



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

RESTRUCTURED POWER SYSTEMS								
II Semester: EPS								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
BPSE18	Elective	L	T	P	C	CIA	SEE	
		3	0	0	3	40	60	
Contact Classes:48		Tutorial Classes: Nil			Practical Classes: Nil			
Prerequisite: Power System Stability					Total Classes: 45			

I. COURSE OVERVIEW:

This course introduces the differences between conventional power system and restructured power system. The course provides restructuring experiences of different countries with special focus on Indian power system. It elaborates the design of power markets, market architectural aspects, changes in operational aspects with new operational challenges like congestion management. It provides an insight to develop economically efficient power system.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. The role of the different types of organizations that operate in the various market structures
- II. The consumer and supplier behavior, various components of production cost and tariff setting principles.
- III. The deregulation of various power systems and the methods of congestion management.
- IV. The pricing mechanism and power exchange in Indian power market.

III. COURSE OUTCOMES:

After successful completion of the course, students will be able to:

- CO 1: Explain deregulation of electric utilities in view of technical and economic issues in power industry.
- CO2: Analyze the consumer and supplier behavior with the principle of demand and supply elasticity
- CO3: Interpret the restructured power systems across the world based on market architecture
- CO4: Analyze the different pricing mechanisms to encourage efficient economic behavior
- CO5: Examine transmission network usage pricing and loss allocation methods to ensure reliable and secure operation of power system.
- CO6: Interpret congestion in transmission network with respect to ATC, TTC, TRM and CBM.

IV. COURSE CONTENT:

MODULE –I OVERVIEW OF RESTRUCTURED POWER SYSTEM (9)

Regulation and deregulation, vertically integrated and deregulated power industry, market models, Market Clearing Price (MCP), Independent System Operator (ISO), role of ISO, Ancillary service management, deregulation in Power Industry (Technical and Economic Issues).

MODULE –II ECONOMIC CONSIDERATIONS IN RESTRUCTURED POWER SYSTEM (9)

Introduction, Consumer and Supplier behavior, Demand elasticity, Supply elasticity, Short-run and Long-run costs, various costs of production. Electricity pricing: Electricity pricing in generation, transmission and distribution, Introduction to Marginal cost, opportunity Costs, Dynamic pricing mechanism (ABT), Price elasticity of demand, Tariff setting principles, Distribution tariff for HT and LT consumers.

MODULE –III GLOBAL AND INDIAN MODELS OF RESTRUCTURED POWER SYSTEM (9)

Global models of restructured power system: Market evolution and deregulation in UK, USA, South America, Nordic pool, China, PJM ISO, and New York market.

Indian power market evolution: Electricity Act 2003 and various national policies and guidelines, Ministry of Power, Role of CEA, CERC, state ERC, load dispatch centers etc., implications of ABT tariff on Indian power sector, introduction to Indian power exchange

MODULE –IV TRANSMISSION PRICING AND CONGESTION MANAGEMENT (9)

Transmission price components, various transmission pricing mechanisms, tracing of power, network usage and loss allocation; Introduction to congestion in transmission network, methods of congestion management

MODULE –V OASIS (9)

Introduction of OASIS, Structure of OASIS, Pooling of information, transfer capability on OASIS and various concepts like ATC, TTC, TRM, and CBM.

I. TEXTBOOKS:

1. Mohammad Shahidehpour, Muwaffaq Alomoush, “Restructured electrical power systems: operation, trading and volatility”, Marcel Dekker. 2nd edition, 1998.
2. Prayas Energy Group, Pune, “Know Your Power”, A citizens Primer on the Electricity Sector, 2nd edition, 2002.

II. REFERENCE BOOKS:

1. Daniel Kirschen, GoranStrbac, “Fundamentals of Power System Economics”, John Wiely& Sons Ltd. 2004.
2. Kankar Bhattacharya, Jaap E Daadler, Math H J Boolen, “Operation of restructured power systems”, Kluwer Academic Pub., 1st edition, 2001.
3. Steven Stoft, “Power system economics: designing markets for electricity”, John Wiley and Sons, 1st Edition, 2002.
4. Sally Hunt, “Making competition work in electricity”, John Wiely& Sons, Inc., 1st edition, 2002
5. Loi Lei Lai, “Power System Restructuring and Deregulation” John Wiley and Sons, 1st edition, 2001.

VII. ELECTRONICS RESOURCES:

1. <https://www.nptel.ac.in/courses/108101005>
2. <https://epdf.tips/restructured-electrical-power-systems-power>.

VIII. MATERIALS ONLINE

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