RKUNIVERSITY

SYLLABUS

Course Title	ENERGY CONSERVATION AND MANAGEMENT
Course Code	TH 921
Course Credit	Lecture : 04
	Practical : 01
	Tutorial : 00
	Total : 05

Course Objective

- To explain the importance of Role of power in respect to current scenario of energy crisis and consumption, and to understand the practical importance of choice of power plants.
- To understand the concept of fluctuating loads on power plants and its effect on the design, capacity and operation for the plant.
- To make the students understand the importance of peak load plants and study its practical application and costing methodology and usage of the generation.
- To study the various tariff methods for consumption of electrical power and understand the difference between the different methods and also to understand the viability and feasibility of the power plant and find an optimum solution for the same.
- To understand the theory and application of the combined operation of different power plants for the purpose of conservation of energy and also to understand the effectiveness of energy conservation in current power scenario.

Detailed Syllabus

Sr. No.	Name of chapter & Details	Hours Allotted
	SECTION-I	
1	**Introduction:** • Energy Scenario, Energy Analysis of Fuels, 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.	**7**
2	**Fluctuating Loads on Power Plants:** • Introduction, load curves, Different terms and definitions. • Effect of variable load on power plant design and operation. • Method to meet variable loads.	**10**
3	**Energy Outlook as related to process industries:** • Thermodynamics efficiencies, fundamental strategy, thermodynamics and economics, approach for steam pricing, pricing other utilities.	**5**

	• Guidelines and recommendation for improving process operations, heat transfer, system interactions and economics.	
4	**Co-generation, Tri-generation & Waste Energy Recovery:** • Co-generation & Tri-generation: Definition, need, application, advantages, classification, saving Potential. • Waste Heat Recovery: Concept of conversion efficiency, energy waste, waste heat recovery classification, advantages and applications, commercially viable waste heat recovery devices.	**6**
	Total	**28**
	SECTION-II	
5	**Energy audit and management:** • Definition, Energy audit- need, Types of energy audit. • Optimizing the input energy requirements, Fuel and energy substitution, • Energy audit instruments	**6**
6	**Energy conservation in electrical utilities:** • Design of energy efficient lighting systems and its applications. • Cost effectiveness of efficient lighting technologies. • Energy conservation methods in high speed drives (pumps, compressors)	**6**
7	**Economic Analysis:** • Economic evaluations method, life cycle cost method, internal rate of return method, overall rate of return method, discounted pay-back method. • Risk assessment, expected value analysis, advantages and disadvantages of EV techniques, mean variance criterion. • Inflation, analysis period, taxes and subsidies, financing, residual values.	**9**
8	**Energy policy:** • Global Energy Issues, National & State Level Energy Issues, National & State Energy Policy, Industrial Energy Policy. • Energy Security, Energy Vision. • Energy Pricing & Impact of Global Variations. • Energy Productivity (National & Sector wise productivity).	**7**
	Total	**28**

Instructional Method and Pedagogy:

- At the beginning of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, blackboard, OHP etc.
- Attendance is compulsory in lectures and laboratory.
- Minimum two internal exams will be conducted and average of two will be considered as a part of overall evaluation.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated regularly.
- Surprise tests/Quizzes/Seminar/Tutorials will be conducted.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.
- Tutorials and assignments are to be submitted as term-work in laboratory related to course contents.

Students Learning Outcomes:

At the end of the course the students will be able to understand,

- And select the optimum power plant for generation of electrical power.
- And analyze the feasibility behind the selection of power plant and set the rates of tariff for power consumption.
- And justify the higher cost for peak load power plants and hereby select different power tariffs during the different time period in a day.
- And apply the principles of energy conservation in practical henceforth the same knowledge can be utilized to pursue further research work.

Reference Books:

1. Energy Engineering and Management AmlanChakrabarti Prentice hall India 2011
2. Energy Management Principles, CB Smith, Pergamon Press, New York,
3. Bureau of energy efficiency –Hand outs New Delhi
4. Energy Management Hand Book. W. C. Turner.John Wiley and sons
5. Handbook on Energy Efficiency, TERI, New Delhi, 2009
6. Energy Auditing and Conservation; Methods, Measurements, Management & Case Study, Hamies, Hemisphere Publishing , Washington, 1980.
7. Industrial Energy Management & Utilization, Write, Larry C Hemisphere Publishers,Washington, 1998.
8. Energy Conservation In Process Industry, W. F. Kenny
9. Power Plant Engineering, Domkundwar
10. Power Plant Engineering, P.K.Nag
11. Energy conservation in process industries, W.F. Kenney, Exxon chemical company, Academic press inc. USA.