

Energy Management

Course Code	20EE2601A	Year	III	Semester	II
Course Category	Open Elective-II	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Applied Physics, Basics of Electrical & Electronics Engineering
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks	100

Course Outcomes

After the completion of the course student will be able to

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

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	3					2	2							
CO3	3		2		2									
CO4		3										2		
CO5		3		2							2			
CO6									3	3		2		
Avg.	3	3	2	2	3	2	2		3	3	2	2		

Syllabus

Unit No.	Contents	Mapped CO
1	Energy Scenario Commercial and non-commercial energy, primary and secondary energy resources, global primary energy reserves, commercial energy production, final energy consumption, energy needs of growing economy, long term energy scenario, energy pricing, sector wise energy consumption in India, energy and environment.	CO1, CO2, CO6

2	Energy Management Introduction to energy management and objectives, principles of energy management, organizational structure, energy management program, energy policy, energy planning, controlling, ownership, reporting, summary.	CO1, CO2, CO6
3	Power Factor Improvement, Lighting and Energy Instruments Power factor –causes of low PF, effects of low PF, advantages of PF improvement, PF with non-linear loads, Lighting fundamentals, process to improve lighting efficiency– List of Instruments for energy audit-wattmeter, data loggers, thermocouples, pyrometers, lux meters, tongue testers (working principle and measurement).	CO1, CO3, CO6
4	Electric Energy Management 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. Energy efficient transformers: Introduction, transformer loading/efficiency analysis.	CO1, CO4, CO6
5	Economic Aspects and Analysis Economics analysis introduction, objectives, general characteristics of capital investment, depreciation methods-straight line, unit production and double declining , time value of money-simple and compound interests, internal rate of return, net present value method, calculation of simple payback method.	CO1, CO5, CO6

Learning Resources

Text Books:

1. W. C. Turner, Energy management Hand book, John Wiley and son, 8th Ed., 2012.
2. S.C. Tripathy, Electric, Energy Utilization and Conservation, Tata McGraw Hill, 1991.
3. Guide books for National Certification Examination for Energy Manager / Energy Auditors Book-1, General Aspects.

References:

1. John. C. Andres, Energy Efficient Electric Motors, Marcel Dekker Inc. Ltd., 3rd Ed., 2005.
2. Paul W.O. Callaghan, Energy Management, McGraw hill Book Company, 1st Ed., 2005

e- Resources & other digital material

1. <https://www.routledgehandbooks.com/doi/10.1201/9781315374178-4> (Economic Aspects)
2. <https://www.youelectricalguide.com/2019/05/lux-meter-working-principle.html>
3. <https://electricalfundablog.com/clamp-meter-tong-tester-types-operating-principle-how-to-operate/>
4. <https://www.elprocus.com/what-is-pyrometer-working-principle-and-its-types/>
5. <http://www.dspmuranchi.ac.in/pdf/Blog/qqqqgmailcomthemocouple1.pdf>
6. <https://www.profitbooks.net/what-is-depreciation/>