

## ENERGY MANAGEMENT

<b>Course Code</b>	20EE2601	<b>Year</b>	III	<b>Semester</b>	II
<b>Course Category</b>	Open Elective-II	<b>Branch</b>		<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	Applied Physics, Basics of Electrical & Electronics Engineering
<b>Continuous Internal Evaluation</b>	30	<b>Semester End Evaluation</b>	70	<b>Total Marks</b>	100

### COURSE OUTCOMES

After the completion of the course student will be able to	
<b>CO1</b>	<b>Understand</b> the fundamentals of energy scenario, energy management, Power Factor, Lighting and Energy Instrument, electric energy and economic aspects. <b>(L2)</b>
<b>CO2</b>	<b>Apply</b> the knowledge of energy scenario and energy management in electrical energy. <b>(L3)</b>
<b>CO3</b>	<b>Apply</b> the knowledge of Power Factor, Lighting and Energy Instruments use in electrical energy systems. <b>(L3)</b>
<b>CO4</b>	<b>Analyze</b> the methods to improve efficiency of electrical energy systems. <b>(L4)</b>
<b>CO5</b>	<b>Analyze</b> the economic aspects for energy conservation. <b>(L4)</b>
<b>CO6</b>	<b>Ability</b> to apply the various laws of energy management tools to measure the <b>basic</b> parameters and <b>submit a report</b> .

#### Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:Substantial, 2: Moderate, 1:Slight)

CO/PO, PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	√					√	√						√	√
CO3	√		√		√								√	√
CO4		√										√	√	√
CO5		√		√						√			√	√
CO6									√	√		√	√	√

### SYLLABUS

Unit No.	Contents	Mapped CO
<b>I</b>	<b>Energy Scenario:</b> Commercial and Non-commercial energy, primary energy resources, commercial energy production, final energy consumption, energy needs of growing economy, long term energy	<b>CO1,CO2, CO6</b>

	scenario, energy pricing, energy sector reforms, energy and environment, energy security, energy conservation and its importance, restructuring of the energy supply sector, energy strategy for the future, air pollution, climate change. Energy Conservation Act-2001 and its features.	
<b>II</b>	<b>Energy Management:</b> Introduction to energy management, principles of energy management, organizing energy management program, initiating, planning, controlling, promoting, monitoring, reporting- Energy manger, Qualities and functions.	CO1,CO2, CO6
<b>III</b>	<b>Power Factor Improvement, Lighting and Energy Instruments</b> :Power factor –Pf with non-linear loads, effect of harmonics on power factor, power factor motor controllers - Good lighting system design and practice, lighting control ,lighting energy audit – List of Instruments for energy audit- wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers (working principle and measurement).	CO1,CO3,CO6
<b>IV</b>	<b>Electric Energy Management:</b> Introduction, Power Supply Effects of Unbalanced Voltages on the Performance of Motors, Electric motor Operating Loads, Determining Electric Motor Operating Loads, Power Meter, Slip Measurement, Electric Motor Efficiency, Sensitivity of Load to Motor RPM, Theoretical Power Consumption, Motor Efficiency Management, Motor Performance Management Process <b>Energy efficient transformers:</b> Introduction, transformer loading/efficiency analysis, case studies.	CO1,CO4,CO6
<b>V</b>	<b>Economic Aspects and Analysis:</b> Economics Analysis-Depreciation Methods, time value of money, internal rate of return, net present value method- Case Study- Energy efficient motors, replacement analysis, life cycle costing analysis- calculation of simple payback method, Case Study, Power factor correction, lighting - Applications of life cycle costing analysis, return on investment .	CO1,CO5,CO6

### Learning Resources

#### **Text Books:**

1. Wayne C.Turner, —*Energy management Hand book*, 8<sup>th</sup> Edition. John Wiley and son.
2. S.C. Tripathy, Electric —*Energy Utilization and Conservation*, Tata McGraw Hill, 1991.
3. Arry C. White, Philip S. Schmidt, David R. Brown, —*Industrial Energy Management Systems*, Hemisphere Publishing Corporation, New York, 1994

#### **References:**

1. John C. Andreas, —*Energy efficient electric motors selection and application*ll.
2. Amit kumarTyagi, —*Hand book on Energy Audit and Management*, TERI (Tata Energy Research Institute).
3. Paul W.O. Callaghan, —*Energy Management*ll, McGraw hill Book Company.
4. Rakosh Das Begamudre, —*Energy conversion systems*, 10<sup>th</sup> Edition, New Age International Publishers.
5. Industrial Energy Management: Principles and Applications by Giovanni Petrecea, Kluwer international series in engineering and computer science. Power electronics & power systems.1993.
6. W.R. Murphy & G.Mckey Butterworths, —*Energy Management*, New Age International Publishers.

#### **e- Resources & other digital material**

1. www.bee-india.com