

<b>COURSE CODE</b>	<b>ENERGY MANAGEMENT</b>	<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>1154ME112</b>		<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**1. Preamble**

This course provides an update, to the knowledge base of the students, in essential Energy Management. Students may gain knowledge on Energy Auditing, Waste Heat Recovery, HVAC, Lighting systems and Maintenance of Energy Systems.

**2. Prerequisite**

Not Required

**3. Links to other courses:**

Project work

**4. Course Educational Objectives :**

Students undergoing this course are expected to:

- Understand the basic principles of Energy Auditing and its types involved in Energy Sector.
- Understand the Energy Management Concepts in Waste Heat Recovery Systems, HVAC Systems, Lighting Systems etc. and to gain knowledge about the maintenance of Energy Systems.

**5. Course Outcomes :**

Upon the successful completion of the course, learners will be able to

<b>CO Nos.</b>	<b>Course Outcomes</b>	<b>Level of learning domain (Based on revised Bloom's)</b>
CO1	Understand the meaning and types of Energy Consuming Devices and concept of Energy Management	K2
CO2	Understand the principle of Energy Auditing and Economic aspects of investments	K2
CO3	Understand the Waste Heat Recovery Concepts and Energy Conservation methods in HVAC Systems	K2
CO4	Understand the Energy Conservation options in Lighting	K2
CO5	Understand the importance of Maintenance of Energy Consuming Devices	K2

(K1-Remember K2-Understand K3-Apply K4-Analyze K5-Evaluate K6-Create)

**6. Correlation of CO's with Programme Outcomes:**

<b>Cos</b>	<b>PO1</b>	<b>PO2</b>	<b>PO3</b>	<b>PO4</b>	<b>PO5</b>	<b>PO6</b>	<b>PO7</b>	<b>PO8</b>	<b>PO9</b>	<b>PO10</b>	<b>PO11</b>	<b>PO12</b>	<b>PSO1</b>	<b>PSO2</b>
CO1									H		M	L	M	L
CO2									H		M	L	M	L
CO3									H		M	L	H	L
CO4									H		M	L	M	L
CO5									H		M	L	M	L

H- High; M-Medium; L-Low

7. **Course Content:**

Unit I **Introduction to Energy Management**

L - 9

Introduction to Energy Consuming Devices – Energy Management – Effective Energy Management – Structure – Energy Policy – Planning – Audit Planning – Educational Planning – Strategic Planning – Reporting.

Unit II **Energy Auditing and Economic Analysis**

L - 9

Energy Auditing Services – Basic Components of Energy Audit – Specialized Audit Tools – Industrial Audits – Commercial Audits – Residential audits – Simple Payback – Return on Investment – Net Present Value method – Time Value of Money Concepts.

Unit III **Waste Heat Recovery and HVAC Systems**

L - 9

Waste Heat Survey – Waste Heat Exchangers – Commercial Options in Waste Heat Recovery Equipment – Economics of Waste Heat Recovery – Surveying Existing Conditions – Human Thermal Comfort – HVAC System Types – Energy Conservation Opportunities – Cooling Equipment – Domestic Hot Water – Estimating HVAC Energy Consumption.

Unit IV **Lighting**

L - 9

Lighting Fundamentals – Lighting Energy Management Steps – Maintenance – New Technologies & Products – Special Considerations – Day Lighting – Common Retrofits – Schematics – Use of Alternative Energy – Solar Energy – Wind Energy – Refuse-Derived Fuel – Fuel Cells

Unit V **Energy Systems Maintenance**

L - 9

Developing the Maintenance Program – Detailed Maintenance Procedure – Material Handling Maintenance – Truck Operation and Maintenance – Measuring Instruments – Saving Energy in Material Handling and Storage – Recent Developments

**45 Hours**

**8. Text Book**

1. Energy Management Handbook, Wayne C. Turner, Marcel Dekker, Inc., New York and Basel.

**9. References**

1. Handbook of Energy Audit, Sonal Desai, Mc Graw Hill Education.
2. Energy Engineering and Management, Amlan Chakrabarti, PHI.
3. Energy Management Handbook, Jonathan H Turner.
4. Study Materials from e-Sources, related to Energy Management.