

Department of Electrical and Electronics Engineering

COURSE MODULES OF THE SUBJECT TAUGHT FOR THE SESSION ODD SEM 2025-26

Course Syllabi with CO's

Energy Conservation and Audit

Faculty Name: Dr Sathish K R		AY 2025-26	
Course Code:	BEE755B	CIE Marks	50
Course Type	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3	Exam Hours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives

- Understand the current energy scenario and the importance of energy conservation.
- Understand the methods of improving energy efficiency in different electrical systems.
- Realize energy auditing.
- Explain the various pillars of electricity market design.
- To explain the scope of demand side management, its concept and implementation issues and strategies.

Teaching-Learning Process

1. **Use Engaging Methods** – Replace traditional lectures with videos, animations, and interactive discussions to explain concepts.
2. **Promote Active Learning** – Encourage group work, problem-solving tasks, and creative thinking by letting students explore different solutions.
3. **Ask Critical Thinking Questions** – Pose higher-order questions (HOT) to deepen understanding and analytical skills.
4. **Connect to Real-World Applications** – Relate concepts to practical uses to enhance relevance and comprehension.

Module-1 (08 hours)

Energy Scenario: Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features.

Revised Bloom's Taxonomy Level: L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analysing

Module-2 (08 hours)

Energy Efficiency in Electrical Systems: Electricity billing, Electrical load management and maximum demand Control, Maximum demand controllers; Power factor improvement, Automatic power factor controllers, efficient operation of transformers, energy efficient motors, Soft starters, Variable speed drives; Performance evaluation of fans and pumps, Flow control strategies and energy conservation opportunities in fans and pumps, Electronic ballast, Energy efficient lighting and measures of energy efficiency in lighting system.

Revised Bloom's Taxonomy Level: L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analysing

Module-3(08 hours)

Energy auditing: Introduction, Elements of energy audits, different types of audit, energy use profiles, measurements in energy audits, presentation of energy audit results.

Revised Bloom's Taxonomy Level: L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analysing

Module-4(08 hours)

Electricity vis-à-vis Other Commodities: Distinguishing features of electricity as a commodity, Four pillars of market design: Imbalance, Scheduling and Dispatch, Congestion Management, Ancillary Services. Framework of Indian power sector and introduction to the availability based tariff (ABT).

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Revised Bloom's Taxonomy Level: L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analysing

Module-5 (08 hours)

Energy Audit Applied to Buildings: Energy-Saving Measures in New Buildings, Water Audit, Method of Audit, General Energy-Savings Tips Applicable to New as well as Existing Buildings. Demand Side Management: Scope of DSM, Evolution of DSM concept, DSM planning and Implementation, Load management as a DSM strategy, Applications of Load Control, End-use energy conservation, Tariff options for DSM.

Revised Bloom's Taxonomy Level: L1 – Remembering, L2 – Understanding, L3 – Applying, L4 – Analysing

Suggested Learning Resources:

Textbooks (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

1. Energy Management Handbook, W.C. Turner, John Wiley, and Sons.
2. Energy Efficient Electric Motors and Applications, H.E. Jordan Plenum Pub Corp.
3. Energy Management W. R. Murphy, G. Mckay Butterworths.

Reference Books:

1. Energy Science Principles, Technologies and Impact, J. Andrews, N. Jelley Oxford University Press.
2. Market operations in power systems: Forecasting, Scheduling, and Risk Management, Shahedepour M., Yamin H., Zuyi Li, John Wiley & Sons, New York.
3. Energy Conservation, Diwan, P, Pentagon Press, (2008).

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

CO1- Analyze about energy scenario nationwide and worldwide, also outline the Energy Conservation Act and its features.

CO2- Discuss load management techniques and energy efficiency.

CO3-Understand the need of an energy audit and the energy audit methodology.

CO4-Understand various pillars of electricity market design.

CO5: Conduct energy audit of electrical systems and buildings and show an understanding of demand side management and energy conservation.

The Correlation of Course Outcomes (CO's) and Program Outcomes (PO's)

Course Code	BEE755B		TITLE: Energy Conservation and Audit									
			Program Outcomes									
List of Course Outcomes	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
	CO-1	3	2	1	1	1	3	-	-	-	-	2
CO-2	3	3	2	1	1	1	3	-	-	-	-	2
CO-3	3	3	2	2	1	1	3	-	-	-	-	2
CO-4	3	2	1	1	1	1	3	-	-	-	-	2
CO-5	3	3	2	2	2	1	2	-	-	-	-	3