

Branch Name:	Electrical Engineering
Program Code:	ET109
Course Name:	Electrical Power-I
Course Code:	1ET1090403
Pre-requisite Course:	Fundamental Knowledge of Electrical Basics & Convectional, Non-convectional Sources.

Course Objectives:

1. In this subject student will learn the generalized theory of Generation of Power.
2. The major objective of the subject is to Energy is an essential ingredient for the industrial and all around development of any country. Electric energy can be obtained, conventionally, by conversion from fossil fuels (coal, oil, natural gas), the nuclear and hydro resources.
3. Due to environmental concerns about fossil fueled conventional generators and desire to increase the diversity and security of fuel supply, the electricity industry worldwide is turning increasingly to renewable sources of energy.
4. To make the students familiar with the impact of electrical power generation.

Teaching and Examination Scheme:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)								
Lecture	Tutorial	Practical	Credit	Theory				Practical				Total
				University Assessment		Continuous Assessment		University Assessment		Continuous Assessment		
				Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
3	-	2	4	28	70	12	30	12	30	08	20	150

Course Contents:

Sr. No.	Topic	Total Hours	Weightage (%)
1	Introduction: Power and Energy, sources of energy such as coal, water, nuclear, wind, solar, tidal etc, Comparison of various power plants.	04	08
2	Economic aspects in power Generation: Terms commonly used in system operation, various factors affecting cost of generation: Load curves, load duration curves, Connected load, maximum load, Peak load, base load and peak load power plants, load factor, Plant capacity factor, Plant use factor, Demand factor, diversity factor, Cost of power plant, Numerical.	04	08
3	Steam Power Plant: Schematic arrangement, advantages and disadvantages, choice of site, efficiency of steam power station, Types of prime movers, characteristic, speed control & auxiliaries. Environmental aspects for selecting the sites and locations of thermal power stations, Numerical.	06	14

4	Hydro Electric Power Plant: Schematic arrangement, advantages and disadvantages, choice of site constituents of hydro power plant, Hydro turbine. Environmental aspects for selecting the sites and locations of hydro power stations.	05	12
5	Nuclear Power Plant: Schematic arrangement, advantages and disadvantages, selection of site, types of reactors, Hazards, Environmental aspects for selecting the sites and locations of nuclear power stations.	05	10
6	Gas Turbine Power Plant: Schematic arrangement, advantages and disadvantages of Gas turbine power plant. Open cycle and Closed cycle gas turbine power plant, Combined cycle power plant.	04	10
7	Diesel Engine Power Plant: Introduction, Schematic arrangement, advantages and disadvantages, Choice and characteristic of diesel engines, auxiliaries.	04	10
8	Solar Power Plant: Introduction of solar energy conversion, Solar Constant, Solar radiation and Geometry, Solar radiation measurement, Types of solar collectors (Flat-Plate, Concentrating Collector), Solar Pond, Solar Thermal Power Plant: Low, Medium and High Temperature System, Application of Solar thermal (Water Heating, Space Heating, Space Cooling, Distillation), Solar PV systems: Principal, Solar cell modules, Efficiency and Power output, Numerical.	06	14
9	Wind Energy Conversion System: Introduction, Power in the Wind, Maximum Power, Forces on the blades, Lift and Drag of WEC, Site selection, Basic components of WECS, Classification of WECS, Wind Energy Collectors, Performance of Wind Machines, Generating System: Introduction, Schemes of Electric Generation, Numerical.	06	14

Text Books:

1. Principles of Electrical Power System, by V.K.Mehta, S.Chand Publishers.
2. G. D. Rai – Non Conventional Energy Sources, Khanna Publishers.
3. Renewable energy sources and conservation technology By- N.K. Bansal, Kleemann and Meliss published by Tata McGraw Hill Publication Co. Ltd., New Delhi.

Reference Books:

1. Electrical Power - Dr. S.L. Uppal, Khanna Publishers.
2. A Text book of Power System Engineering, A Chakrabarti, M. L Soni, P. V. Gupta, U. S. Bhatnagar, Dhanpat Rai Publication.

List of Experiments:

1. Interpret the line diagram of Thermal Power Station and main cycles & explain working of T.P.S.
2. Study on load curve preparation and its interpretation.
3. Study and working of various Equipment used in HPS.
4. Draw and Interpret schematic diagram of gas based power plant.
5. Study and working of various Equipments used in Diesel power plant.

6. Study and working of various Equipments used in nuclear power plant.
7. Solar isolation measurement using Optical pyranometer.
8. Solar cell/module/Array modelling, I-V characteristic and performance analysis.
9. PV module design and output analysis.
10. Study and working of various Equipments used in wind energy conversation system.

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

CLO	Description	Bloom's Taxonomy Level
CLO1	Understand the basic functioning of conventional and non-conventional power plants.	2 Understanding
CLO2	Identify the key point to improve the performance of the power plants.	5 Evaluate
CLO3	Identify the different equipment used in various power plants in detail.	5 Evaluate
CLO4	Know the power generation by non-conventional power plants such as wind, solar, fuel cell etc.	1 Remembering
CLO5	Understand the lead towards new era of energy generation technology.	2 Understanding
CLO6	Identify the problems related various power generation plants.	3 Applying

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	L		H		M						M					L
CLO2			H				L	H		L			L		H	
CLO3		M			L				M				M			L
CLO4						L		H		M		M				L
CLO5	M			L				M					M			L
CLO6			H			H	L	M		M		M	L		H	L

H: High, M: Medium, L: Low