							
		Th	Tu	Pr	Total		Theory				Practical (Marks)			Total
							Sessional Exam		University Exam		Internal		University	
							Marks	Hrs	Marks	Hrs	Pr/Viva	TW	Pr	
4TE05EPS1	Electrical Power System	4	0	2	6	5	30	1.5	70	3	---	20	30	150

### OBJECTIVES

- To introduce the students to the concepts of various electrical power plants namely
  - Steam power station,
  - Hydro power station,
  - Nuclear power station
  - Gas turbine power plant.
- To study design and implementation and modelling of power plants analysis.
- To introduce the students to the concepts of renewable analysis.

### PREREQUISITES

- Basics and fundamental of mathematics analysis.

### COURSE OUTLINES

Sr. No.	Course Contents	Hours
1	<b>Introduction To Basic Structure Of Power System:</b> Generation, Transmission and Distribution, generating stations, Schematic arrangement, advantages and disadvantages, efficiency, choice of site, types of prime movers, characteristic, speed control and auxiliaries. Environmental aspects for selecting sites and locations for; (a) Steam power station, (b) Hydro power station, (c) Nuclear power station (d) Gas turbine power plant. Renewable energy. Introduction Basics of energy, unit conversions, Trends of energy consumption, developed and developing country, Indian and world energy scenario, environmental concern importance of renewable energy, Fossil fuel, availability and limitations. Need to develop new renewable energy sources-energy conservation method.	14

2	<p><b>Overhead Transmission Line:</b> Types of conductors, Calculation of line parameters – Inductance and Capacitance of single phase, three phase, symmetrical and unsymmetrical configurations, Concepts of GMD and GMR, Transposition, Bundle conductors, Double or parallel circuit, Effect of earth on capacitance calculation, Interference with communication circuit, Concept of Corona discharge. <b>Performance Of Lines:</b> Short, medium and long lines - Representation, A, B, C, D constants, Voltage regulation and Transmission efficiency, Ferranti effect.</p>	12
3	<p><b>Power Flow Through Transmission Line:</b> Mathematical expressions, Effect of active and reactive power flow on bus voltage magnitude and phase angle. <b>Overhead Line Insulators:</b> Different types, Voltage distribution, String efficiency, Methods of equalizing potential, Insulator failure. <b>Mechanical Design Of Overhead Lines:</b> Sag and tension calculations, Effect of ice and wind, Stringing chart, Sag template, Tower design, Spacing and clearance, Vibration damper. <b>Underground Cables:</b> Different types, Insulating materials, Dielectric stress, Grading, Capacitance, Heating and causes of breakdown.</p>	12
4	<p><b>Variable Load ,Economics, power factor on Power Station:</b> Structure of Electrical Power system, Load curve, importance terms and factors, load duration curves, types of load and calculation, Peak load calculation in power station and electrical systems, methods of meeting the load interconnected grid system. Economics of Power generation, depreciation, importance of high load factor, tariff, power factor improvement, power triangle, disadvantage of low factor, causes of low power factor, calculations of correction, introduction of power system.</p>	12
5	<p><b>Power System Grounding or Earthing:</b> Equipment grounding, Neutral grounding – Different methods, Grounding transformer. Types of Grounding with details</p>	04

### Learning Outcomes

After the completion of this course the students would be able to:

1. To design and implement various Power plants.
2. Understand basic properties of renewable energy or non-renewable energy.
3. Design of the fundamental power plants and distribution system.

### Books Recommended

- 1 V. K. Mehta, Rohit Mehta, “ Principles of Power System , Publication by S.Chand & Company LTD.
- 2 Sivanagaraju and Satyanarayana, “Electrical Power Transmission and Distribution”, Pearson Education
- 3 Glover, Sarma , Overbye, “Power System Analysis and Design” Cengage Publication 3 B.A. Oza, “Power System Generation”
- 4 M.V. Deshpande, “Electrical Power Stations” PHI Publications

5 Dr. S.L. Uppal, "Electrical Power" Soni, Gupta and Bhatnagar, "A course in electrical power"