

EE425 ENERGY CONSERVATION & AUDIT (Dept. Elective - IV)

Course Description & Objectives:

Understand the types of electricity tariffs and energy auditing by knowing simple electrical principles. Understand the types of instruments for auditing and assessment, and economic methods for energy analysis by considering case studies. Analysis of transformers, cables and feeders by considering case study models. Understand the economical load flow problems

Course Outcomes:

- I Elucidate the type of electricity tariffs and energy auditing by knowing simple electrical principles
- I Apply Tools for energy audit and recommend measures for energy conservation.
- I Select appropriate tariff system and methods for reducing electricity consumption and energy saving.

UNIT I - Introduction to Energy auditing:

Introduction :System approach, end use approach to efficient use of Electricity; Electricity tariff types.

Energy auditing: Types and objectives, audit instruments, ECO assessment and Economic methods, Specific energy analysis, Minimum energy paths, consumption models, Energy auditing of a typical industrial unit - case studies.

UNIT II - Electric motors:

Energy efficient controls and starting efficiency, motor efficiency and Load analysis, Energy efficient / high efficient Motors - Case studies; Load Matching and selection of motors. Variable speed drives. Pumps and Fans: Efficient Control strategies-optimal selection and sizing, optimal operation and storage - case studies.

UNIT III - Distribution and Reactive Power Management:

Transformer Loading/Efficiency analysis, feeder/cable loss evaluation, case studies.

Reactive power management: Capacitor Sizing, Degree of Compensation, Capacitor losses, Location-placement-Maintenance, case studies.

UNIT IV - Peak Demand Control :

Methodologies, types of Industrial loads, optimal Load scheduling, case studies; Lighting: Energy efficient light sources, Energy conservation in Lighting Schemes, Electronic ballast, Power quality issues, Luminaries, case studies.

UNIT V - Cogeneration:

Types and Schemes, optimal operation of cogeneration plants, case studies. Electric loads of Air conditioning and Refrigeration, Energy conservation measures, Cold storage types – Optimal operation, case studies; Electric water heating: Geysers, Solar Water Heaters, Power Consumption in Compressors, Energy conservation measures; Electrolytic Process; Computer Controls - software - EMS.

TEXT BOOKS:

1. Industrial Energy Management: Principles and Applications by Giovanni Petrecca, The Kluwer international series-207 (1999)
2. Guide to Electric Load Management by Anthony J.Pansini, Kenneth D.Smalling, Pennwell Publications (1988)

REFERENCE BOOKS:

1. Energy-Efficient Electric Motors and their applications by Howard E.Jordan, Plenum publishing corp; 2nd ed. (1994)
2. Energy Management Hand book by Turner, Wayne C, Lilburn, The Fairmont press, 2001
3. Handbook of Energy Audits by Albert Thumann, Fairmont Pr; 5th edition (1998)
4. Recommended practice for Energy Conservation and cost effective planning in Industrial facilities by IEEE Bronze book, IEEE Inc, USA
5. Electric Energy Utilization and Conservation by Tripathy S.C , TMH
6. Hand book on Energy Audit and Management by Amit kumar Tyagi, published by TERI (Tata energy research Institute).