

Course Syllabi: UEE522 Energy Auditing and Management (L : T : P :: 3 : 1 : 0)

1. **Course number and name:** UEE522; Energy Auditing and Management

2. **Credits and contact hours:** Credits: 3.5; Hours: 4

3. **Text book, title, author, and year**

- *Abbi, Y.P. and Jain, S., Handbook on Energy Audit and Environment Management, Teri Bookstore (2006).*
 - *Diwan, P., Energy Conservation, Pentagon Press (2008).*
 - *Younger, W., Handbook of Energy Audits, CRC Press (2008).*
- a. Other supplemental materials
- Nil

4. **Specific course information**

a. Brief description of the content of the course (catalog description)

Energy Scenario: Energy needs of growing economy, Long term energy scenario, Energy pricing, Energy sector reforms, Energy and environment: Air pollution, Climate change, Energy security, Energy conservation and its importance, Energy strategy for the future, Energy conservation Act-2001 and its features.

Energy Management and Audit: 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.

Material and Energy balance: Facility as an energy system, Methods for preparing process flow, Material and energy balance diagrams.

Financial Management: Investment-need, Appraisal and criteria, Financial analysis techniques- Simple payback period, Return on investment, Net present value, Internal rate of return, Cash flows, Risk and sensitivity analysis, Financing options, Energy performance contracts and role of ESCOs.

Electrical system: Electricity tariff, Load management and maximum demand control, Power factor improvement, Distribution and transformer losses. Losses in induction motors, Motor efficiency, Factors affecting motor performance, Rewinding and motor replacement issues, energy efficient motors, Light source, Choice of lighting, Luminance requirements, and Energy conservation avenues.

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 efficiency.

HVAC and Refrigeration System: Vapor compression refrigeration cycle, Refrigerants, Coefficient of performance, Capacity, Factors affecting refrigeration and air conditioning system performance and savings opportunities, Vapor absorption refrigeration system: Working principle, Types and comparison with vapor compression system, Saving potential, Fans, Blowers and pumps- Types, Performance evaluation, Efficient system operation, Flow control strategies and energy conservation opportunities.

5. **Specific goals for the course**

After the completion of the course, the students will be able to:

- Analyze about energy scenario nationwide and worldwide.
- Decide about energy management in more effective way.
- Analyze about various energy related aspect of electrical system.
- Carry out financial management.
- Conduct studies related to operational aspects of compressed air system and refrigeration system.

6. **Brief list of topics to be covered**

- Energy Management and Audit
- Material and Energy balance
- Financial management
- Electrical system
- Compressed air system
- HVAC and Refrigeration System