

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE – PILANI, HYDERABAD CAMPUS**  
**SECOND SEMESTER 2021-2022**  
**(COURSE HANDOUT: PART-II)**

**Date: 15/01/2022**

In addition to Part-I (a general handout for all courses appended to the time-table), this handout provides the specific details of this course.

**Course No. : ME F424**  
**Course Title : ENERGY MANAGEMENT**  
**Instructor-in-charge : SANDIP DESHMUKH**

### **1. Course Description**

World and Indian energy scenario; energy policy; energy management principles; energy conservation; energy auditing; analysis; formulation of energy management options; economic evaluation, implementation & control; energy conservation techniques – conservation in energy intensive industries; choice of fuels and stoichiometry, steam generation, distribution systems, and electrical systems; integrated resource planning; demand-side management; cogeneration; total energy schemes; thermal insulation; energy storage; economic evaluation of conservation technologies; analysis of typical applications.

### **2. Scope and Objective**

To learn the principles of energy efficiency in organizations  
To learn the energy management techniques for various utilities  
To learn the methodologies for monitoring energy efficiency in industries

### **3. Text Books:**

W R Murphy, G McKay, “Energy Management”, Butterworth Heinemann, 2011

### **4. Reference Books:**

1. Rajan G. G, Optimising Energy Efficiencies in Industry, New Delhi, Tata McGraw Hill, 2001
2. Thumann A, P E, Plant Engineers and Managers Guide to Energy Conservation, New York, Van Nostrand Reinhold Co, 1993
3. Kreith F, West R E (Eds) Handbook of Energy Efficiency, London, CRC Press, 2001

### **5. Course Plan**

<b>Lecture No.</b>	<b>Learning objectives</b>	<b>Topics to be covered</b>	<b>Chapter in the Text Book</b>
1-4	Energy Management & Auditing	Energy Management, Energy Auditing, Level of Responsibility, Internal Control Questionnaire, Energy Conservation Schemes, Industrial Energy Use, Energy Conversion, Energy Index, Energy Costs, Cost Index, Energy Surveying and Auditing, Integrated Resource Planning and Demand Side Management	Ch. 1 (T1)
5-8	Energy Sources	Energy Sources, Energy Consumption, World Energy Reserves, Energy Prices, Energy Policies, Fuel Production and Processing, Choice of Fuels, Cycle Efficiency	Ch. 2 (T1)
9-12	Energy Economics	Energy Economics, Costing Techniques, Financial Appraisal and Profitability, Cost Optimization	Ch. 3 (T1)
13-20	Heat Transfer	Properties, Quantities, units and dimensions;	Ch. 4 & 5

	theory & Heat transfer media	conduction; convection; radiation; thermal insulation; Water; steam; thermal fluids; air -water vapour mixtures	(T1)
21-24	Heat Transfer equipments	Heat exchangers; combustion and thermal efficiency; steam plant; pressure hot water and thermal fluid plants	Ch. 6 (T1)
25-28	Energy Utilisation & Conservation	Furnaces; hydraulic power systems, compressed air; combined power and heating systems; energy conversion; district heating. Conservation in energy	Ch. 7 (T1)
29-30	Electrical Energy	Electric circuit theory; electrical measurements; lighting; motive power and power factor improvement; temperature measurement; optimal start control; industrial heating	Ch. 8 (T1)
31-36	Building construction and Air conditioning	Space heating; condensation; heat gain and space cooling; Load characteristics and calculations; supply and removal of heat; the efficient use of energy	Ch. 9 & 10 (T1)
37-41	Heat Recovery and Energy Storage	Sources of waste heat and its potential applications; heat recovery systems; incinerators; regenerators and recuperators; waste heat boilers; energy storage systems	Ch. 11 (T1)

## 6. Evaluation Scheme

Evaluation Component	Duration (minute)	Weightage (%)	Date & Time	Nature of Component
Mid Semester Test	90	25	16/03 11.00am to 12.30pm	CB
Surprise Quiz (6 out of 8)		15	To be announced in the Class	OB
Assignments (In-class & Take-home)		20		
Comprehensive Exam <sup>#</sup>	120	40	19/05 AN	CB

7. **Chamber Consultancy Hour:** To be announced in the class room.

8. **Notices:** All notices concerning this course shall be displayed on the CMS (the Institute's web based course management system). Besides this, students are advised to visit regularly CMS for latest updates.

9. **Make-up Policy:** Make-up shall be given only to the genuine cases with prior confirmation. Request for the make-up tests, duly signed by the students, should reach the under signed well before the scheduled test.

10. **Academic Honesty and Integrity Policy:** Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

**Instructor-in-Charge**  
**ME F424**