



Kadi Sarva Vishwavidyalaya
Faculty of Engineering & Technology
Master of Engineering Semester I
(Electrical Power System)

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

Subject Code: MEEE-104-N	Subject Title: Power System Modelling & Simulation
Pre-requisite	

A. Course Objective:

- To review Deep concepts of Power System in the field of Power System.
- To address the underlying concepts and methods behind Advanced Power System
- To impart knowledge of advancement in the field of power system with insight experimental approach.

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	Network Formulation and Graph Theory	8
2	Load Flow Studies	12
3	Load forecasting	8
4	Modelling of Power System Components	10
5	State Estimation in Power Systems	12
6	Power System Security	10

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	Network Matrices and Graph Theory: Introduction, Network Equations, Graph Theory, Definitions, Primitive network, Incidence Matrices, Bus admittance matrix, Branch admittance and Branch Impedance Matrices, Loop Impedance and Loop Admittance Matrices, Network Matrices by non-singular transformation, Building Algorithm for the Bus Impedance Matrix, Modification of ZBUS matrix, Addition of a Branch & Link, Change in Impedance of Elements with mutual Impedance (step by step).	8	15
2	Load Flow Studies: Introduction, Static Load Flow Equations and solution methods, Gauss Seidal method, Newton Raphson method, Application of N-R method in Power flow studies, Algorithm of all methods, De-Coupled method, Fast Decoupled method, Modified Fast Decoupled, Three-phase load flow Mismatch equations, The power flow Jacobian, Performance of the power flow, DC load flow.	12	20
3	Load forecasting: Objectives of forecasting - Load growth patterns and their importance in planning – Load forecasting Based on discounted multiple regression technique, Weather sensitive load forecasting, Determination of annual forecasting, Use of AI in load forecasting.	8	10
4	Modelling of Power System Components: The need for modelling of power system, Governor Modelling, Steam Turbine model, Modeling of Exciter, Transformer modelling such as auto-transformer, tap-changing & phase-shifting transformer, Load modelling, Modelling of Shunt & Series capacitor	10	15
5	State Estimation in Power Systems: Introduction, Power system state estimation, Maximum Likelihood Weighted Least Squares Estimation, Introduction, Maximum Likelihood Concepts, Matrix Formulation, State Estimation of an AC network, Development of Method, An Introduction to Advanced topics in state estimation, Detection and Identification of Bad measurements, Estimation of quantities not being measured, Network Observability and Pseudo measurements, Application of Power Systems State Estimation	12	20
6	Power System Security: Introduction, Factors Affecting Power System Security, Short Circuit Studies of a Large Power System Networks, Symmetrical Fault Analysis Using Bus Impedance Matrix, Contingency Analysis, Detection of Network Problems, Overview of security analysis, Linear Sensitivity Factors, Concentric Relaxation, Bounding.	10	20
Total		60	100



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C. Instructional Method and Pedagogy:

- 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, which may carries five marks in overall evaluation.
- One internal exam of 30 marks is conducted as a part of mid semester 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 carries a weight age 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.

D. Learning Outcome

On successful completion of the course

- The student can identify different techniques of power system modeling, analysis and their comparison.
- Student should be able to implement different modeling techniques through simulation in power system.

E. Text Books & Reference Books:

- Power Generation Operation & Control, John Wiley & Sons, Inc, - A. J.Wood and B. F. Wollenberg
- Modern Power System Analysis, I.J. Nagarith, D.P.Kothari, 3rd edition, Tata Mcgraw Hill, New Delhi
- Modelling of Power System Components, P S R Murthy, B S Publication
- Power System Analysis Operation & Control, A. Chakrabarti, Sunita Halder, PHI Publication
- Power System Analysis, Tata Mcgraw Hill, New Delhi, - Hadi Sadat
- Elements of Power System Analysis, W.D. Stevenson Jr., 4th Edition, Mcgraw hill,
- Power System Analysis, A.R. Bergen, Vijay Vittal, 2nd edition, Pearson Publication.