

## CONCEPTS OF ENERGY AUDITING & MANAGEMENT

<b>Course Code</b>	23EE2502	<b>Year</b>	III	<b>Semester</b>	I
<b>Course Category</b>	Open Elective-I	<b>Branch</b>	EEE	<b>Course Type</b>	Theory
<b>Credits</b>	3	<b>L-T-P</b>	3-0-0	<b>Prerequisites</b>	BEEE
<b>Continuous Internal Evaluation:</b>	30	<b>Semester End Evaluation:</b>	70	<b>Total Marks:</b>	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
<b>CO1</b>	Understand the fundamentals of energy auditing, management, efficient motors, lighting systems, power factor improvement, energy measuring instruments, and economic considerations (L2).
<b>CO2</b>	Apply energy audit and management practices to assess and improve energy efficiency (L3).
<b>CO3</b>	Analyze energy data and management strategies to enhance energy conservation (L4).
<b>CO4</b>	Apply energy efficiency, measurement, and economic analysis methods to conduct energy audit (L3).
<b>CO5</b>	Analyze the performance and economic impact of energy efficient system to minimize energy usage and cost (L4).

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	PSO1	PSO2
CO1	2	1											
CO2	3					1					1		
CO3		3									1		
CO4	3				1						1		
CO5		3									1		

SYLLABUS		
Unit No.	Contents	Mapped CO
I	<b>Basic Principles of Energy Audit</b> 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-2017).	<b>CO1 CO2 CO3</b>

II	<b>Energy Management</b> 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.	<b>CO1 CO2 CO3</b>
III	<b>Energy Efficient Motors and Lighting</b> 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.	<b>CO1 CO4 CO5</b>
IV	<b>Power Factor Improvement and Energy Instruments</b> 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.	<b>CO1 CO4 CO5</b>
V	<b>Economic Aspects and their Computation</b> 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.	<b>CO1 CO4 CO5</b>

<b>Learning Resources</b>	
<b>Text Books:</b>	
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.	
<b>Reference Books:</b>	
1. John.C.Andreas , “Energy efficient electric motors”, Marcel Dekker Inc Ltd,2 <sup>nd</sup> edition, 1995 2. by Paul o’ Callaghan , “Energy management”, Mc-graw Hill Book company,1 <sup>st</sup> edition, 1998 3. Energy management and good lighting practice : fuel efficiency- booklet12-EEO	
<b>E-Resources:</b>	
1. <a href="https://nptel.ac.in/courses/108106022">https://nptel.ac.in/courses/108106022</a> 2. <a href="https://archive.nptel.ac.in/courses/108/106/108106022">https://archive.nptel.ac.in/courses/108/106/108106022</a>	