

P.V.P SIDDHARTHA INSTITUTE OF TECHNOLOGY
(Autonomous)

ENERGY AUDITING

Course Code	23ME2702E	Year	IV	Semester	I
Course Category	Open Elective - IV	Branch	ME	Course Type	Theory
Credits	3	L-T-P	3-0-0	Pre-requisites	
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,

CO	Statement	Skill	Blooms	Units
CO1	Understand energy consumption patterns and perform basic energy audits using suitable tools	Understand	L2	1
CO2	Evaluate power systems for conservation opportunities and apply DSM and PF improvement strategies	Apply	L3	2
CO3	Apply energy-saving techniques in boilers, furnaces, steam systems, and waste heat recovery units	Apply	L3	3
CO4	Recommend energy-efficient practices for motors, compressors, HVAC, and lighting Systems.	Apply	L3	4
CO5	Perform energy performance analysis using economic tools and understand schemes like PAT and ESCO	Analyze	L4	5

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of Correlations : H: High[3], M: Medium[2], L: Low [1]

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
C01	3	2	1	1	2	1					2	2	1
C02	3	3	2	1	2	3				1	2	3	2
C03	3	2	3	1	2	3					2	3	2
C04	3	3	2	2	3	3	1			1	2	3	3
C05	3	3	2	3	3	2	1	1	2	3	3	2	3

[illegible]

Course Content		
Unit No	Contents	Mapped CO
UNIT-1	INTRODUCTION: Energy scenario of World, India and TN Environmental aspects of Energy Generation, Material and Energy balancing, Energy Auditing : Need, Types, Methodology and Barriers. Role of Energy Managers. Basic instruments for Energy Auditing.	CO1
UNIT-2	ELECTRICAL SUPPLY SYSTEMS: Electricity Tariff Structures Typical Billing, Demand Side Management, HT and LT supply, Power Factor, Energy conservation in Transformers, Harmonics.	CO2
UNIT-3	ENERGY CONSERVATION IN MAJOR THERMAL UTILITIES: Stoichiometry, Combustion principles. Energy conservation in: Boilers, Steam Distribution Systems, Furnaces, Thermic Fluid Heaters, Cooling Towers, D.G. sets. Insulation and Refractories - Waste Heat Recovery Devices	CO3
UNIT-4	ENERGY CONSERVATION IN MAJOR ELECTRICAL UTILITIES: Energy conservation in: Motors, Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration and Air Conditioning Systems, Illumination systems.	CO4
UNIT-5	ENERGY MONITORING, TARGETING, LABELLING AND ECONOMICS: Elements of Monitoring & Targeting System CUSUM, Energy/Cost index diagram, Energy Labeling, Energy Economics, Cost of production and Life Cycle Costing, Economic evaluation techniques, Discounting and Non-Discounting, ESCO concept, PAT scheme	CO5
Learning Resources		
Text books	1. Guide book for National Certification Examination for “Energy Managers and Energy Auditors” (4 Volumes). Available at http://www.em-ea.org/gbook1.asp. This website is administered by Bureau of Energy Efficiency (BEE), a statutory body under Ministry of Power, Government of India. 2. K. Nagabhushan Raju, Industrial Energy Conservation Techniques: (concepts, Applications and Case Studies), Atlantic Publishers &Dist, 2007.	

**Reference
books**

1. Abbi Y P, Shashank Jain., Handbook on Energy Audit and Environment Management, TERI Press, 2006.
2. Albert Thumann and Paul Mehta D, "Handbook of Energy Engineering", 7th Edition, The Fairmont Press, 2013.
3. Murphy.W.R. and McKay.G, "Energy Management", Butterworth, London 1982.
4. Paul W.O'Callaghan, Design and management for energy conservation: A handbook for energy managers, plant engineers, and designers, Pergamon Press, 1981.
5. Steve Doty, Wayne Turner C, Energy Management Handbook 7th Edition, The Fairmont Press, 2009