CONCEPTS OF ENERGY AUDITING & MANAGEMENT

Course Code	23EE2502	Year	III	Semester	I
Course Category	Open Elective-I	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	BEEE
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 auditing, management, efficient motors, lighting systems, power factor improvement, energy measuring instruments, and economic considerations (L2).
CO2	Apply energy audit and management practices to assess and improve energy efficiency (L3).
CO3	Analyze energy data and management strategies to enhance energy conservation (L4).
CO4	Apply energy efficiency, measurement, and economic analysis methods to conduct energy audit (L3).
CO5	Analyze the performance and economic impact of energy efficient system to minimize energy usage and cost (L4).
CO6	Prepare a report on the fundamentals of energy auditing, management, efficient equipment, power factor, energy measurement, and economic considerations.

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											1		
CO3		3										1		
CO4	3											1		
CO5		3										1		
CO6				3					2	2		2		

SYLLABUS		
Unit No.	**Contents**	**Mapped CO**
I	**Basic Principles of Energy Audit** Energy audit- definitions - concept - types of Energy audit - energy index - cost index - pie charts - Sankey diagrams and load profiles - Energy conservation schemes- Energy audit of industries- energy saving potential - energy audit of process industry, thermal power station - building energy audit - Conservation of Energy Building Codes (ECBC-	**CO1 CO2 CO3 CO6**

	2017).	
II	**Energy Management** Principles of energy management - organizing energy management program - initiating - planning - controlling - promoting - monitoring - reporting. Energy manager - qualities and functions - language - Questionnaire – check list for top management.	**CO1** **CO2** **CO3** **CO6**
III	**Energy Efficient Motors and Lighting** Energy efficient motors - factors affecting efficiency - loss distribution - constructional details - characteristics – variable speed - RMS - voltage variation-voltage unbalance-over motoring-motor energy audit. lighting system design and practice - lighting control - lighting energy audit.	**CO1** **CO4** **CO5** **CO6**
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 power factor - power factor motor controllers – Energy Instruments- watt meter - data loggers - thermocouples - pyrometers - lux meters - tongue testers.	**CO1** **CO4** **CO5** **CO6**
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 value method- Power factor correction - lighting – Applications of life cycle costing analysis - return on investment.	**CO1** **CO4** **CO5** **CO6**

Learning Resources
Text Books:
1. W.R.Murphy & G.Mckay Butter worth, “Energy management”,Heinemann publications,1982. 2. W.CTurner , “Energy management hand book”, John wiley and sons - 1982.
Reference Books:
1. John.C.Andreas , “Energy efficient electric motors”, Marcel Dekker Inc Ltd,2nd edition, 1995 2. by Paul o’ Callaghan , “Energy management”, Mc-graw Hill Book company,1st edition, 1998 3. Energy management and good lighting practice : fuel efficiency- booklet12-EEO
E-Resources: 1. https://nptel.ac.in/courses/108106022 2. https://archive.nptel.ac.in/courses/108/106/108106022