ME472: ENERGY CONSERVATION AND MANAGEMENT
CREDITS - 5 (L=3, T=2, P=0)

Course Objective:
To evaluate energy conservation and management, 3Es (Energy, Economics and Environment) and their interaction, energy audit and financial management.

Teaching and Assessment Scheme:

Teaching Scheme			Credits	Assessment Scheme				
L	T	P	C	Theory		Practical		Total Marks
				ESE	CE	ESE	CE	150
3	2	0	5	70	30	30	20	

Course Contents:

Unit No.	Topics	Teaching Hours
1	**Energy Scenario:** 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.	10
2	**Energy Conservation Act 2001 and related policies:** 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.	03
3	**Financial Management:** Energy Economics- discount period, payback period, internal rate of return, net present value; Life Cycle costing- ESCO concept.	05
4	**Energy Monitoring and Targeting:** Defining monitoring & targeting, elements of monitoring & targeting, data and information-analysis, techniques – energy consumption, production, cumulative sum of differences (CUSUM).	05

Unit No.	Topics	Teaching Hours
5	**Energy Conservation in Electrical Utilities:** 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.	08
6	**Energy Efficiency in Thermal Utilities and systems:** 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.	14
	TOTAL	**45**

List of References:

1. "*Industrial Energy Management and Utilization"*, Witte L.C., Schmidt P.S. and Brown D.R., Hemisphere Publ., Washington, 1988.
2. "*Design and Management for Energy Conservation"*, Callaghn P.W., Pergamon Press, Oxford
3. "*Energy Management"*, Murphy W.R. and McKay G., Butterworths, London, 1987.
4. "*Energy Manager Training Manual"*, *Bureau of Energy Efficiency* Reference book No: 1,2,3,4.
5. "*Energy Conservation Guidebook"*, Dale R Patrick, Stephen W Fardo, 2nd Edition, CRC Press

Course Outcomes (COs):

After learning the course the students should be able to:

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