

# GUJARAT TECHNOLOGICAL UNIVERSITY

ENERGY ECONOMICS AND MANAGEMENT

**SUBJECT CODE:** 2721008

**SEMESTER:** II

**Type of course:** Open elective

**Prerequisite:** Nil

**Rationale:** The course is prepared to provide detailed understanding of energy economics and management.

**Teaching and Examination Scheme:**

Teaching Scheme			Credits	Examination Marks						Total Marks
L	T	P		Theory Marks		Practical Marks				
			ESE (E)	PA (M)	ESE (V)		PA (I)			
					ESE	OEP	PA	RP		
3	2#	2	5	70	30	20	10	10	10	150

**Content:**

Sr. No.	Content	Total Hrs	% Weightage
1	Introduction to Energy Economics and Management, Overview of World Energy Scenario, Overview of India's Energy Scenario	3	5%
2	Energy Economics: Initial and Annual Costs, Present Worth Calculation, Repayment of Loan in Equal Annual Instalments, Annual Saving, Cumulative Saving and Life Cycle Savings, Economic Analysis of Add-on Solar System, Payback Period, Clean Development Mechanisms, Time Value of Money, Internal Rate of Return (IRR), Net Present Value (NPV), carbon credit calculation	15	35%
3	Energy Management: Importance of energy management, Country Energy Balance, Energy efficiency in thermal utilities like boilers, furnaces, steam systems, cogeneration utilities, waste heat recovery. Energy efficiency in electrical utilities like electric motors, compressed air systems, HVAC&R systems, fans and blowers, pumps, cooling tower and lighting systems. Applications of non-conventional and renewable energy sources	24	60%

**Reference Books:**

1. Guide books No. 1,2,3,4 for National Certificate Examination for Energy Managers and Energy Auditors, Bureau of Energy Efficiency, India
2. Solar Energy: Principles of Thermal Collection and Storage, S P Sukhatme, McGraw-Hill
3. Energy Management and Conservation Handbook, Frank Kreith and D Yogi Goswami, CRC Press
4. Energy Economics: Concepts, Issues, Markets and Governance, S C Bhattacharyya, Springer
5. TERI hand book on Energy Conservation
6. Introduction to Environment Management by M M Sulphery, PHI learning

**Course Outcome:**

After learning the course the students should be able to:

- Understand the current domestic and global energy scenario.
- Understand the energy economics.
- Understand energy management to minimize the use of energy by its effective utilization for various applications.

**List of Experiments:**

1. Calculate the Boiler Efficiency with direct and indirect methods of testing with sample data.
2. Analyse the furnace Efficiency as per standards for reference readings.
3. Understand the methodology for heat exchanger performance assessment with sample calculations.
4. Carryout the performance evaluation of the rewind motors.
5. Test the performance of a cooling air fan as per reference standards.
6. Determine the pump efficiency through field testing.
7. Calculate the isothermal efficiency of a reciprocating air compressor.
8. Evaluate the performance of an air conditioning unit.
9. Assess the lighting system of a confined place as per the standards.
10. Carryout economic analysis of add-on solar system

**Design based Problems (DP)/Open Ended Problem:**

1. Energy audit of a close area like computer lab, seminar hall etc.
2. Analysis of energy utilization by a D G Set.
3. Performance improvement of a refrigeration system or air conditioning unit.
4. Evaluation of the energy consumption for a small house and suggestions to improve the utilization efficiency.

**List of Open Source Software/learning website:**

1. Bureau of Energy Efficiency, India [<http://220.156.189.23/index.php>]
2. The Ministry of New and Renewable Energy (MNRE) [<http://mnre.gov.in/>]

**Review Presentation (RP):** The concerned faculty member shall provide the list of peer reviewed Journals and Tier-I and Tier-II Conferences relating to the subject (or relating to the area of thesis for seminar) to the students in the beginning of the semester. The same list will be uploaded on GTU website during the first two weeks of the start of the semester. Every student or a group of students shall critically study 2 papers, integrate the details and make presentation in the last two weeks of the semester. The GTU marks entry portal will allow entry of marks only after uploading of the best 3 presentations. A unique id number will be generated only after uploading the presentations. Thereafter the entry of marks will be allowed. The best 3 presentations of each college will be uploaded on GTU website