

PCH222 ENERGY RESOURCES AND MANAGEMENT

L	T	P	Cr
3	1	0	3.5

Course Objective:

To learn about energy resources, scenario, auditing and conservation in process industries.

Energy Resources: Classification of energy sources, Primary fuels and secondary fuels, Conventional and renewable energy sources.

Energy Scenario: Supply and demand, Energy intensive industries, Industrial use of energy, Importance of energy in industrial promotion and employment.

Energy Audit: Importance of energy audit and questionnaire, Instruments used in energy audit, Identification of quality and cost of various energy inputs, Evaluation of energy consumption pattern in different processes, Heat loss analysis, Electrical energy input analysis.

Energy Conservation: Analysis of scope and potential for energy conservation, Energy storage such as thermal insulation, Accumulators and storage media, Co-generation practice, Efficiency improvement in boilers and furnaces, Heat recovery techniques, Electrical energy conservation by using variable speed drives and motor controllers, LED, Analysis of pumps, Optimization of steam system.

Fuel Cells: General characteristics, types of fuel cells, Applications, Hydrogen production and storage, Safety issues and life cycle analysis of fuel cells, Economic and environmental aspects.

Course learning outcomes (CLOs):

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, furnaces
4. know the types of fuel cells, and hydrogen production/storage

Recommended Books:

1. Charles E.B., *World Energy Resources*, Springer (2002).
2. Kenney, W.F., *Energy Conservation in the Process Industries*, Academic Press (1984).
3. Green, R., *Process Energy Conservation*, *ChemicalEngineering Magazine*, McGraw Hill (1982).
4. Basu, S., *Fuel Cell Science and Technology*, Springer (2007).
5. O'Hayre, R.P., Cha, S., Colella, W., and Prinz, F.B., *Fuel Cell Fundamentals*, Wiley (2006).
6. *Bureau of Energy Efficiency*, Government of India (www.beeindia.in)

Evaluation Scheme:

S.No.	Evaluation Elements	Weightage (%)
1.	MST	30
2.	EST	45
3.	Sessional (may include Assignments/Projects/Tutorials/Quizes/Lab Evaluations)	25