INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

INDUSTRIAL LOAD MODELLING AND CONTROL								
II Semester: EPS								
Course Code	**Category**	**Hours / Week**			**Credits**	**Maximum Marks**		
BPSE16	**Core**	**L**	**T**	**P**	**C**	**CIA**	**SEE**	**Total**
		3	-	-	3	40	60	100
Contact Classes: 45	**Tutorial Classes: Nil**	**Practical Classes: Nil**				**Total Classes: 45**		
Prerequisite: Electrical Distribution systems								

I. COURSE OVERVIEW:
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. COURSES OBJECTIVES:
The students will try to learn

I. The Electric Energy Scenario - industrial load management and their implementation through various classical methods.
II. The necessity and power quality improvements of generation, transmission and distribution of electrical power for energy saving in industries.
III. The concepts of captive power units its operation, power pooling and industrial cogeneration with characteristics for real-world engineering problems and applications.
IV. The optimal operating strategies required on the system to meet the minute-to-minute variation of system demand and its significance in power system operation and control by maintaining the frequency and voltage as constant.

III. COURSE OUTCOMES:
At the end of the course students should be able to:

CO1 Apply knowledge of engineering science including electrical circuits, control systems and electrical machines in industrial load modeling and control.
CO2 Determine the industrial load management in a power system to supply specific amount of demand.
CO3 Outline the interruptible load control, Direct load control, controls power quality impacts for minimizing transmission line losses and energy saving in industries.
CO4 Analyse the cooling and heating loads, cool storage, control strategies in an industrial power system.
CO5 Design a capitative power unit in industrial load for imparting knowledge of various controllers with its evolution, principle of operation and applications
CO 6
CO6 Determine the optimal operating strategies of power capacitors for integrated load management and industries with economic justification.

IV. COURSE CONTENT:

MODULE - I: ELECTRIC ENERGY SCENARIO (9)

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.

MODULE–II: DIRECT LOAD CONTROL INTERRUPTIBLE LOAD CONTROL (9)

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.

MODULE –III: COOLING AND HEATING LOADS LOAD PROFILING (9)

Cooling and heating loads, load profiling, modeling, cool storage, types.
Control strategies, optimal operation, problem formulation, case studies.

MODULE –IV: CAPTIVE POWER UNITS (9)

Captive power units, operating and control strategies, power pooling, operation models, energy banking, industrial cogeneration.

MODULE –V: OPTIMAL OPERATING STRATEGIES (9)

Selection of schemes, optimal operating strategies, peak load saving, constraints problem formulation, case study, integrated load management for industries.

V. TEXTBOOKS:

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

VI. REFERENCE BOOKS:

1. Y. Manichaikul and F.C. Schweppe, "Physically based Industrial load", IEEE Trans. on PAS, April, 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, 1st edition, 1995.
4. IEEE Bronze Book- “Recommended Practice for Energy Conservation and cost effective planning in Industrial facilities”, IEEE Inc,USA.

VII. ELECTRONICS RESOURCES:

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

VIII. MATERIALS ONLINE

1. Course template
2. Tutorial question bank
3. Definition and terminology
4. Assignments
5. Model question paper-I
6. Model question paper-II
7. Lecture notes
8. Power point presentations
9. Tech talk topics
10. E-learning readiness videos (ELRV)