INTRODUCTION TO RESTRUCTURED POWER SYSTEMS
(Professional Elective-VI)

Course Code: 15EE1146  L   T   P   C
3    0    0    3

Pre requisites:
Power System Operation and Control

Course Outcomes:
At the end of the Course, the Student will be able to:

CO 1  Understand the process of restructuring of power industry
CO 2  Analyze the Philosophy of Market Models and Market power
CO 3  Explain Transmission Congestion Management, Financial Transmission Rights (FTR), Pricing of transmission network usage
CO 4  Understand different Ancillary Services
CO 5  Understand Reforms in Indian power sector.

UNIT-1 (10 Lectures)
INTRODUCTION TO RESTRUCTURING OF POWER INDUSTRY AND FUNDAMENTALS OF ECONOMICS:
Introduction, reasons for restructuring / deregulation of power industry, understanding the restructuring process, Introduction to issues involved in deregulation, Reasons and objectives of deregulation of various power systems across the world, Consumer behavior, Supplier behavior, Market equilibrium, Short-run and long-run costs, Various costs of production, Relationship between short-run and long-run average costs, Perfectly competitive market.
UNIT-II  
THE PHILOSOPHY OF MARKET MODELS AND MARKET  
POWER AND GENERATORS BIDDING:

Introduction, Market models based on contractual arrangements, 
Comparison of various market models, Electricity vis-à-vis other 
commodities, Market architecture, Attributes of a perfectly competitive 
market, the firm’s supply decision under perfect competition, Imperfect 
competition, Market power Financial markets associated with 
electricity markets, Introduction to optimal bidding by a generator 
company, Optimal bidding methods, Different entities in deregulated 
electricity markets, Benefits from a competitive electricity market.

UNIT-III  
TRANSMISSION CONGESTION MANAGEMENT, FINANCIAL  
TRANSMISSION RIGHTS (FTR), PRICING OF TRANSMISSION  
NETWORK USAGE AND LOSS ALLOCATION:

Introduction, Classification of congestion management methods, 
Calculation of ATC, Non-market methods, Market based method, 
Nodal pricing, Inter-zonal Intra-zonal congestion management, Price 
area congestion management, Capacity alleviation method, 
Comparison and conclusion, Mathematical preliminaries, Introduction 
to Financial Transmission Rights, Risk Hedging Functionality Of 
financial Transmission Rights, Simultaneous feasibility test and 
revenue adequacy, FTR issuance process, Treatment of revenue 
shortfall, Secondary trading of FTRs,Flow Gate rights, FTR and 
market power, FTR and merchant transmission investment, 
Introduction to transmission pricing, Principles of transmission pricing, 
Classification of transmission pricing methods, Rolled-in transmission 
pricing methods, Marginal transmission pricing paradigm, Composite 
pricing paradigm, Merits and de-merits of different paradigms., 
Debated issues in transmission pricing, Introduction to loss allocation, 
Classification of loss allocation methods, Comparison between various 
methods.
UNIT-IV  
(10 Lectures)

ANCILLARY SERVICE MANAGEMENT:
Introduction to ancillary services, Types of ancillary services, Classification of ancillary services, Load-generation balancing related services, Voltage control and reactive power support services, Black start capability service, How to obtain ancillary services, Co-optimization of energy and reserve services, International comparison, Reactive power management in some deregulated electricity markets, Synchronous generators as ancillary service providers.

UNIT-V  
(10 Lectures)

REFORMS IN INDIAN POWER SECTOR:
Introduction, Framework of Indian power sector, Reform initiatives during 1990-1995, the availability based tariff (ABT), The Electricity Act 2003, Open Access issues.

TEXT BOOK:

WEB LINK:
http://www.nptel.ac.in/syllabus/108101005/

REFERENCES: