

ENERGY CONSERVATION AND AUDIT

Course Code	20EE4701B	Year	IV	Semester(s)	I
Course Category	Professional Elective III	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Nil
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to	
CO1	Understand the concepts of energy conservation and audit. (L2)
CO2	Apply the knowledge of energy scenario. (L3)
CO3	Analyze the theory of energy management and audit. (L4)
CO4	Apply the concepts of energy efficiency in electrical and industrial Systems. (L3)
CO5	Examine the different energy efficient technologies in electrical system.(L4)
CO6	Show the ability to apply the various energy conservation and audit concepts and submit a report.

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1													3	3
CO2	2						2						3	3
CO3		2				2							3	3
CO4	3												3	3
CO5		3											3	3
CO6								3	3			3	3	3

SYLLABUS

Unit No.	Contents	Mapped CO
I	Energy Scenario Renewable and non-renewable energy, Indian energy scenario, integrated energy policy, energy intensity on purchasing power parity, Energy sector reforms, energy and environment, energy security, energy conservation and its importance, Energy Conservation Act-2001 and its features.	CO1 CO2 CO6
II	Energy Management & Audit Definition, energy audit, need, types of energy audit and approach, understanding energy costs, bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies,	CO1 CO3 CO6

	optimizing the input energy requirements, fuel & energy substitution, energy audit instruments	
III	<p>Energy Efficiency in Electrical Systems</p> <p>Electrical system: Electricity billing, electrical load management and maximum demand control, power factor improvement benefits, selection and location of capacitors, performance assessment of PF capacitors, distribution and transformer losses.</p> <p>Electric motors: motor efficiency, factors affecting motor performance, rewinding and motor replacement issues, energy saving opportunities with energy efficient motors.</p>	<p>CO1</p> <p>CO4</p> <p>CO6</p>
IV	<p>Energy Efficiency in Industrial Systems</p> <p>Compressed Air System: Types of air compressors, compressor efficiency, efficient compressor operation, compressed air system components, capacity assessment, leakage test, factors affecting the performance and savings opportunities in HVAC,</p> <p>Fans and blowers: Types, performance evaluation, efficient system operation, flow control strategies and energy conservation opportunities.</p>	<p>CO1</p> <p>CO4</p> <p>CO6</p>
V	<p>Energy Efficient Technologies in Electrical Systems</p> <p>Maximum demand controllers, automatic power factor controllers, energy efficient motors, soft starters with energy saver, variable speed drives, energy efficient transformers, electronic ballast, occupancy sensors, energy efficient lighting controls, energy saving potential of each technology.</p>	<p>CO1</p> <p>CO5</p> <p>CO6</p>

Learning Resources

Text Books

1. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects (available online)
2. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-3, Electrical Utilities (available online)
3. S. C. Tripathy, —Utilization of Electrical Energy and Conservation, McGraw Hill, Reprint 1991.

Reference Books

1. W.R. Murphy & G. Mckey Butterworths, "Energy Management", New Age International Publishers, 2007
2. Amit kumar Tyagi, Hand book on Energy Audit and Management, TERI (Tata Energy Research Institute).
3. Rakosh Das Begamudre, Energy conversion systems, New Age International Publishers 10th Edition, 2000

Web Links

1. Success stories of Energy Conservation by BEE, New Delhi (www.bee-india.org)