

Branch Name:	Electrical Engineering
Program Code:	ET403
Course Name:	ENERGY CONSERVATION & AUDIT
Course Code:	2ET4030502
Pre-requisite Course:	

Course Objectives:

1. Interpret energy conservation scenario in India.
2. Implement energy conservation techniques in electrical machines.
3. Use Co-generation and relevant tariff for reducing losses in facilities.
4. Carry out energy audit of an Industry or Organization.
5. Select appropriate energy conservation method to reduce the wastage of energy.

TEACHING AND EVALUATION SCHEME:

Teaching Scheme (Hours per week)				Evaluation Scheme (Marks)				
Lecture	Tutorial	Practical	Credit	Theory (Marks)		Practical (Marks)		Total (Marks)
				University Assessment	Continuous Assessment	University Assessment	Continuous Assessment	
4	-	2	5	60	40	20	30	150

DETAILS OF COURSE CONTENTS:

Unit	Topics and Sub-topics	Total Hours	% Weightage
1	Energy Conservation and Management 1.1 Concept of Energy conservation, Sector wise Energy consumption, demand supply gap, Benefits of energy conservation 1.2 Energy conservation Principle and concept, energy efficiency 1.3 Mandatory provisions of EC act 1.4 Energy management concept and objectives 1.5 Initializing Planning, Leading, Controlling, Promoting, Monitoring and Reporting. energy management program	08	15

2	Energy Conservation Approaches In Industries/Organization 2.1 Energy conservation approach by energy efficient motors 2.2 Effects of harmonics on – Motors, and remedies leading to energy conservation. Energy conservation by VSD 2.3 Methods and techniques of energy conservation in ventilation and air conditioners compressors pumps, fans and blowers 2.4 Area Sealing, Insulating the Heating / cooling fluid pipes, automatic door closing- Air curtain, Thermostat /Control 2.5 Energy conservation in electric furnaces, ovens and boilers 2.6 Lighting techniques – Natural, CFL, LED lighting sources and fittings	16	30
3	Techno-Economic Evaluation of Energy Conservation 3.1 New equipment technology, staffing, training 3.2 Different costing of energy conservation project. 3.3 Straight line Method, Depreciation cost, sinking fund method to calculate Depreciation 3.4 Cost evaluation by Return of Investment (ROI) and pay back method etc. 3.5 Risk analysis 3.6 Case study.	12	25
4	Energy Conservation in Power Generation, Transmission and Distribution sector 4.1 Performance improvement of existing power plant: co-generation, combined cycle, small hydro 4.2 Demand side management 4.3 Load response programs 4.4 Technical measures to optimize T and D losses	10	15
5	Energy Audit 5.1 Benefits of Energy audit 5.2 Elements of Energy Audit 5.3 Preliminary and Detailed energy audit. 5.4 Methodology of preliminary energy audit and detailed Energy audit report. 5.5 Tools for Energy Audit- Power Analyzer, Combustion analyzer, fuel efficiency monitor, thermometer-contact, infrared, pitot tube and manometer, water flow meter, leak detector, tachometer and luxmeter	10	15

LIST OF REFERENCES:

Sr. No.	Title of Book	Author	Publication
1	Principles of Power System	Mehta, V.K.	S. Chand & Co.
2	Electric Energy Generation, Utilisation and Conservation	Sivaganaraju, S	Pearson, New Delhi, 2012

LIST OF LEARNING WEBSITES

1. www.google.com
2. www.youtube.com
3. www.nptel.iitm.ac.in
4. www.bee.com

LIST OF PRACTICAL:

SR NO	PRACTICALS/EXPERIMENTS
1	Identify the energy management skills and strategies in the energy management system
2	List the various energy conservation methods useful in a particular industry
3	Select appropriate energy conservation method for the critical area identified
4	Find out the payback period for a given energy conservation equipment
5	Determine depreciation cost of a given energy conservation project/equipment
6	Co-generation and combined cycle power plant
7	List the various energy conservation methods useful in power generation, transmission and distribution
8	Identify various measuring instruments used for energy audit
9	Prepare a technical report on ECBC
10	Prepare an energy audit report

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Interpret energy conservation policies in India.	3 Applying, 2 Understanding
CLO2	Implement energy conservation techniques in electrical machines.	2 Understanding, 4 Analyze
CLO3	Apply energy conservation techniques in electrical installations.	3 Applying, 4 Analyze
CLO4	Use Co-generation and relevant tariff for reducing losses in facilities.	3 Applying, 2 Understanding
CLO5	Undertake energy audit for electrical system.	5 Evaluating, 3 Applying, 6 Creating
CLO6	List the various energy conservation methods useful in power generation, transmission and distribution	2 Understanding, 1 Remembering

Mapping of CLOs with Pos & PSOs

Course Learning Outcomes	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CLO1	M				H			L		L			M	M	L
CLO2	L				H								M	M	L
CLO3	H												L		H
CLO4					L			L					L		M
CLO5			M		L						M		L		
CLO6										M			L	L	

H: High, M: Medium, L: Low