

**3ME84: ENERGY CONSERVATION AND MANAGEMENT**  
**CREDITS – 4 (LTP: 3,0,1)**

**Course Objective:**

To apply energy conservation principles and management techniques to different energy conversion systems

**Teaching and Assessment Scheme:**

Teaching Scheme (Hours per week)			Credits	Assessment Scheme				
L	T	P		Theory Marks		Practical Marks		Total Marks
			ESE	CE	ESE	CE		
3	0	2	4	60	40	20	30	<b>150</b>

**Course Contents:**

Unit No.	Topics	Teaching Hours
1	<b>Energy Scenario:</b> Introduction to energy & power scenario of world, National Energy consumption data and environmental aspects associated with energy utilization; Energy Auditing- need, types, methodology and barriers, role of energy managers, instruments of energy auditing.	8
2	<b>Energy Conservation Act 2001 and related policies:</b> Energy conservation Act 2001 and its features, notifications under the Act, Schemes of Bureau of Energy Efficiency (BEE) including Designated consumers, State Designated Agencies, ECBC code for Building Construction.	3
3	<b>Financial Management:</b> Energy Economics- discount period, payback period, internal rate of return, net present value; Life Cycle costing- ESCO concept.	5
4	<b>Energy Monitoring and Targeting:</b> Defining monitoring & targeting, elements of monitoring & targeting, data and information-analysis, techniques – energy consumption, production, cumulative sum of differences (CUSUM).	5
5	<b>Energy Conservation in Electrical Utilities :</b> Components of EB billing, HT and LT supply, transformers, cable sizing; Concept of capacitors, power factor improvement, harmonics; Electric motors- motor efficiency computation, energy efficient motors; Illumination- Lux, Lumens, types of lighting, efficacy, LED lighting and scope of energy conservation in lighting.	8
6	<b>Energy Efficiency in Thermal Utilities and systems:</b> Thermal systems, Boilers, Furnaces, Heat exchangers and Thermic Fluid heaters- efficiency computation and energy conservation measures; Steam distribution and usage, steam traps, condensate recovery, flash steam utilization; Insulation & Refractories. Energy conservation in major utilities; pumps, fans, blowers, compressed air systems, Refrigeration & Air Conditioning systems, Cooling Towers, DG sets	13
<b>Total</b>		<b>42</b>

**List of References:**

1. Witte L.C., Schmidt P.S. and Brown D.R., "*Industrial Energy Management and Utilization*", Hemisphere Publ., Washington, 1988..
2. Callaghan P.W., "*Design and Management for Energy Conservation*", Pergamum Press, Oxford
3. Murphy W.R. and McKay G., "*Energy Management*", Butterworth's, London, 1987.
4. Bureau of Energy Efficiency, "*Energy Manager Training Manual*", Reference book No:1 to 4.
5. Dale R Patrick, Stephen W Fardo, "*Energy Conservation Guidebook*", 2nd Edition, CRC Press.
6. Shobh Nath Singh, "*Non-Conventional Energy Resources*", Pearson Education India; First edition (2015).

**Course Outcomes (COs):**

After learning the course the students should be able to:

1. Outline energy scenario, audit and management.
2. Apply energy conservation policy, regulations in industrial practices.
3. Evaluate energy economics.
4. Identify opportunities for rational use of energy.
5. Analyze electrical systems for energy conservation.
6. Analyze the thermal systems for energy efficiency.