

B.Tech III Year II Semester**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA
19AEE64a- ENERGY AUDIT, CONSERVATION & MANAGEMENT****(Professional Elective-II)**

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Course Objectives:

- To understand energy efficiency, scope, conservation and technologies.
- To design energy efficient lighting systems.
- To estimate/calculate power factor of systems and propose suitable compensation techniques.
- To understand energy conservation in HVAC systems.
- To calculate life cycle costing analysis and return on investment on energy efficient technologies.

UNIT – I: ENERGY AUDITING**10 Hrs**

Basic Principles of Energy Audit and management Energy audit – Definitions – Concept – Types of audit – Energy index – Cost index – Pie charts – Sankey diagrams – Load profiles – Energy conservation schemes and energy saving potential – Numerical problems – Principles of energy management – Initiating, planning, controlling, promoting, monitoring, reporting – Energy manager – Qualities and functions – Language – Questionnaire – Check list for top management.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the energy audit basic principles **L1**
- Understand the classification of energy audit and energy representations **L2**

UNIT – II: LIGHTING**10 Hrs**

Lighting Modification of existing systems – Replacement of existing systems – Priorities: Definition of terms and units – Luminous efficiency – Polar curve – Calculation of illumination level – Illumination of inclined surface to beam – Luminance or brightness – Types of lamps – Types of lighting – Electric lighting fittings (luminaries) – Flood lighting – White light LED and conducting Polymers – Energy conservation measures

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn how to conserve energy with good lighting practices **L1**
- Learn about different light efficient equipments **L2**

UNIT – III: POWER FACTOR AND ENERGY AUDITING INSTRUMENTS**10 Hrs**

Power Factor and energy instruments Power factor – Methods of improvement – Location of capacitors – Power factor with non linear loads – Effect of harmonics on Power factor – Numerical problems. Energy Instruments – Watt-hour meter – Data loggers – Thermocouples – Pyrometers – Lux meters – Tong testers – Power analyzer.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the impact of power factor and its improvement **L1**
- Learn the importance of energy auditing instruments **L2**

UNIT – IV: HEATING AND COOLING**10 Hrs**

Space Heating and Ventilation – Air-Conditioning (HVAC) and Water Heating: Introduction – Heating of buildings – Transfer of Heat-Space heating methods – Ventilation and air-conditioning – Insulation-Cooling load – Electric water heating systems – Energy conservation methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the importance of natural resources **L1**

- Learn the importance of heating and cooling in energy utilization

L2

UNIT – V: ECONOMIC ASPECTS AND ANALYSIS

10 Hrs

Economics Analysis – Depreciation Methods – Time value of money – Rate of return – Present worth method – Replacement analysis – Life cycle costing analysis – Energy efficient motors (basic concepts). Computation of Economic Aspects Calculation of simple payback method – Net present worth method – Power factor correction – Lighting – Applications of life cycle costing analysis – Return on investment.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn the concepts of economic analysis
- Learn impact of economic analysis in energy auditing

L1

L2

Text Books:

1. Energy management by W.R. Murphy & G. McKay Butter worth, Elsevier publications. 2012
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd–2nd edition, 1995

Reference Books:

1. Electric Energy Utilization and Conservation by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
2. Energy management by Paul o' Callaghan, Mc–Graw Hill Book company–1st edition, 1998.
3. Energy management hand book by W.C.Turner, John wiley and sons.
4. Energy management and conservation –k v Sharma and pvenkatasshaiah-I KInternational Publishing House pvt.ltd,2011.
5. http://www.energymanagertraining.com/download/Gazette_of_IndiaPrIIISecI-37_25-08-2010.pdf

Course Outcomes:

At the end of this Course the student will be able to

- Explain energy efficiency, conservation and various technologies.
- Design energy efficient lighting systems
- Calculate power factor of systems and propose suitable compensation techniques
- Explain energy conservation in HVAC systems.
- Calculate life cycle costing analysis and return on investment on energy efficient technologies.

L1

L2

L3

L4

L5