SCHEME OF COURSE WORK

Course Details:

Course Title	**: RESTRUCTURED POWER SYSTEMS**		
Course Code	**:** 13EE2114	**L T C**	**:4 0 3**
Program:	**: M.Tech.**		
Specialization:	**: Power System Control and Automation**		
Semester	**: II**		
Prerequisites	**: Power System Operation and Control**		

Course Outcomes (COs):

After completion of the course student acquire knowledge in

1	Understand the operation of deregulated electricity market systems.
2	Understand and examine topical issues in electricity markets and how these are handled world-wide in various markets.
3	Analyize various types of electricity market operational and control issue using new mathematical models.

Program Outcomes (POs):

A graduate of Power System Control & Automation will be able to

PO 1: Acquire in depth knowledge in the area of power system control and automation.

PO 2: Analyze the models with respect to any kind of problem on hand and try to solve related to power system control and automation.

PO 3: Develop the capability of problem solving and original thinking to arrive at feasible and optimal solutions considering societal and environmental factors.

PO 4: Interpret and demonstrate sufficient knowledge base, to apply the techniques and tools either individually or in groups to solve power system problems.

PO 5: Select state-of-the-art tools for modeling, simulation and analysis of problems related to power systems.

PO 6: Recognize positively any collaborative and multidisciplinary research to achieve common goals.

PO 7: Demonstrate knowledge and understanding of power system engineering and management principles and apply the same for efficiently carrying out projects with due consideration to economical and financial factors.

PO 8: Communicate confidently, make effective presentations and write good reports to engineering community and society.

PO 9: Recognize the need for life-long learning and have the ability to do it independently.

PO 10: Understand Social responsibilities and follow ethical practices to contribute to the community for sustainable development.

PO 11: Predict and self examine critically the outcomes of actions, reflect on to make corrective measures and move forward positively.

Course Outcome Versus **Program Outcomes:**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO-1	S	S	S	M	S	S	M	-	M	-	-	M
CO-2	S	-	S	S	S	-	S	M	-	-	-	-
CO-3	S	S	M	M	S	S	M	-	-	-	-	-

S - Strongly correlated, *M* - *Moderately* correlated, *Blank* - *No correlation*

Assessment Methods:	Assignment / Quiz / Seminar / Case Study / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Overview of key issues in electric utilities- introduction – restructuring models.	CO1	1. What is the necessity of restructuring and its benefits. 2. What are the differet models of restructuring?	• Classroom • Seminar by the student	Test-I (Week-9) Assignment-I (Week 3-5)
2	Independent System Operator (ISO) – power exchange - market operations – market power	CO1	1. What is ISO and its Role? 2. Describe in detail the day-ahead market operations.	• Classroom • Seminar by the student	Test-I (Week-9) Assignment-I (Week 3-5)
3	Stranded Cost – TransmissionPricing.	CO1	What are the different methods of Transmission Pricing? Discuss their advantages and disadvantages.	• Classroom • Seminar by the student	Test-I (Week-9) Assignment-I (Week 3-5)
4	Congestion Pricing: Management of inter zonal/intra zonal congestion.	CO1	What is Congestion? How congestion management is done using Inter-zonal Management?	• Classroom • Seminar by the student	Test-I (Week-9) Assignment-I (Week 3-5)
5	OASIS: open access same-time information system- structure of OASIS - pooling of information.	CO1	Describe the architecture of OASIS and its advantages.	• Classroom • Seminar by the student	Test-I (Week-9) Assignment-

					I (Week 3-5)
6	Transfer Capability on OASIS – definitions transfer capability issues.	CO2	What is Transfer Capability? How is it different from Transmission Capaciity?	• Classroom • Seminar by the student	Test-I (Week-9) Assignment-I (Week 6-8)
7	ATC – TTC – TRM – CBM calculations.	CO2	Describe how ATC is calculated?	• Classroom • Seminar by the student	Test-I (Week-9) Assignment-I (Week 6-8)
8	Methodologies to calculate ATC.	CO2	Describe various methods of calculating ATC.	• Classroom • Seminar by the student. • Demo of ATC Calculation using Open Source Software.	Test-I (Week-9) Assignment-I (Week 6-8)
9	Methodologies to calculate ATC. **Mid-Test-I**	CO2		• Classroom • Seminar by the student. • Demo of ATC Calculation using Open Source Software.	Test-I (Week-9) Assignment-I (Week 6-8)
10	Power system operation in competitive environment- introduction – operational is planning activities of ISO.	CO3	What are the activities of ISO – day-ahead, hour-ahead in realtime.	• Classroom • Seminar by the student	Test-II (Week-18) Assignment-II (Week 10-14)
11	ISO in Pool Markets	CO3	Explain the operation of ISO in a pool market with double auction and single auction.	• Classroom • Seminar by the student	Test-II (Week-18) Assignment-II (Week 10-14)
12	ISO in Bilateral Markets	CO3	Explain the operation of ISO in a bilateral market using trasaction matrix.	• Classroom • Seminar by the student	Test-II (Week-18) Assignment-II (Week 10-14)
13	Operational planning activities of a GENCO- ancillary services management.	CO4	What are the different planning activities of a GENCO in a restructured environment? Explain.	• Classroom • Seminar by the student	Test-II (Week-18) Assignment-II (Week 10-14)
14	Reactive Power as an ancillary service – a review – synchronous generators as ancillary service providers.	CO4	Explain how synchronous generator is used as ancillary service provider for reactive power?	• Classroom • Seminar by the student	Test-II (Week-18) Assignment-II (Week 10-14)

15	Introduction, Framework of Indian power sector, Historical Developments, The Institutional Framework, Operational Demarcation of the Power System, National and Transnational Grids, Reform initiatives during 1990-1995.	CO4	Explain the need for restructuring of Indian Power Industry. What are the reform initiatives taken up in India during restructuring?	• Classroom • Seminar by the student	Test-II (Week-18)
16	Necessity of ABT?, the mechanism, working of the mechanism, effects of ABT, intra-state ABT.	CO5	Explain in the detail the Availabiity Based Tariff and how it improved the operational discipline in India?	• Classroom • Seminar by the student. • Discussing the operation of National Grid with the help of Web-site data.	Test-II (Week-18)
17	Electricity Act 2003, provisions in the generation sector, provisions in the transmission sector, provisions in the distribution sector.	CO5	What are the salient points of Electricity Act 2003?	• Classroom • Seminar by the student.	Test-II (Week-18)
18	Power Trading and other important changes. **Mid Test - II**	CO5	Describe the power trading in Indian Power Industry.	• Classroom • Seminar by the student	Test-II (Week-18)
19/20	End Semester Examinations				