

EE471: ENERGY CONSERVATION & AUDIT
CREDITS = 5 (L=3, T=0, P=2)

Course Objective:

The subject aims to provide the student with:

1. The knowledge of existing and upcoming industrial utility and energy management theory that allows the student to have a solid theoretical knowledge and be able in the future to design and development of various energy management technologies.
2. The skill to identify, formulate and solve fields problem in a multi-disciplinary frame individually or as a member of a group.

Teaching and Assessment Scheme:

Teaching Scheme			Credit	Marks Distribution				Total Marks
L	T	P		Theory Marks		Practical Marks		
3	0	2	5	ESE	CE	ESE	CE	150
				70	30	30	20	

Course Contents:

Unit No.	Topics	Teaching Hours
1	<p><u>General Aspects:</u></p> <p>Basics of electrical & thermal energy, energy units and conversion. Energy Scenario: Primary & Secondary energy, Commercial & Non Commercial energy, Nonrenewable & renewable energy, Globally energy reserves and production, Energy conservation and its importance. Energy Conservation Acts: 2001, 2010, Electricity act 2003, National action plan on climate changes, Integrated energy policy, Schemes under EC act 2001</p>	05
2	<p><u>Energy Management & Audit:</u></p> <p>Definition as per EC act-2001, Objective, Need, Types, Benchmarking. Management : Top management commitment & support, Energy policy & planning, Evaluating Energy Performance, Management Tools for Effective Implementation- 5S, KAIZEN, TPM, TQM, ISO 50001, Financial analysis: techniques, Role of ESCOs, project management technique- critical path method, pert analysis. Energy Monitoring & Targeting: Definition, Key elements, CUSUM analysis.</p>	07

3	<u>Global energy Issues:</u> Acid rain, Ozone layer, depletion, global warming & climate change, loss of biodiversity.	05
4	<u>Energy Efficiency And Performance of Electrical Utilities:</u> Electric motor, Air compressed system, HVAC and refrigeration system, Fans & Blowers, Pumps & Pumping System, Cooling towers , Lighting system, DG, ECBC codes. Case study.	13
5	<u>Energy Efficiency & Performance Of Thermal Utilities:</u> Boiler, furnace, Insulation & Refractories, Heat exchangers. Case study.	10
6	<u>Applications of Internet of Things in Energy Sector:</u> Introduction of IoT, definitions: overview, applications, potential & challenges, and architecture. Energy Management with The Internet of Things.	05
TOTAL		45

Reference Books:

1. General aspects of energy management and energy audit, Guide book EA-EM, BEE, India.
2. Energy efficiency in Electrical utilities, Guide book EA-EM, BEE, India.
3. Energy efficiency in Thermal utilities, Guide book EA-EM, BEE, India.
4. Energy performance assessment for equipment and utility systems, Guide book EA-EM, BEE, India.
5. Doty, Steven; Turner, Wayne C, Energy Management Handbook (8th Edition), Fairmont Press, Inc., 978-0-88173-707-3
6. Amlan Chakrabarti, Energy Engineering and management, PHI Publication.

Web Resources:

1. www.beeindia.gov.in
2. www.ea-em.org
3. NPTEL Course on Introduction to Internet of Things (IoT)
<http://nptel.ac.in/courses/106105166/>

Course Outcomes (COs):

After learning this course the students will be able to:

- CO1. Understand energy scenario and policy
- CO2. Understand the significance and procedure for energy conservation and audit.
- CO3. Understand causes and remedies for global energy issues.
- CO4. Analyze, calculate and improve the energy efficiency and performance of electrical utilities.
- CO5. Analyze, calculate and improve the energy efficiency and performance of mechanical utilities.
- CO6. Understand the applications of Internet of Things (IoT) in the energy sector.