

**4/4 B.Tech. EIGHTH SEMESTER****EE8T2D ENERGY AUDIT, CONSERVATION & MANAGEMENT Credits: 3****Lecture: 3 periods/week****Internal assessment: 30 marks****Tutorial: 1 period /week****Semester end examination: 70 marks****Course Objective:**

It introduces principles of energy audit & energy management, lighting systems, power factor improvement and various energy Instruments. It also introduces space heating and ventilation; analysis of economic aspects and computation.

**Course Outcomes:**

After completing this course, student is able to

1. Assess the benefits and drivers of an energy audit.
2. Have knowledge of the energy audit process and the elements that make up the process.
3. Understand how to plan and carry out an energy audit.
4. Know the process of reviewing energy data and analysis in the energy audit process
5. Have knowledge of the equipment and key considerations required when carrying out an energy audit.

**UNIT I****Basic Principles of Energy Audit & Energy 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.

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting, energy manager, qualities and functions, language, questionnaire- check list for top management.

**UNIT II****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.

**UNIT III****Power Factor and Energy Instruments**

Power factor – methods of improvement, location of improvement, location of capacitors, Pf with non linear loads, effect of harmonics on p.f., motor controllers

Energy instruments – watt – hour meter, data loggers, thermocouples pyrometers, lux meters, tong testers, power analyzer.

**UNIT IV****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.

**UNIT V****Economic Aspects and Analysis & Computation**

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).

calculation of simple payback method, net present worth method- power factor correction, lighting – applications of life cycle costing analysis, return on investment.

**Learning Resources****Text Books:**

1. Energy management by W. R. Murphy & F. McKay Butter worth, Elsevier publications. 2012.
2. Electric Energy Utilization and Conservation by S C Tripathy , Tata McGraw hill publishing company Ltd. New Delhi.

**Reference Books:**

1. Energy management by Paul o' Callaghan, Mc- graw Hill Book company- 1<sup>st</sup> edition, 1998.
2. Energy management hand book by W. C. Turner. John wiley and sons
3. Energy efficient electric motors by John. C. Andreas, Marcel Inc Ltd- 2<sup>nd</sup> edition. 1995.