# IV Year I Semester 17EE734

### L T P C 3 1 0 3

# POWER SYSTEM REFORMS (Professional Elective-II)

### **Preamble:**

This course introduces the concepts and issues of power system reforms and aims at computation of Available Transfer Capability (ATC), Congestion Management, Electricity Pricing, Ancillary services Management and Power system operation in competitive environment.

## Learning objectives:

- 1. To study fundamentals of power system deregulation and restructuring.
- 2. To study available transfer capability.
- 3. To study congestion management
- 4. To study various electricity pricing methods.
- 5. To study operation of power system in deregulated environment.
- 6. To study importance of Ancillary services management.

#### Unit – I

### Over view of key issues in electric utilities

Introduction – Restructuring models – Independent system operator (ISO) – Power Exchange – Market operations – Market Power – Standard cost – Transmission Pricing – Congestion Pricing – Management of Inter zonal / Intra zonal Congestion.

### Unit – II

## Available Transfer Capability (ATC)

Structure of OASIS – Processing of Information – Transfer capability on OASIS – Definitions Transfer Capability Issues – ATC – TTC – TRM – CBM calculations – Methodologies to calculate ATC.

### Unit – III

#### **Congestion Management**

Introduction to congestion management – Methods to relieve congestion

### Unit – IV

### **Electricity Pricing**

Introduction – Electricity price volatility electricity price indexes – Challenges to electricity pricing – Construction of forward price curves – Short–time price forecasting.

#### Unit – V

#### Power system operation in competitive environment

Introduction – Operational planning activities of ISO – The ISO in pool markets – The ISO in bilateral markets – Operational planning activities of a GENCO.

#### Unit – VI

#### **Ancillary Services Management**

Introduction – Reactive power as an ancillary service – A review – Synchronous generators as ancillary service providers.

# Learning Outcomes:

- 1. Will understand importance of power system deregulation and restructuring.
- 2. Able to compute Available Transfer Capability.
- 3. Will understand transmission congestion management.
- 4. Able to compute electricity pricing in deregulated environment.
- 5. Will be able to understand power system operation in deregulated environment.
- 6. Will understand importance of ancillary services.

# Text books:

- 1. Kankar Bhattacharya, Math H.J. Boller, JaapE.Daalder, 'Operation of Restructured Power System' Kluver Academic Publisher 2001.
- 2. Mohammad Shahidehpour, and Muwaffaqalomoush, "Restructured electrical Power systems" Marcel Dekker, Inc. 2001

# **Reference books:**

- 1. Loi Lei Lai; "Power system Restructuring and Deregulation", Jhon Wiley & Sons Ltd., England.
- 2. Electrical Power Distribution Case studies from Distribution reform, upgrades and Management (DRUM) Program, by USAID/India, TMH