GUJARAT TECHNOLOGICAL UNIVERSITY
MECHENICAL ENGINEERING
B. E. SEMESTER: VII

Subject Name: **Energy Conservation and Management**
(Department Elective - I)
Subject Code: **171907**

Teaching Scheme				Evaluation Scheme			
Theory	Tutorial	Practical	Total	University Exam (E)		Mid Sem Exam (Theory) (M)	Practical (Internal)
				Theory	Practical		
3	2	0	5	70	30	30	20

Sr. No	Course Content	Total Hrs.
1.	**Energy Scenario :** Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, Indian energy scenario,	3
	1.1 Sectoral energy consumption (domestic, industrial and other sectors), energy needs of growing economy, energy intensity, long term energy scenario, energy pricing,	3
	1.2 Energy security, energy conservation and its importance, energy strategy for the future, Energy Conservation Act 2001 and its features.	2
2.	**Basics of Energy its various forms and conservation :** Electricity basics – Direct Current and Alternative Currents, electricity tariff, Thermal Basics-fuels, thermal energy contents of fuel, temperature and pressure, heat capacity, sensible and latent heat, evaporation, condensation, steam, moist air and humidity and heat transfer.	3
	2.1 Evaluation of thermal performance – calculation of heat loss – heat gain, estimation of annual heating & cooling loads, factors that influence thermal performance, analysis of existing buildings setting up an energy management programme and use management – electricity saving techniques	4
3.	**Energy Management & Audit:** Definition, energy audit, need, types of energy audit. Energy management (audit) approach-understanding energy costs,	3

	3.1 Bench marking, energy performance, matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel and energy substitution, energy audit instruments and metering	4
4.	**Financial Management :** Investment-need, appraisal and criteria, financial analysis techniques-simple payback period, return on investment, net present value, internal rate of return, cash flows, risk and sensitivity analysis; financing options, energy performance contracts and role of Energy Service Companies (ESCOs)	06
5.	**Energy Monitoring and Targeting:** Defining monitoring & targeting, elements of monitoring & targeting, data and information-analysis, techniques – energy consumption, production, cumulative sum of differences (CUSUM). Energy Management Information Systems (EMIS)	05
6.	**Energy Efficiency in Thermal Utilities and systems:** Energy efficiency in thermal utilities like boilers, furnaces, pumps and fans , compressors, cogeneration (steam and gas turbines), heat exchangers ,lighting system, Motors belts and drives, refrigeration system.	08
7.	**Heat Recovery and Co-generation**:- Heat recovery from ventilation, air co-generation of heat and electricity, heat recovery and bottoming cycles.	04

Term Work:

The term work shall be based on the topics mentioned above. Preferably Industrial audits and case studies to be covered as part of term work

Practical / Oral:

The candidate shall be examined on the basis of term-work.

Text Books:

1. Energy Engineering and Management Amlan Chakrabarti Prentice hall India 2011
2. Energy Management Principles, CB Smith, Pergamon Press, New York,
3. Bureau of energy efficiency –Hand outs New Delhi

Reference Books:

1. Energy Management Hand Book. W. C. Turner.John Wiley and sons
2. Handbook on Energy Efficiency, TERI, New Delhi, 2009
3. Energy Auditing and Conservation; Methods, Measurements, Management & Case Study, Hamies, Hemisphere Publishing , Washington, 1980.
4. Industrial Energy Management & Utilization, Write, Larry C Hemisphere Publishers, Washington, 1998.
5. Energy Conservation In Process Industry, W. F. Kenny