B.E.MECHANICALENGINEERING

Choice Based Credit System(CBCS)

SEMESTER -VI

Energy Auditing (3:0:0)3

(Effectivefromtheacademicyear2021-22)

Course Code	**21ME652**	CIE Marks	50
Teaching Hours/Week (L:T:P)	**3:0:0**	SEE Marks	50
Total Number of Contact Hours	**40**	Exam Hours	03

Course objectives:

This course will enable students to:

- Comprehend energy scenario and general aspects of energy audit.
- Analyze the methods and concept of energy audit.
- Enumerate the energy utilization pattern including wastage and its management.

Module –1

General Aspects: Review of energy scenario in India, General Philosophy and need of Energy Audit and Management, Basic elements and measurements - Mass and energy balances – Scope of energy auditing industries - Evaluation of energy conserving opportunities, Energy performance contracts, Fuel and Energy substitution, Need for Energy Policy for Industries.

(08Hours)

Self-study topic: National & State level energy Policies.

Module –2

Energy Audit Concepts: Need of Energy audit - Types of energy audit – Energy management (audit) approach - understanding energy costs - Bench marking – Energy performance - Matching energy use to requirement - Maximizing system efficiencies -Optimizing the input energy requirements - Duties and responsibilities of energy auditors- Energy audit instruments - Procedures and Techniques.

(08Hours)

Self-study topic: Case study on potential energy savings

Module –3

Principles and Objectives of Energy Management: Design of Energy Management Program - Development of energy management systems – Importance - Indian need of Energy Management - Duties of Energy Manager - Preparation and presentation of energy audit reports - Monitoring and targeting.

(08 Hours)

Self-study topic: Recent Energy management systems

Module –4

Thermal Energy Management: Energy conservation in boilers - steam turbines and industrial heating systems - Application of FBC - Cogeneration and waste heat recovery -Thermal insulation - Heat exchangers and heat pumps –HVC industries-Building Energy Management.

(08 Hours)

Self-study topic: Case study of HIV industry

Module –5

Electrical Energy Management: Supply side Methods to minimize supply-demand gap- Renovation and modernization of power plants - Reactive power management – HVDC- FACTS - Demand side - Conservation in motors - Pumps and fan systems – Energy efficient motors.

(08Hours)

Self-study topic: Advanced Energy Efficient motors

Course outcomes:

The students will be able to:

CO1: Understand the basic concepts of energy audit and energy management.
CO2: Explain different types of energy audit, maximizing and optimizing system efficiency.
CO3: Summarize energy management systems, prepare and present energy audit report 23
CO4: Identify energy saving potential of thermal and electrical systems.
CO5: Discuss Energy audit instruments, Procedures and Techniques.

Question paper pattern:

- SEE will be conducted for 100 marks.
- Part A: First question with 20 MCQs carrying 1 mark each.
- Part B: Each full question is for 16 marks. (Answer five full questions out of 10 question with intra modular choice).
  a. There will be a maximum of three sub-questions from each module.
  b. There will be a choice from two full questions from each module.

Textbooks:

1. 1.Energy Management Handbook by W C Turner and Steve Doty 6th edition (John Wiley and Sons, A Wiley a. Inter science publication)
2. Energy audit and management by L Ashok Kumar and Gokul Ganeshan , ISBN 9781032067797,CRC press,1st edition 2023

References:

1. Murphy, W. R., Energy Management, Elsevier/bsp Books Pvt. Ltd 2007
2.Energy Management, Audit and Conservation" by Barun Kumar De
3. De, B. K., Energy Management audit & Conservation, 2nd Edition, Vrinda Publication, 2010.
4.Energy Management and Conservation by K V Sharma and P Venkataseshaiah, IK International publishing house,ISBN-13