

IV Year I Semester
17EE732

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ENERGY AUDIT AND MANAGEMENT
(Professional Elective-II)

Preamble:

To enable the students to acquire the knowledge of energy conservation measures in thermal and electrical energy systems. To familiarize the students about energy conservation and energy audit. To familiarize the students with the concept of energy conservation and management

Learning objectives:

1. Understand the energy management concepts
2. Energy conservation principles and measures
3. Learn the methods of energy audit and usage of instruments
4. Analyze and report the outcome of energy audit

Unit – I

Introduction to energy conservation

Principles - Past and present energy scenario of world – Energy consumption in India – resource availability – Demand supply gap - Environmental aspects–Energy Conservation act – Standards and labelling – designated consumers

Unit – II

Energy conservation in thermal systems

Steam systems – Boilers - blow down control – furnaces – thermic fluid heaters – steam traps – insulators and refractories –cooling tower – air pressure control – waste heat recovery – cogeneration

Unit – III

Energy conservation in electrical systems

Components of EB billing - types of tariff – HT and LT supply – Transformers – cable selection – power factor improvement – capacitors – harmonics – electric motors – efficiency – energy efficient motors – variable speed drives - lighting – types- efficacy – LED

Unit – IV

Energy conservation in industries

Pumps – fans – blowers – compressed air systems – refrigeration and air conditioning systems – cooling towers – DG sets

Unit – V

Energy audit

Energy audit -need – types - benefits - methodology and barriers – role of energy managers – instruments for energy auditing; Cogeneration-Types and Schemes, Optimal operation of cogeneration plants- Case study. Computer aided energy management.

Unit – VI

Energy economics

Economic analysis methods-cash flow model, time value of money, evaluation of proposals, pay-back method, average rate of return method, internal rate of return method, present value method, life cycle costing approach, Case studies.

Learning Outcomes:

1. Identify the energy demand supply gap in the World & India and understand energy conservation opportunities available.
2. Quantify the energy conservation opportunities in different thermal systems.
3. Quantify the energy conservation opportunities in different electrical systems.
4. Identify and evaluate the common energy conservation opportunities in different energy intensive industrial equipment's.
5. Understand the need for energy audit and examine the economic evaluation of energy
6. Conservation solutions adopted.

Text books:

1. Kennedy, William J., Turner, Wayne C., & Capehart, Barney L., Guide to Energy Management, The Fairmount Press
2. Callaghan, P.W., Design and Management for Energy Conservation", Pergamon Press, Oxford

Reference books:

1. Dryden, I.G.C., The Efficient Use of Energy, Butterworth's, London
2. Turner, W.C., Energy Management Handbook, Wiley, New York (1982)
3. Energy Manager Training Manual (www.energymanagertraining.com)