



# Kadi Sarva Vishwavidyalaya

## Faculty of Engineering & Technology

### Master of Engineering Semester II

#### (Electrical Power System)

(With effect from Academic Year 2017-18 (CBCS))

<b>Subject Code: MEEE206-N-A</b>	<b>Subject Title: Restructured Power System ( Major Elective)</b>
<b>Pre-requisite</b>	

#### A. Course Objective:

- To study about the developing countries need to make radical changes in the policy and regulation such that barrier to entry for private players is removed.
- To study about power sector which depend on the prevailing conditions of respective countries.

Teaching scheme				Total Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE Marks	CIA Marks	Pract. Marks	
Hrs	Hrs	Hrs	Hrs		Hrs	Marks				
04	00	02	06	05	03	70	30	20	30	150

#### B. Outline of the Course:

Sr. No	Title of the Unit	Minimum Hours
1	Introduction to restructuring of power industry	6
2	Fundamentals of Economics	6
3	The Philosophy of Market Models	4
4	Transmission Congestion Management	12
5	Ancillary Service Management	16
6	Pricing of transmission network usage and loss allocation	10
7	Market power and generators bidding	6

**Total Hours (Theory): 60**

**Total Hours (Lab): 30**

**Total Hours: 90**



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#### Detailed Syllabus

Sr. No.	Topic	Lecture Hours	Weight age(%)
1	<b>Introduction to restructuring of power industry:</b> 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	6	10%
2	<b>Fundamentals of Economics</b> Introduction, 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	6	10%
3	<b>The Philosophy of Market Models</b> Introduction, Market models based on contractual arrangements, Comparison of various market models, Electricity vis-à-vis other commodities, Market architecture	4	10%
4	<b>Transmission Congestion Management</b> Introduction, Classification of congestion management methods, Calculation of ATC, Non-market methods, Market based methods, Nodal pricing, Inter-zonal Intra-zonal congestion management, Price area congestion management, Capacity alleviation method	12	20%
5	<b>Ancillary Service Management</b> 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	16	25%
6	<b>Pricing of transmission network usage and loss allocation</b> 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	10	15%
7	<b>Market power and generators bidding</b> 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	6	10%
		60	100



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**C. Instructional Methods**

- At the start of course, the course delivery pattern , prerequisite of the subject will be discussed
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lectures and laboratory, which may carries five marks in overall evaluation.
- Two internal exams may be conducted and average of the same may be converted to equivalent of 15 marks as a part of internal theory evaluation.
- Assignment based on course content will be given to the student for each unit/topic and will be evaluated at regular interval. It may carry an importance of five marks in the overall internal evaluation.
- Surprise tests/Quizzes/Seminar/Tutorial may be conducted and having share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concept being taught in lectures.
- Experiments shall be performed in the laboratory related to course contents.

**D. Student Learning outcomes:**

- The student can understand recent trends in pricing in power system and identify solution for economical market operation

**E. Text Books & Reference Books:**

- Fundamentals of Power System economics Daniel Kirschen and Goran Strbac, John Wiley & Sons Ltd, 2004.
- Making competition work in electricity Sally Hunt, John Wiley & Sons, Inc., 2002.
- Operation of restructured power systems Kankar Bhattacharya, Jaap E. Daadler, Math H.J Bollen, Kluwer Academic Pub., 2001.