ENERGY MANAGEMENT

Course Code	20EE2601A	Year	III	Semester(s)	II
Course Category	Open Elective-II	Branch	Common to All	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Basics of Electrical & Electronics Engineering
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the 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:High, 2: Medium, 1:Low)

	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		

SYLLABUS		
Unit No.	**Contents**	**Mapped CO**
I	**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**

II	**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**
III	**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**
IV	**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**
V	**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] Wayne C.Turner, ―Energy management Hand book, John Wiley and son, 8th Edition 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 (available online).

Reference Books

[1] John. C. Andres, Energy Efficient Electric Motors, Marcel Dekker Inc. Ltd – 3rd Edition, 2005.

[2] Paul W.O. Callaghan, ―Energy Management, McGraw hill Book Company,1st Edition, 2005.

Web Links

1. https://www.routledgehandbooks.com/doi/10.1201/9781315374178-4 (Economic Aspects)
2. https://www.yourelectricalguide.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/