

GUJARAT TECHNOLOGICAL UNIVERSITY

ELECTRICAL ENGINEERING (07) ECONOMICS OF ENERGY GENERATION & SUPPLY SUBJECT CODE: 2720725 SEMESTER: II

Type of course: Engineering Science (Electrical)

Prerequisite: NA

Rationale: NA

Teaching and Examination Scheme:

Teaching Scheme			Credits C	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	Energy Scenario: Energy sources, global & Indian energy scenario, energy sector reforms, energy and environment, energy conservation, energy security	04	10
2	Energy Demand analysis and forecasting: Evolution of Demand Analysis, Overview of Energy Demand Decisions, Economic Foundations of Energy Demand, Alternative Approaches for Energy Demand Analysis, Factor Analysis, Econometric Approach, energy demand forecasting techniques – econometric approach, End-Use Method, Input–Output Model, Scenario Approach, Artificial Neural Networks, Hybrid Approach	10	30
3	Energy Demand Management: Demand-side management (DSM) – evolution, justification, load management – direct & indirect load control, energy efficiency – opportunities & economics, cost effectiveness of DSM – participant test, ratepayer impact measure, total resource cost test, utility cost test	08	20
4	Economics of Fossil Fuel Supply: Introduction, Field Development, Production, Economics of Fossil Fuel Production, Supply Forecasting	06	15
5	Economics of Electricity Supply: Basic Concepts, Economic Dispatch, Unit Commitment, Investment Decisions	06	15
6	Economics of Renewable Energy Supply: Renewable Energies for Electricity Generation, Drivers of Renewable Energy, Economics	06	15

Reference Books:

1. S. C. Bhattacharya, Energy Economics: Concepts, Issues, Market and governance, Springer, 2011.
2. W. C. Turner, S. Doty, Energy Management Handbook, Fairmont Press & CRC Press, 2012
3. B. L. Capehart, W. C. Turner, W. J. Kennedy, Guide to Energy Management, Fairmont Press & CRC Press, 2011
4. A. Thumann, D. P. Mehta, Handbook of Energy Engineering, Fairmont Press & CRC Press, 2013
5. J. Evans, L. C. Hunt, International Handbook on the Economics of Energy, Edward Elgar Publishing Limited, 2011
6. Books of Energy Management & Auditors, Bureau of Energy Efficiency, <http://beeindia.in/> volume 1, 2, 3 & 4.

Course Outcome:

After learning the course the students should be able to:

- Understand the concepts of energy management
- Forecast energy demand
- Analyze economics of energy supply

List of Experiments:

- To analyze energy demand using factor analysis
- To analyze energy demand using econometric approach
- To forecast energy demand using end-use method
- To forecast energy demand using scenario approach
- To forecast energy demand using artificial neural networks
- To perform load management using direct & indirect control
- To evaluate cost effectiveness of demand-side management using participant test
- To evaluate cost effectiveness of demand-side management using ratepayer impact measure

Design based Problems (DP)/Open Ended Problem:

Course coordinator has to define at least 3 open ended problems related to the course.

Major Equipment:

Necessary instruments, kits and apparatus are to be provided for conducting above said practical in a group of maximum four students.

List of Open Source Software/learning website:

- E-materials available at the website of Bureau of Energy Efficiency:
http://beeindia.in/content.php?page=miscellaneous/useful_download.php

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.

