

**EE207: ELECTRICAL POWER GENERATION**  
**CREDITS = 6 (L=4 T=0, P=2)**

**Course objective:**

The subject aims to provide the student of electrical engineering discipline with:

- C1.** An understanding of basic abstractions of electrical power generations from conventional and non-conventional sources of energy.
- C2.** The capability to use abstractions to comprehend and analyze the impact of various system on environments and economics aspects of energy generation.
- C3.** Knowledge for learning advanced topics in electrical power system.
- C4.** The capability to incorporate the knowledge of electrical power generation in other field of science, engineering and economics.

**Teaching and examination scheme:**

Teaching Scheme			Credit	Marks Distribution				Total Marks
L	T	P	C	Theory Marks		Practical Marks		
				ESE	CE	ESE	CE	
4	0	2	6	70	30	30	20	150

**Course contents:**

Unit No.	Topics	Teaching Hours
1	<b><u>Sources of energy:</u></b>  Types and choice of power generation, amount of generation of electric power from conventional and non-conventional sources of energy in Gujarat and India and some developed countries of the world.	03
2	<b><u>Steam power station:</u></b>  Main parts, layout and working of a steam station, characteristics of steam turbines and turbo generator; advantages and disadvantages, choice of site, efficiency of steam power station; environmental aspects for selecting the sites and locations of thermal power stations. Numerical.	08
3	<b><u>Hydro power station:</u></b>  Main parts, layout and working of a hydro station, characteristics of hydro turbines and generator; advantages and disadvantages, choice of site, efficiency of hydro power station; environmental aspects for selecting the sites and locations of hydro power stations. Numerical.	07

4	<b><u>Nuclear power station:</u></b>	05
	Schematic arrangement, advantages and disadvantages, selection of site, types of reactors, Hazards, Environmental aspects for selecting the sites and locations of nuclear power stations.	
5	<b><u>Power Generation by Non-Conventional Energy Sources:</u></b>	05
	Need of Renewable energy. Concept of Distributed energy resources (DER) and dispersed generation (DG), Cogeneration. Types, merits and demerits of cogeneration.	
6	<b><u>Photovoltaic Power Conversion systems:</u></b>	05
	Solar radiation spectrum. Radiation measurement. Solar Photovoltaic (SPV) systems. Applications. Green Building. Present Status of PV in India. Governmental incentives.	
7	<b><u>Wind Power Conversion System:</u></b>	05
	Principles of wind energy conversion. Basic components of wind energy conversion systems. Classifications of wind power plants (WPPs), Comparison/ advantages and disadvantages of WECS. Site selection considerations.	
8	<b><u>Economics Aspects:</u></b>	06
	Introduction. Diversity factor, load factor, plant capacity factor, plant use factor, plant utilization factor and loss factor, load duration curve. Cost of generating station, factors influencing the rate of tariff designing, tariff, and types of tariff. Power factor improvement Numerical.	
9	<b><u>Substation:</u></b>	05
	Classification of Substations, substation equipment, Specification and selection of equipment, Site selection of substation. Bus bar arrangement schemes, Interconnection of power stations.	
10	<b><u>Neutral Earthing:</u></b>	04
	Introduction, isolated neutral, earth neutral systems-solid, resistance, reactance. Arc suppression coil, voltage transformer and earthing, transformer, earthing systems. Numerical.	
11	Introduction to simulation of power system.	01

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<b>TOTAL</b>	<b>54</b>
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**List of references:**

1. A Chakrabarti, M. L. Soni, P. V. Gupta, U. S. Bhatnagar , “*A Text book of Power System Engineering*” , Dhanpat Rai Publication
2. Solanki, Chetan S. “*Renewable Energy Technologies*”, PHI Learning, New Delhi.
3. V. K. Mehta, Rohit Mehta, “*Principles of Power Systems*”, S. Chand Publication.
4. S. N. Singh, “*Electric Power Generation, Transmission and Distribution*”, PHI Learning, New Delhi

**Course outcome (co):**

After learning the course the students will be able to:

- CO1.** Demonstrate the knowledge about the electric power generations and their impacts.
- CO2.** Assess the theory and practices of conventional and non-conventional power generation method.
- CO3.** Determine the operation, maintenance and working of power plants.
- CO4.** Determine the operation, maintenance and working of substations
- CO5.** Interpret the practices of various earthing systems.