# INDUSTRIAL LOAD MODELLING AND CONTROL

**PEC-III: EPS**

| Course Code | Category | Hours / Week | | | Credits | Maximum Marks | | |
|---|---|---|---|---|---|---|---|---|
| | | L | T | P | C | CIA | SEE | Total |
| BPSB15 | Elective | 3 | - | - | 3 | 30 | 70 | 100 |
| Contact Classes: 45 | Tutorial Classes: Nil | Practical Classes: Nil | | | | Total Classes: 45 | | |

## I. COURSEOVERVIEW:

This course deals with the Electrical energy scenario of Demand and load side management, Optimization and control algorithms and reactive power management of direct and interruptible load control, load profiling of cooling and heating loads and cool storage and control strategies, problem formulation, describe capacitive power units and power pooling, Illustrate optimal operating and control strategies of optimal operating condition and load management for industries.

## II.COURSE OBJECTIVES:

**The course should enable the students to:**

I. Understand the energy demand scenario.
II. Explain the modeling of load and its ease to study load demand industrially.
III. Describe electricity pricing models.
IV. Study reactive power management in industries.

## III.COURSE OUTCOMES:

| After successful completion of the course, students will be able to: | | |
|---|---|---|
| CO 1 | **Apply** knowledge of engineering science including electrical circuits, control systems and electrical machines in industrial load modeling and Control. | Apply |
| CO 2 | **Determine** the industrial load management in a power system to supply specific amount of demand. | Understand |
| CO 3 | **Outline** the interruptible load control, Direct load control, controls power quality impacts for minimizing transmission line losses and Energy saving in industries. | Apply |
| CO 4 | **Analyze** the cooling and heating loads, cool storage, control strategies in an industrial power system. | Analyze |
| CO 5 | **Design** a capitative power unit in industrial load for imparting Knowledge of various controllers with its evolution, principle of operation and applications. | Apply |
| CO 6 | **Determine** the optimal operating strategies of power capacitors for integrated load management and industries with economic Justification. | Apply |

## IV.SYLLABUS:

| UNIT-I | ELECTRIC ENERGY SCENARIO | Classes: 09 |
|---|---|---|

Electric Energy Scenario, demand side management, industrial load management, load curves, load shaping objectives, methodologies, barriers, classification of industrial loads, continuous and batch processes, load modeling.

| UNIT-II | DIRECT LOAD CONTROL INTERRUPTIBLE LOAD CONTROL | Classes: 09 |
|---|---|---|

Direct load control, interruptible load control, bottom up approach, scheduling, formulation of load models, optimization and control algorithms, case studies, reactive power management in industries, controls power quality impacts, application of filters, energy saving in industries.

| UNIT-III | COOLING AND HEATING LOADS LOAD PROFILING | Classes: 10 |
|---|---|---|
| Cooling and heating loads, load profiling, modeling, cool storage, types.<br><br>Control strategies, optimal operation, problem formulation, case studies. | | |
| **UNIT-IV** | **CAPTIVE POWER UNITS** | **Classes: 08** |
| Captive power UNITs, operating and control strategies, power pooling, operation models, energy banking, industrial cogeneration. | | |
| **UNIT-V** | **OPTIMAL OPERATING STRATEGIES** | **Classes: 09** |
| Selection of schemes, optimal operating strategies, peak load saving, constraints problem formulation, case study, integrated load management for industries. | | |

**Text Books:**

1. CO Bjork "Industrial Load Management - Theory, Practice and Simulations", Elsevier, theNetherlands, 1st Edition, 1989.
2. CW Gellings and S NTalukdar, "Load management concepts," IEEE Press, New York, 2nd Edition,1986.

**Reference Books:**

1. Y. Manichaikul and F.C. Schweppe, "Physically based Industrial load", IEEE Trans. on PAS, 2nd Edition, 1981.
2. H. G. Stoll, "Least cost Electricity Utility Planning", Wiley Interscience Publication, USA, 2nd Edition, 1989.
3. I.J.Nagarath and DPKothari, .Modern Power System Engineering., Tata McGraw Hill publishers, New Delhi, 1stEdition, 1995.
4. IEEE Bronze Book- "Recommended Practice for Energy Conservation and Cost Effective Planning in Industrial Facilities", IEEE Inc, USA.

**Web References:**

1. https://www.researchgate.net/publication/257725360_Modelling.
2. https://www.ethesis.nitrkl.ac.in/5348/1/109EE0274.pd

**E-Text Books:**

1. https://www.pacontrol.com/.../Industrial-Automation-Pocket-Guide.pdf
2. https://www.matlabi.ir/wp-content/uploads/bank_papers/cpaper/c117.