

Course Name : Electrical Engineering Group

Course Code : EE/EP

Semester : Fifth

Subject Title : Energy Conservation and Audit (Elective I for EP and Elective II for EE)

Subject Code: 9092

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme						
TH	TU	PR	PAPER HRS	TH	TEST	PR	OR	TW	TOTAL
03	-	02	03	80	20	-	25#	25@	150

Rationale:

This subject is categorized under technology subjects, Rapid Developments in the standard of living of countrymen results into increased energy consumption. But due to limited availability of conventional sources and difficulties in their tapping and uneconomical and insufficient R and D aspect of non conventional sources, energy conservation is the most important tool to some extent, to face the problem of the increased demand.

For monitoring effectiveness of the energy conservation methods and proper use of electrical energy, energy audit is must. To maintain the growth of development, electricity generation will be required to be increased by proper mix of conventional and non-conventional sources of energy but at the same time its conservation and audit should be done to increase the efficiency of electrical power system. Hence electrical engineers must have knowledge of various methods of energy conservation and concept of energy audit and its implementation.

Objectives:

The students will be able to:

1. List causes for limited growth of conventional energy sources and limitations of non-conventional sources of energy.
2. Suggest methods of energy conservation for different load conditions.
3. Select appropriate tariff system and methods for reducing electricity consumption and energy saving.
4. Apply Tools for energy audit and recommend measures for energy conservation.

Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	Energy Review of various energy sources, Need of energy conservation and energy audit.	04	10
02	Energy Conservation: Lighting energy: methods/Techniques of efficient lighting . Heating: methods/Techniques of energy Saving in Furnaces, Ovens and Boilers. Cooling: methods/Techniques of Energy Saving in Ventilating systems and Air Conditioners Motive power, Energy Efficient Motors, and Efficient use of energy in motors with the help of voltage reducers, automatic star/ delta converters . Power factor improvement devices and soft starters/Variable Frequency Drives. Amorphous Core Transformers Cogeneration -Types and Advantages.	12	20
03	Tariff and Energy Conservation in Industries: Energy cost and Recent MSEB tariffs, Application of Tariff System to reduce Energy bill, Energy Conservation by improving load factor and power factor.	06	10
04	Energy Conservation In Transmission and Distribution Systems: Reactive power compensation, demand side management, system voltage optimization and phase current balancing, Losses in transmission and distribution system and its minimization	08	10
05	Energy and the Environment: Environment and social concerns related to energy utilization, The green house effect, Global Warming and its effect , Pollution, Acid Rains, Global Energy and environment Management.	04	10
06	Energy Audit: Procedure of Energy audit, ABC analysis, Energy Flow Diagram and its importance, Measurements in energy audit and various measuring instruments, Questionnaires for the energy audit, internal energy audit checklist, Equipment used for energy conservation, Calculation of payback period for energy conservation equipment. IE rules and regulations for energy audit, Electricity act 2003(Numerical).	14	20
Total		48	80

Practical:

Skill to be developed:

Intellectual Skills:

1. Identify different methods used for energy conservation.
2. Understand the importance of energy conservation.
3. Select proper tariff for given industry/institute.
4. Collect technical information regarding electricity act.

Motor Skills:

4. Prepare energy audit report.
5. Write visit report.
6. Use different methods of energy conservation.
7. Use of energy saving devices.

List of Practicals:

1. Energy saving by using electronic ballast as compared to conventional choke.
2. Collect the Standard tariff rates and suggest suitable tariff for given industry/Lab/Institute/Commercial establishment.
3. Make a survey of 01 establishment to identify different methods used for energy conservation.
4. Prepare Energy audit report for Industry/workshop/ Institute or its on section.
5. Ask to search on the website of power ministry and MERC for Electricity act 2003 and collect the information regarding role of energy manager, energy auditor and prepare power point presentation/report.

Learning Resources:**Books:**

Sr. No.	Name Of Author	Name Of Book	Publication
01	Siemens	Power Factor Correction	New Age Vol.38 2005
02	T.Gonen	Electric Power Distribution System Engg.	Tata McGraw Hill
03	M.J. Steinburg and T.H. Smith	Economy Loading of Power plant and Electric system	John Willey and sons
04	C.L. Wadhawa	Generation Distribution and Utilization of Electrical Energy	New Age 2004