Course Name	Energy Management and Audit
Course Code	EE801B
Course Credit	3
Contact Hour	3L
Prerequisite	Power System I (EE 502), Power System II (EE 602), Control System I (EE503), Control System II (EE 603)

Course Objective

The objectives of this course are

1. Ability to Identify the energy management skills and strategies in the energy management system.
2. Ability to understand various energy conservation methods useful in a particular industry.
3. Ability to Select appropriate energy conservation method for the critical area identified.
4. Ability to prepare a energy audit report.

Course Outcome

On completion of the course students will be able to

1. Identify the demand supply gap of energy in Indian scenario
2. Carry out energy audit of an industry/Organization.
3. Draw the energy flow diagram of an industry and identify the energy wasted or a waste stream.
4. Select appropriate energy conservation method to reduce the wastage of energy.
5. Evaluate the techno economic feasibility of the energy conservation technique adopted.

CO Mapping with departmental POs

H: High, M: Medium, L: Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	H	M	L									
CO 2	M	H	L									
CO 3			M		L							
CO 4			M	M								
CO 5	M	L	M		L							

Course Content

Module 1: Energy Management & Audit: 6L

Definition, Energy audit- need, 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 and intervals of EA regulation.

Module 2: Energy Scenario: 8L

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, Concept of smart grid, Tariff.

Module 3: Energy Conservation Act-2001 and related policies: 6L

Energy Conservation Act-2001 and its features, Notification Under the act, Designated agencies, Schemes of Bureau of Energy Efficiency(BEE)-ECBC, S & L, DSM, BLY, SME's, Designated Consumers, Electricity Act 2003, Integrated Energy Policy.

Module 4: Energy Efficiency and Climate changes: 6L

Energy and environment, Air pollution, Climate change, United Nations Framework Convention on climate change (UNFCCC), Kyoto Protocol, Clean Development Mechanism (CDM), CDM methodology and Procedures, Sustainable development.

Module 5: Non-Conventional Energy Sources: 6L

Concept of renewable Energy and importance, Different types of renewable Energy, Solar energy, Wind energy, Biomass energy, Hydro-energy, Fuel cells, Energy from wastes, Wave, Tidal and geothermal. Concept of energy storing device.

Module 6: Energy Efficient Technologies in Electrical Systems: 6L

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.

Text Books:

1. Energy Management Supply and Conservation, Dr. Clive Beggs, Butterworth Heinemann, 2002 .
2. Handbook of Energy Engineering, Albert Thumann & Paul Mehta, The Fairmont Press, INC.
3. Plant Engineers & Manager Guide to Energy Conservation, Albert.
4. Energy Management Handbook, Wayne C, John Willey and Sons

Reference Books:

1. NPC energy audit manual and reports
2. Guide to Energy Management, Cape Hart, Turner and Kennedy
3. Cleaner Production – Energy Efficiency Manual for GERIAP, UNEP, Bangkok prepared by National Productivity Council