18EEP11	ELECTRICAL ENERGY CONSERVATION AND AUDITING	L	T	P	C
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Course Objectives:

1.	To get knowledge about basics of energy and energy scenario on India.
2.	To understand the energy conservation concepts.
3.	To know about energy auditing.

Unit I	**ENERGY SCENARIO**	**9**	**+**	**0**

Commercial and Non-commercial energy -Primary energy resources - Commercial energy production - Final energy consumption - Energy needs of growing economy - Long term energy scenario - Energy pricing - Energy sector reforms -Energy and environment - Energy security - Energy conservation and its importance - Restructuring of the energy supply sector - Energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features.

Unit II	**ENERGY SOURCES**	**9**	**+**	**0**

Electricity tariff - Load management and maximum demand control - Thermal Basics-fuels - Thermal energy contents of fuel, temperature and pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity & heat transfer, units and conversion.

Unit III	**ENERGY MANAGEMENT AND AUDIT**	**9**	**+**	**0**

Definition - Energy audit – Need and types of energy audit. Energy management (audit) approach understanding energy costs - Bench marking - Energy performance - Matching energy use to requirement - Maximizing system efficiencies - Optimizing the input energy requirements, fuel and energy substitution - Energy audit instruments. Material and energy balance: Facility as an energy system - Methods for preparing process flow, material and energy balance diagrams.

Unit IV	**ENERGY EFFICIENCY**	**9**	**+**	**0**

Electrical system: Electricity billing - Electrical load management and maximum demand control -Power factor improvement and its benefit - Selection and location of capacitors - Performance assessment of PF capacitors, distribution and transformer losses. Electric motors: Types - Losses in induction motors - Motor efficiency - Factors affecting motor performance - Rewinding and motor replacement issues - Energy saving opportunities with energy efficient motors.

Unit V	**ENERGY EFFICIENT TECHNOLOGIES**	**9**	**+**	**0**

Maximum demand controllers - Automatic power factor controllers - Energy efficient motors -Softstarters with energy saver - Variable speed drives - Energy efficient transformers - Electronic ballast - Occupancy sensors - Energy efficient lighting controls - Energy saving potential of each technology.

Total (45+0)= 45 Periods

Course Outcomes:

Upon completion of this course, the students will be able to:

CO1	:	Understand the present energy scenario.
CO2	:	Get fundamental knowledge about energy and its various forms.
CO3	:	Understand the process of energy management and energy auditing.
CO4	:	Understand the methods improving energy efficiency and energy efficient devices.
CO5	:	Conduct Energy Audit in industry.

Text Books:

1.	Sonal Desai, “Handbook of Energy Audit”, McGraw Hill, 2017.
2.	Tripathy, S. C, “Utilization of Electrical Energy and Conservation”, McGraw Hill, 1991.

Reference Books:	
1.	General Aspects of Energy Management and Energy Audit, Bureau of Energy Efficiency, New Delhi, 2015.
2.	Energy Efficiency in Electrical Utilities, Bureau of Energy Efficiency, New Delhi, 2015.
E-References:	
1.	www.bee-india.nic.in
2.	NPTEL Course: Non-Conventional Energy Resources – Prof. PrathapHaridoss, IIT-M.
3.	NPTEL Course: Energy Management Systems and SCADA, 2015 organised by IIT-M.

CO/PO Mapping

CO \ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	1	2	3	2	2	1	3	2	2	2	2	2
CO2	1	1	2	2	1	1	3	2	1	1	2	2
CO3	2	2	2	3	1	1	3	2	2	2	1	2
CO4	2	1	2	2	1	1	3	2	1	2	2	2
CO5	2	2	3	1	2	1	3	1	2	1	2	1