FACULTY OF ENGINEERING & TECHNOLOGY

Effective from Academic Batch: 2022-23

Programme: **Bachelor of Technology (Automobile Engineering)**

Semester: **V**

Course Code: **202050521**

Course Title: **Energy Conservation and Management**

Course Group: **Open Elective - I**

Course Objectives: The course provides basic understanding of energy audit and management. The consumption of energy is increasing day by day. One way to cope up with the increase in energy demand is to increase the production of energy which demands more investment, and the other way is to conserve the energy as energy conserved/saved is twice the energy generated. Energy conservation means reduction in energy consumption but not compromising with the quality or quantity of energy production. Essential theoretical and practical knowledge about the concept of energy conservation, energy management, different approaches of energy conservation in industries, economic aspects of energy conservation projects and energy audit and measuring instruments in the commercial and industrial sector will be achieved through this course.

Teaching & Examination Scheme:

Contact hours per week			Course Credits	Examination Marks (Maximum / Passing)				
				Theory		J/V/P*		Total
Lecture	Tutorial	Practical		Internal	External	Internal	External	
3	0	0	3	50/18	50/17	NA	NA	100/35

* **J**: Jury; **V**: Viva; **P**: Practical

Detailed Syllabus:

Sr.	Contents	Hours
1	**Energy Conservation** Need of Energy Audit and Management, Benefits of Energy Audit, EC Act 2001, Definition and Objective of Energy Management, Energy Management Skills, Energy Management Strategy, Economics of implementation of energy optimization projects, it's constraints, barriers and limitations, Financial Analysis: Simple Payback, IRR, NPV, Discounted Cash flow; Instruments for Audit and Monitoring Energy and Energy Savings demonstration and hands on.	12

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2	**Electrical Distribution and Utilization** To study Basic Electrical Power System & Demand Side Management, Basics of Transformers, Transformers loss reductions, parallel operations, T & D losses, P.F. improvement, Load Management, Harmonics measurements & its improvements Electronic Lighting ballasts for Lighting, LED Lighting, Commercial Lighting system	**12**
3	**Electrical Motors and Generator Audit** To understand Basics about various Motors and Generators, Energy Efficient motors and Soft starters, Automatic power factor Controllers, Variable speed drive & VFD, Trends and Approaches: Study of 4 to 6 cases of Electrical Energy audit and management By doing Industrial visit, Visit of Diesel Generator plant/Solar Rooftop systems for Energy Audit.	**10**
4	**Thermal System and Mechanical Utilities Audit** Methods of Energy Conservation in Boiler, Fan & Blowers, Methods of Energy Audit in Cooling Towers, Pumps and Compressor, Insulation and Refractory, Refrigeration and Air conditioning, Cogeneration, Report-writing, preparations and presentations of energy audit reports, Post monitoring of energy conservation projects, MIS, Case studies / Report studies of Energy Audits. Study of Energy Audit reports for various Industries and visit large Organizations like Power Plant, or Sub-station and other companies.	**8**

Reference Books:

1	Energy Audit and Management, Volume-I, IECC Press
2	Energy Efficiency in Electrical Systems, Volume-II, IECC Press
3	Energy Management: W.R.Murphy, G.Mckay, Butterworths Scientific
4	Energy Management Principles, C.B.Smith, Pergamon Press
5	Industrial Energy Conservation, D.A. Reay, Pergammon Press
6	Energy Management Handbook, W.C. Turner, John Wiley and Sons, A Wiley Interscience
7	Industrial Energy Management and Utilization, L.C. Witte, P.S. Schmidt, D.R. Brown, Hemisphere Publication, Washington, 1988

Supplementary learning Material:	
1	https://beeindia.gov.in
2	https://www.electrical4u.com/
3	www.nptel.ac.in
4	https://interestingengineering.com/electrical-engineering-salaries-worldwide

Pedagogy:

- Direct classroom teaching
- Audio Visual presentations/demonstrations
- Assignments/Quiz
- Continuous assessment
- Interactive methods

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- Seminar/Poster Presentation

Internal Evaluation :

The internal evaluation comprised of written exam (40% weightage) along with combination of various components such as Certification courses, Assignments, Mini Project, Simulation, Model making, Case study, Group activity, Seminar, Poster Presentation, Unit test, Quiz, Class Participation, Attendance, Achievements etc. where individual component weightage should not exceed 20%.

Suggested Specification table with Marks (Theory) (Revised Bloom's Taxonomy):

Distribution of Theory Marks in %						**R**: Remembering; **U**: Understanding; **A**: Applying; **N**: Analyzing; **E**: Evaluating; **C**: Creating
R	**U**	**A**	**N**	**E**	**C**	
10%	40%	30%	10%	10%	0%	

Note: This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

Course Outcomes (CO):

Sr.	Course Outcome Statements	%weightage
CO-1	Identify and assess the energy conservation/saving opportunities in different electric system	**20**
CO-2	Demonstrate skills required for energy audit and management.	**20**
CO-3	Prepare energy flow diagrams and energy audit report	**20**
CO-4	Suggest cost-effective measures towards improving energy efficient and energy conservation.	**20**
CO-5	Identify and assess the energy conservation/saving opportunities in different electric system	**20**

Curriculum Revision:	
Version:	2
Drafted on (Month-Year):	June-2022
Last Reviewed on (Month-Year):	
Next Review on (Month-Year):	June-2027

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