Practical Course on Energy Audits and Conservation – Audit Course		
Sr. No.	**TOPICS**	**Required time**
1	Energy Audit and Management - Definitions, Objective, Principles, Skills, Strategy; Need, Types, Methodology and Approach. Energy Management Approach, Understanding Energy Costs, Bench marking, Energy performance,	3 Hrs
2	Procedures and Techniques Data gathering, Analytical Techniques, Evaluation of saving opportunities, Saving Potential, Energy Audit Reporting & presentation	3 Hrs
3	Energy Policy Planning and Implementation , Force Field Analysis, Energy Policy Role and responsibilities of Energy Manager, Accountability. Motivating – Motivation of employees, Requirements for Energy Action Planning. Information Systems: Design	3 Hrs
4	Energy Balance & MIS Facility as an Energy system, Methods for preparing process flow, Materials and Energy Balance diagram, Identification of losses, Improvements. Energy Balance sheet and Management Information System (MIS) Energy Modelling and Optimization	4 Hrs
5	Energy Audit Instruments for Audit and Monitoring Energy and Energy Savings, Types and Accuracy	4 Hs
6	Techno-economic Evaluation of Energy Conservation Option Energy Conservation in Power Generation, Transmission and Distribution	3 Hrs
	Total	20 Hrs

Module Overview:

Practical Energy Audit and Management:

General Philosophy and need of Energy Audit and Management. Definition and Objective of Energy Management, General Principles of Energy Management, Energy Management Skills, Energy Management Strategy. Energy Audit: Need, Types, Methodology and Approach. Energy Management Approach, Understanding Energy Costs, Bench marking, Energy performance, Matching energy usage to requirements, Maximizing system efficiency, Optimizing the input energy requirements, Fuel and Energy substitution.

Procedures and Techniques Data gathering : Level of responsibilities, energy sources, control of energy and uses of energy get Facts, figures and impression about energy /fuel and system operations, Past and Present operating data, Special tests, Questionnaire for data gathering. Analytical Techniques: Incremental cost concept, mass and energy balancing techniques, inventory of Energy inputs and rejections, Heat transfer calculations, Evaluation of Electric load characteristics, process and energy system simulation. Evaluation of saving opportunities: Determining the savings in Rs, Noneconomic factors, Conservation opportunities, estimating cost of implementation. Energy Audit Reporting: The plant energy study report- Importance, contents, effective organization, report writing and presentation.

Energy Policy Planning and Implementation Key Elements: Force Field Analysis, Energy Policy-Purpose, Perspective, Contents and Formulation. Format and Ratification, Organizing: Location of Energy Manager, Top Management Support, Managerial functions, Role and responsibilities of Energy Manager, Accountability. Motivating – Motivation of employees, Requirements for Energy Action Planning. Information Systems: Designing, Barriers, Strategies, Marketing and Communicating Training and Planning.

Energy Balance & MIS First law of efficiency and Second law of efficiency, Facility as an Energy system, Methods for preparing process flow, Materials and Energy Balance diagram, Identification of losses, Improvements. Energy Balance sheet and Management Information System (MIS) Energy Modeling and Optimization.

Energy Audit Instruments for Audit and Monitoring Energy and Energy Savings, Types and Accuracy

Energy Conservation Approaches In Industries

Energy saving opportunities in electric motors, Benefits of Power factor improvement and its techniques-Shunt capacitor, Synchronous Condenser etc., Effects of harmonics on – Motors, and remedies leading to energy

conservation., Energy conservation by VSD, Methods and techniques of energy conservation in ventilation and air conditioners ,compressors pumps, fans and blowers,Area Sealing, Insulating the Heating / cooling fluid pipes , automatic door closing- Air curtain, Thermostat / Control., Energy conservation in electric furnaces, ovens and boilers., lighting techniques – Natural , CFL, LED lighting sources and fittings.Also Steam, Boi;er & Air-Compressor.

Techno-economic Evaluation of Energy Conservation Option,, Energy Conservation in Power Generation, Transmission and Distribution

Course Outcome

The theory should be taught and practical should be carried out in such a manner that students are able to acquire different learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

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

References: Hand Books by BEE - [Beauro of Energy Efficiency]