

Course Type	Course Code	Name of Course	L	T	P	Credit
OE	EEO404	Renewable Energy Systems and Energy Audit	3	0	0	9
Course Objective						
The course presents about the distinct features of the Renewable Energy Sources in power systems. The course will also give an insight into the performance assessment and energy auditing of the electrical equipments.						
Learning Outcomes						
<p>Upon successful completion of this course, students will:</p> <ul style="list-style-type: none"> understand and learn the recent developments in the alternative energy sources, learn the methods for the energy assessment of old electrical equipments and to improve the energy efficiency. The course will help in gaining the knowledge, which is required for modern day power sector. 						

Unit No.	Topics to be Covered	Lecture Hours	Learning Outcome
1	Solar Energy: Components of solar radiation, Geometry of the collector and the beam, flat plate and concentrating collectors, Solar photovoltaic systems, Electrical Equivalent circuit, characteristics, maximum power point tracking, Classification of photovoltaic power systems.	8	Understanding the different methods of harvesting solar energy.
2	Wind Energy: Nature of wind, energy from wind, wind energy conversion terms, power equation and power coefficient, types of wind mills and their components, wind energy conversion systems.	6	Understanding the wind energy conversion techniques
3	Fuel Cells: Design, operation, classification, conversion efficiency, polarization.	4	Helps in gaining the knowledge about the operating principle of fuel cells.
4	Biomass Energy: Biomass conversion technologies, Biogas generation, types of biogas plants, types of biomass gasifiers, process zones of gasifiers.	4	Understanding the extraction of energy from biomass.
5	Ocean Energy: Ocean thermal energy conversion plants, equation for wave energy and power, wave energy conversion devices, tides, methods for utilization of tidal energy, power estimation.	8	Helps in understanding the different methods of harnessing the ocean energy.
6	Geothermal Energy: Distribution of geothermal energy, types of geothermal resources, advantages and disadvantages, geothermal conversion technologies.	4	Helps in gaining the knowledge about different forms of geothermal energy.
7	Energy Audit: Definition, Types of Energy Audit, Ten steps methodology, Report preparation.	3	Understanding the energy auditing methodology.
8	Energy Assessment of Electrical Equipment: Energy assessment of motors, pumps and variable speed drives: Efficiency testing of motor, determining the load, format of data collection, efficiency testing of pump, Necessity for implementation of variable speed drives.	5	Helps in understanding the energy assessment of motors and variable speed drives.

Text Books

- Renewable Energy Resources - Twidell & Weir.
- Advanced Renewable Energy Systems (part-1) – S. C. Bhatia

Reference Books:

- Bureau of Energy Efficiency, India.
 - Book-1: General Aspects of Energy Management and Audit.
 - Book-4: Energy Performance Assessment of Motors/ Variable speed drives.