

B.Tech III Year II Semester**JNTUA COLLEGE OF ENGINEERING (AUTONOMOUS) PULIVENDULA****19AEE65a- ENERGY CONSERVATION & MANAGEMENT****(Open Elective-II)**

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Course Objectives: The objectives of the course are to make the students learn about

- 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:**09 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

- To know about various types of Energy Audit **L1**
- To know about various types of Energy conservation schemes and Energy Manager functions **L2**

UNIT – II:**09 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

- To know about various Lighting systems and types of lamps. **L1**
- To evaluate illumination level Illumination of inclined surface to beam and Design of Energy efficient lighting systems. **L2**

UNIT – III:**09 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

- To know about various Methods of Power Factor improvement **L1**
- To know about various Energy Instruments **L3**

UNIT – IV:**09 Hrs**

Space Heating and Ventilation 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

- To know about analysis of Heating and HVAC L1
- To know about Energy conservation methods L2

UNIT – V:**09 Hrs**

Economic Aspects and Analysis 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

- To know about basic concept of Analysis of Economics and different methods L1
- To know about Computation of Economic Aspects Calculation 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 pvenkata seshaiiah-I K International Publishing House pvt.ltd, 2011.
5. http://www.energymanagertraining.com/download/Gazette_of_IndiaP_art_IIsecI-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. L1
- Design energy efficient lighting systems. L2
- Calculate power factor of systems and propose suitable compensation techniques. L3
- Explain energy conservation in HVAC systems. L4
- L5

