



## **C.U.SHAH UNIVERSITY – WADHWAN CITY**

**FACULTY OF:** -Technology and Engineering (Diploma Engineering)

**DEPARTMENT OF:** -Electrical Engineering

**SEMESTER:** - V      **CODE:** - 2TE05EAC1

**NAME** – Energy Audit and Conservation Technique (EAC)

### **Teaching & Evaluation Scheme:-**

Subject Code	Subject Name	Teaching Scheme (Hours)				Credits	Evolution Scheme								
		Th	Tu	Pr	Total		Theory				Practical (Marks)				Total Marks
							Sessional Exam		University Exam		Internal		University		
							Marks	Hours	Marks	Hours	Pr	TW	Pr	TW	
2TE05EAC1	Energy Audit and Conservation Technique (EAC)	04	00	02	06	05	30	1.5	70	03	---	20	30	---	150

### **Objectives:-**

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

### **Prerequisites:** - Basic Knowledge about Energy

- Basic knowledge of Audit and Conservation.

### **Course Outlines:-**

Sr. No.	Course Contents	No Of Hours
1	<b>Energy Scenario and Environment</b> Primary and Secondary Energy, Commercial and Non-Commercial Energy, Energy Resources, Energy Distribution and Energy Supply: Coal, Oil, Nuclear, Hydro. Environment and Social Concerns Related to Energy, Utilization, Green House Effect, Global Warming and its Effects, Pollution, Acid Rains, Global Energy and Environment Management	12
2	<b>Energy Audit</b> Need for Energy Audit, Types of 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	10
3	<b>Elements of Energy Conservation</b> General Energy Problem, Sector Wise Energy Consumption, Demand Supply Gap, Scope for Energy Conservation and its Benefits, Energy Conservation Principle – Maximum Energy Efficiency, Maximum Cost Effectiveness Mandatory Provisions of Energy Conservation Act, Features of Energy Conservation Act-Standards and Labeling, Designated Consumers, Energy Conservation Building Codes (ECBC).	10

4	<b>Tariff and Energy Conservation In Industries</b> Energy Cost and Recent MSEB Tariffs, Application of Tariff System to Reduce Energy Bill, Energy Conservation by Improving Load Factor and Power Factor.	06
5	<b>Techno-Economic Evaluation of Energy Conservation Option</b> New Equipment, Technology, Staffing, Training, Calculation and Costing of Energy Conservation Project, Depreciation Cost, Sinking Fund Method, Cost Evaluation by Return on Investment (ROI) and Pay Back Method Etc, Risk Analysis, Case Study.	06
6	<b>Energy Efficiency</b> Performance Improvement of Existing Power Plant: Co-Generation, Small Hydro, DG Set, Demand Side Management, Load Response Programs, Types of Tariff and Restructuring of Electric Tariff, Technical Measures to Optimize T and D Losses, Residential Sector - Light source, Choice of Equipments, Luminance requirements, and Energy Conservation avenues. Industrial/commercial sector - Efficient motor, pump air compressor and furnace. Agriculture sector – use of Renewable energy source and use of latest energy efficient equipments.	08

#### List of Experiments:-

- Prepare a Technical Report on Energy Conservation Act 2003
- Prepare a Sample Energy Audit Questionnaire
- Prepare a Technical Report on ECBC
- List the Various Energy Conservation Methods Useful in a Particular Industry
- Identify Critical Areas where Energy Conservation is Required
- Calculation of Payback Period for a Given Energy Conservation Equipment
- Calculation Depreciation Cost of a Given Energy Conservation Project/Equipment
- Draw the Energy Flow Diagram for a Industry/Shop Floor Division
- List the Various Energy Conservation Methods Useful in Power Generation, Transmission and Distribution
- Energy Conservation in Power Station by Combined Cycle Method and Co-Generation
- Project Cost Evaluation Case Study No 1.
- Demand Side Management Case Study No 2.
- Prepare a Energy Audit Report for Industry
- Prepare a Energy Audit Report for Workshop/ Institute

#### Learning Outcomes:-

- Importance of Energy Audit.
- Importance of Energy conservation.
- Knowledge about Calculations of economic Evaluation of Energy Conservation.
- Knowledge about Energy Conservation in Power Generation, Transmission and distribution

#### Reference Books:-

- Electric Energy Generation, Utilization and Conservation by **Sivaganaraju, S**, Pearson, New Delhi, 2012
- Electrical Power- by **S. L. Uppal** , Khanna and Khanna Publishers, New Delhi
- Electrical Power- by **V. K. Mehta**, Khanna and Khanna Publishers, New Delhi