**19EE42E2-ELECTRICAL ENERGY CONSERVATION & AUDITING**

 **(EEE)**

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| **Course Category:** | Professional Elective  | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-0-0 |
| **Pre-requisite:** | Basics of electrical Circuits and Generation of Electrical Power. | **Sessional Evaluation:****External Exam Evaluation:****Total Marks:** | 4060100 |

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| **Course Objectives:** | To make the student learn about: |
| 1. The energy and its management
2. The importance of energy conservation.
3. The fundamentals of product strategy management.
4. The studying methods of energy accounting and energy auditing in energy sector, industry and final consumption.
5. The opportunities to increase the rational use of energy.
6. The energy conservation in industrial application
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| **Course Outcomes:** | After completing the course the student will be able to |
| **CO1** | Familiarizing the current global energy scenario |
| **CO2** | Explain the importance of energy conservation.  |
| **CO3** | Demonstrate the concepts of energy management.  |
| **CO4** | Describe the concepts of energy auditing.  |
| **CO5** | Understand the methods of improving energy efficiency in lighting systems. |
| **CO6** | Enumerate the methods of improving energy efficiency in heating and air conditioning. |
| **Course Content:** | **UNIT- I****Energy scenario:** Global & Indian energy scenario- classification of energy sources, energy needs of growing economy- energy sector reform-energy and environment, global environmental concerns- basics of energy and its various forms.**UNIT – II****Energy conservation:** 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.**UNIT – III****Electric energy management:** Principles of electric energy management- energy management control systems-energy systems maintenance -energy management in water and waste water treatment- solid waste treatment-electricity act-energy conservation act.**UNIT – IV****Energy audit:** Types of energy audit- energy management (audit) approach, understanding energy costs- bench marking- energy performance-matching energy use to requirement, maximizing system efficiencies, optimizing the input energy requirements, fuel and energy substitution, energy audit instruments.**UNIT – V****Energy efficiency in lighting systems:** Lighting modification of existing systems, replacement of existing systems, definition of terms and units-luminous efficiency, polar curve, calculation of illumination level, types of lamps and types of lighting conservation measures.**UNIT – VI****Energy efficiency in heating and air conditioning**: 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. |
| **Text books &****Reference books:** | **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
3. “General aspects of energy management and audit”, National Productivity Council of India, chennai (course material-national certification examination for energy management)

**Reference books:**1. “Electric Energy Utilization and Conservation”, by S C Tripathy, Tata McGraw hill publishing company Ltd. New Delhi.
2. “Energy Management Handbook”, by W.C. Turner, Marcel Dekker, Inc, New York, 5th Edition, 2005.
3. “Guide to Energy Management”, by B. L. Capehart, W. C. Turner, W. J. Kennedy, CRC Press, New York, 2005.
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