



Lok Jagruti Kendra University
University with a Difference

Diploma in Mechanical Engineering



Subject Code: 025060602
Energy Management & Audit

Programme / Branch Name			Diploma in Mechanical Engineering			
Course Name	Energy Management & Audit				Code	025060602
Course Type	HSSC	BSC	ESC	PCC	OEC	PEC

Legends: HSSC: Humanities and Social Sciences Courses

ESC: Engineering Science Courses

OEC: Open Elective Courses

BSC: Basic Science Courses

PCC: Program Core Courses

PEC: Program Elective Courses

1. Teaching and Evaluation Scheme

Teaching Hours / Week				Evaluation Scheme			
L	T	P	Total Credit	CCE	SEE (Th)	SEE (Pr)	TOTAL
3	0	2	4	50	50	50	150

Legends:

L: Lectures

T: Tutorial P: Practical

CCE:

Continuous & Comprehensive Evaluation

SEE (Th):

Semester End Evaluation (Theory)

SEE (Pr):

Semester End Evaluation (Practical)

2. Prerequisites

- ✓ Thermodynamics
- ✓ Metrology & Instrumentations
- ✓ Thermal Engineering
- ✓ Industrial Engineering & Maintenance

3. Rationale

The course is designed to give knowledge of Energy Management and audit and its applications in the present context of Industrial Sectors also explores Knowledge the Concept of HVAC and cogeneration utilization in turn. Due to recent advancement in technology, it is necessary to examine the terms of Energy Management system for better Energy conservation, students aware about the main technologies involved; their costs and environmental impact in energy conservation systems and their future prospects

4. Objectives

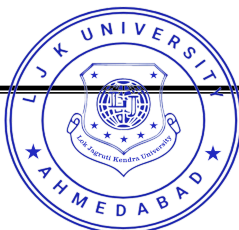
- ✓ To enable the students to understand the concept of energy management and energy management opportunities
- ✓ To understand the different methods used to control peak demand
- ✓ To know energy auditing procedure
- ✓ To understand the different methods used for the economic analysis of energy projects
- ✓ Economic evaluation, energy auditing techniques and energy management in various systems

5. Contents

Unit No.	Topics	Sub-Topics	Learning Outcome	% Weightage	Hours
1.	Introduction	1.1. Background 1.2. The Value of Energy Management 1.3. The Energy Management Profession 1.4. Some Suggested Principles of Energy Management	<ul style="list-style-type: none"> To understand the needs to be integrated, proactive, and incorporate Energy procurement. To know certain principles of Energy Management helps to provide an initial approach to the problem of effective management. 	20	8
2.	Effective Energy Management	2.1. Introduction 2.2. Energy Management Program 2.3. Organizational Structure 2.4. Energy Policy 2.5. Planning 2.6. Audit Planning 2.7. Educational Planning 2.8. Strategic Planning	<ul style="list-style-type: none"> To understand various components of organizational structure, a policy, and plans for audits, education, reporting, and strategy. To understand setup of Energy Management plan and identification of outside assistance. To have a knowledge of energy policy and audit in energy sector. To identify the alternatives such as improved operational techniques and new equipment that could substantially reduce energy costs. 	24	10
3.	Energy Auditing	3.1. Introduction 3.2. Energy Auditing Services 3.3. Basic Components of an Energy Audit 3.4. Specialized Audit Tools 3.5. Industrial Audits 3.6. Commercial Audits	<ul style="list-style-type: none"> To understand and identify the types and costs of energy use. To understand how that energy is being used and possibly wasted. To understand how to perform an economic analysis on those 	14	6

			alternatives and determine which ones are cost-effective for the business or industry involved.		
4.	Cogeneration and HVAC Systems	4.1. Introduction 4.2. Surveying Existing Conditions 4.3. Cogeneration System Design and Analysis 4.4. Human Thermal Comfort 4.5. HVAC System Types 4.6. Domestic Hot Water 4.7. Estimating HVAC Energy Consumption	<ul style="list-style-type: none"> To understand how the cogeneration process reduce the wastage of energy and increase performance of energy systems To know about HVAC system utilized in industrial and commercial application . To understand concept of energy utilization by using better alternatives. 	23	10
5.	Energy Systems Maintenance & Codes Standards	5.1. Developing the Maintenance Program 5.2. Detailed Maintenance procedures 5.3. Materials Handling Maintenance 5.4. Measuring Instruments 5.5. State Codes & BEE – SME Programmed 5.6. Standards and Labeling according BEE	<ul style="list-style-type: none"> To understand the proper system, utilize in maintenance schedule program for better conservation of energy systems. To develop concept of ongoing preventive maintenance tasks as well as preventive maintenance ought to performed. To determine the present maintenance state of each of the major energy systems and each major piece of energy consuming equipment within the facility. To understand BEE rating on Appliances. To understand the Methodology adopted for estimating energy saving as per BEE code standards. 	19	8

Total Hours **42**



6. List of Practical / Exercise

The practical/exercises should be properly designed and implemented in an attempt to develop different types of skills so that students can acquire the competencies/Programme outcomes. Following is the list of practical exercises for guidance.

Sr. No.	Practical / Exercises	Key Competency	Hours
1.	To study Energy Management Program Flow Chart	To prepare Flow Chart of energy Management.	6
2.	To Prepare Audit chart regarding energy consumption	To understand Standards of BEE for audit related to equipments and how audit must be done by preparing Audit sample chart.	4
3.	To Identify the critical areas where energy conservation is required	To understand the concept of typical areas and technological advancement where by utilizing how energy is reduced in Machines and Equipments.	4
4.	List out the methods and energy conservation diagram use in particular industry or Organization	To study any Industrial structure where major steps were taken for energy conservation & identify the techniques of Energy Conservation.	2
5.	To study on concept of cogeneration and HVAC	To understand the concept of Regeneration , how waste energy is utilized and HVAC concept in Heating and Cooling	4
6.	To prepare rating report of equipment's on BEE rating	To study BEE standard rating report of Equipment and prepare a list	4
7.	Prepare a list of questions for audit and sample Rating on any power consumption equipment	Prepare a sample of Power Consumption Report of equipments Energy Management and give Standard of the equipments based on BEE	4
Total Hours			28

7. Suggested Specification Table for Evaluation Scheme

Unit No.	Unit Name	Distribution of Topics According to Bloom's Taxonomy					
		R %	U %	Ap %	C %	E %	An %
1.	Introduction	35	35	25	0	0	5
2.	Effective Energy Management	15	40	25	10	0	10
3.	Energy Auditing	20	30	30	10	0	10
4.	Cogeneration and HVAC Systems	10	40	20	10	10	10
5.	Energy Systems Maintenance & Codes Standards	30	35	35	0	0	0

Legends: R: Remembering U: Understanding
 App: Applying C: Creating
 E: Evaluating An: Analyzing

8. Textbooks

- 1) Energy management by Paul O Callaghan, Mcgraw Hill, New Delhi

9. Reference Books

- 1) William J. Younger, Handbook of Energy Audits, Albert Thumann, CRC Press, 2003.
- 2) Energy Management and Conservation Handbook, D. Yogi Goswami Press, 2007
- 3) General Aspects of Energy Management & Energy Audit, Bureau of Energy Efficiency

10. Open Sources (Website, Video, Movie)

- 1) <https://www.youtube.com/watch?v=WwBquDjDGOA>
- 2) <https://www.youtube.com/watch?v=JIPk6rFGvvU&list=PLImNQubhYtnAmyPNwO-nPU-VQIIXH0xqM&index=2>
- 3) <https://beeindia.gov.in/content/energy-auditors>
- 4) <https://nptel.ac.in/noc/courses/noc17/SEM2/noc17-mm17/>