

UCH836: ENERGY MANAGEMENT IN PROCESS INDUSTRIES

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| 3 | 1 | 0 | 3.5 |

Course Objectives:

To introduce the energy and water management principles related to process plants.

Introduction: Energy scenario - supply and demand, Energy intensive industries, Industrial use of energy, Importance of energy in industrial promotion and employment.

Energy Audit: Definition, need and objectives; Types of energy audit; Basic components of energy audit; preparing for audit, Energy audit instruments, Data collection, safety considerations. Methodologies of conducting energy audit; Preliminary questionnaire, Review of previous records, Walk through audit, Energy flow diagram (Shankey diagram).

Energy Conservation: Analysis of scope and potential for energy conservation, Good housekeeping practice, Thermal insulation, Efficiency improvement in boilers, furnaces and heat recovery techniques, Energy conservation in HVAC systems, Electrical energy conservation; analysis of motor, analysis of pumps, Process integration as a measure of energy conservation, Optimization of steam system, Energy saving opportunities with compressed air systems and cooling towers.

Water Management: Sources of water, importance of water in industrial applications, Flow monitoring devices, Quality and cost of water, Water distribution in process industries and scope for water conservation, Reuse and recycle of water.

Case Studies

Course Learning Outcomes (CLO):

Upon completion of this course, the students will be able to:

1. know the components involved in energy auditing.
2. know energy conservation and waste heat recovery techniques.
3. evaluate the performance of industrial boilers and furnaces.
4. identify the scope for recycle and reuse of water.

Text Books:

1. Barney L. Capehart, Wayne C. Turner, William J. Kennedy, *Guide to energy management*, The Fairmont Press (2008).
2. Nagabhushan Raju, K., *Industrial Energy Conservation Techniques: Concepts, Applications and Case Studies*, Atlantic Publishers & Distributors (2007).

Reference Books:

1. Kenney, W.F., *Energy Conservation in the Process Industries*, Academic Press, (1984).
2. Reay, D.A., *Industrial Energy Conservation*, Pergamon Press (1979).

3. *Giovanni Petrecca, Industrial energy management: principles and applications, Springer (1993).*

Evaluation Scheme:

| S. No. | Evaluation Elements | Weightage (%) |
|---------------|---|----------------------|
| 1 | MST | 30 |
| 2 | EST | 45 |
| 3 | Sessional (May includes tutorials/ assignments/ quiz's etc) | 25 |