I Year I Semester **L P C**

Code: 17PE237 **4 0 3**

ENERGY AUDITING, CONSERVATION&MANAGEMENT
(Common to PE, P&ID, PE&ED, PE&D, PE&S, EM&D)
(Elective IV)

Perquisites: Concepts of utilization of electrical energy, electrical machines and electrical measurements.

Course Educational Objectives:

1. To learn principle of energy audit as well as management for industries and utilities and buildings.
2. To study the energy efficient motors and lighting.
3. To learn power factor improvement methods and operation of different energy instruments.
4. To compute depreciation methods of equipment for energy saving.

UNIT I: **Basic Principles of Energy Audit**

Energy audit- definitions, concept , types of audit, energy index, cost index ,pie charts, Sankey diagrams, load profiles, Energy conservation schemes- Energy audit of industries- energy saving potential, energy audit of process industry, thermal power station, building energy audit

UNIT II: **Energy Management –I**

Principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting. Energy manger, Qualities and functions, language, Questionnaire – check list for top management

UNIT III: **Energy Efficient Motors and Lighting**

Energy efficient motors , factors affecting efficiency, loss distribution , constructional detailscharacteristics – variable speed , variable duty cycle systems, RMS hp- voltage variation-voltage unbalance- over motoring- motor energy audit. Good lighting system design and practice, lighting control, lighting energy audit.

UNIT IV: **Power Factor Improvement and energy instruments**

Power factor – methods of improvement , location of capacitors , Power factor with non-linear loads, effect of harmonics on p.f. , p.f motor controllers – Energy Instruments- watt meter, data loggers, thermocouples, pyrometers, lux meters, tongue testers ,application of PLC's

UNIT V: **Economic Aspects and their computation**

Economics Analysis-Depreciation Methods, time value of money, rate of return, present worth method, replacement analysis, lifecycle costing analysis – Energy efficient motors. Calculation of simple payback method, net present worth method- Power factor correction, lighting – Applications of life cycle costing analysis, return on investment.

Course Outcomes:

After completion of this course the students will be able to:

- Perform energy audit in different organizations.
- Recommend energy efficient motors and design good lighting system.
- Understand advantages to improve the power factor.
- Evaluate the depreciation of equipment.

Reference Books:

1. Energy management by W.R. Murphy & G. Mckay Butter worth, Heinemann publications.
2. Energy efficient electric motors by John .C. Andreas, Marcel Dekker Inc Ltd-2nd edition, 1995-
3. Energy management by Paul o' Callaghan, Mc-graw Hill Book company-1st edition, 1998
4. Energy management hand book by W.C.Turner, John wiley and sons 5. Energy management and good lighting practice : fuel efficiency- booklet12-EEO.