Faculty of Engineering & Technology

Power System Analysis 2

Information :

Course Code :	EPR 512	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Electrical Power Engineering

Instructor Information :

Title	Name	Office hours
Professor	Said Fouad Mohamed Mekhemar	2

Area Of Study :

Upon successful completion of the course, the student should be able to:
1- Demonstrate understanding of the power system at normal operation.
2- Understand the basic concepts of the power system voltage stability (VS).
3- Assess VS indices and estimate the required corrective measure.
4- Solve small disturbance stability problems.
5- Solve large disturbance stability problems.
6- Understand the equal area criterion to predict the stability condition.
7- Use the numerical solution method to solve the swing equation.

Description :

Transients in electrical systems: Types of transients, Equivalent circuits of power system elements, Multi-machine linear systems, Maximum power and loading limit, Modeling of basic elements of electrical systems: Vector diagram representation, Simplified systems, Excitation and speed control systems, Block diagram representation, Simplified criteria of transient stability: Concept of transient stability, Equal area criterion, Numerical solutions of rotor electromechanical equation, Dynamic stability: Analysis of uncontrolled systems, Controlled systems, Power system stabilizers, Voltage stability of loads and power systems: Criteria of voltage stability, Voltage collapse in electrical power.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Illustrate and describe theorems for solving power systems.
2 -	Illustrate and describe solving techniques of power systems.
3 -	Demonstrate knowledge and understanding of components and concepts of power systems.
b.Intellectual Skills: :	
1 -	Evaluate obtained results both individually or as a part of team.
2 -	Decide and choose among different solution alternatives.
3 -	Ability to apply different alternative solutions.
4 -	Express ideas in structural and mathematical terms so that quantities evaluation is facilitated.
c.Professional and Practical Skills: :	
1 -	Applying solution techniques on simple power systems in the lab.

2 -	Implementation for simple power systems.
3 -	Testing electrical components.
d.General and Transferable Skills: :	
1 -	Analyze problems and use innovative thinking in their solution.
2 -	Work coherently and successfully as a part of a team in the Lab.
3 -	Work in a self-directed manner.
4 -	Write technical reports in accordance with standard scientific guidelines.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Introduction, Power System Modeling at normal operation	6	3	3
Voltage stability: concepts, assessment indices, counter measures & case study	24	12	12
Power system stability: basic concepts, swing equation, machine models	12	6	6
Steady state stability, small disturbance,	12	6	6
Transient stability (TS)- large disturbance, equal area criterion,	18	9	9
Introduction to numerical solution, TS enhancement methods	6	3	3

Teaching And Learning Methodologies :

Lectures
Tutorials
Laboratories

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Assignment and Quizzes (1)	10.00	5	to assess the skills of problem solving, understanding of related topics.
Assignment and Quizzes (2)	10.00	9	to assess the skills of problem solving, understanding of related topics.
Attendance	10.00		to assess the performance of students during the course
Final Exam	40.00	15	to assess the comprehensive understanding of the scientific background of the course, to assess the ability of problem solving with different techniques studied.
First Mid-Term Exam	15.00	7	to assess the skills of problem solving, understanding of related topics.
Second Mid-Term Exam	15.00	11	to assess the skills of problem solving, understanding of related topics.

Course Notes :

No course notes are required

Recommended books :

Hadi Saadat, ñPower System Analysisò, McGraw-Hill, 2nd edition, 2004
6.3- Recommended books

J. D. Glover, M. S. Sarma and T. J. Overbye, "Power System analysis and Design", Cengage Learning, USA, 5th Edition, 2012

J. J. Grainger and W. D. Stevenson, Jr., ñpower system analysisò, McGraw-Hill, Int. editions 1994.

P. Kundur, ñPower system stability and controlò, McGraw-Hill, Int. editions 1994.