FUTURE UNIVERSITY IN EGYPT
جامعة المستقبل

Faculty of Engineering & Technology

Power System Analysis 1

Information :

Course Code :	EPR 411	**Level :**	Undergraduate	**Course Hours :**	3.00- Hours

Department : Specialization of Electrical Power Engineering

Instructor Information :

Title	Name	Office hours
Professor	Said Fouad Mohamed Mekhemar	6
Teaching Assistant	Toaa Abdelsalam Elsayed Mohamed	1

Area Of Study :

- Develop the students' knowledge about the power system operation under both normal and abnormal conditions.
- Prepare students to analyze power systems under normal operation and fault conditions.
- Train students to use commercial software packages to study the normal operation of power systems.
- Train students to perform basic experiments on power system simulator.

Description :

Symmetrical components: Synthesis of unsymmetrical phasor diagrams from their symmetrical components, Symmetrical components of unsymmetrical systems, Power in terms of symmetrical components, Positive, negative and zero phase sequence networks, Unsymmetrical faults: Shunt faults, Series faults, Network matrices: Network topology, System admittance and system impedance matrices, Load flow solutions and control: Load flow equations, The Gauss-Seidel method, Newton-Raphson method and approximations, De-coupled methods, Regulating transformers.

Course outcomes :

a.Knowledge and Understanding: :	
1 -	Describe power flow equations in both rectangular and polar forms.
2 -	Explain the transformation from phase domain to symmetrical components domain and vice versa.
b.Intellectual Skills: :	
1 -	Convert power system parameters from normal units to per unit and vice versa.
2 -	Solve power flow equations using Gauss-Seidel, Newton-Raphson and Fast-Decoupled methods.
3 -	Apply symmetrical components' method to analyze unsymmetrical three-phase circuits.
4 -	Analyze power systems under symmetrical and unsymmetrical faults.
c.Professional and Practical Skills: :	
1 -	Use measuring instruments, and laboratory equipment to practice power system simulator experiments, collect, analyze and interpret results.
2 -	Use of techniques, equipment, and software packages pertaining to power system analysis.

3 -	Apply modern techniques, skills and numerical modeling methods to power system analysis.
d.General and Transferable Skills: :	
1 -	Collaborate effectively within team.
2 -	Work in stressful environment and within constraints.
3 -	Communicate effectively
4 -	Effectively manage tasks, time, and resources.
5 -	Demonstrate efficient IT capabilities.

Course Topic And Contents :

Topic	No. of hours	Lecture	Tutorial / Practical
Bus admittance and bus impedance matrices	5	3	2
Power flow problem	5	3	2
Solving power flow equations using Gauss-Seidel method	5	3	2
Power System Modeling and per unit system	5	3	2
Solving power flow equations using Newton-Raphson method	5	3	2
Application of Fast decoupled method	5	3	2
Use of PowerWorld Simulator in solving power flow problems	5	3	2
System modeling under fault conditions	5	3	2
System representation, Symmetrical fault	5	3	2
Symmetrical faults solution using bus impedance matrix	5	3	2
Definition of symmetrical components, Sequence networks of loads and series impedances	5	3	2
Sequence networks of machines and transformers	5	3	2
Single-Line to Ground fault	5	3	2
Line-Line and Line-Line to Ground faults	5	3	2
Experiment on Power System Simulator	5	3	2

Teaching And Learning Methodologies :

Interactive Lecturing
Problem Solving
Experiential Learning

Course Assessment :

Methods of assessment	Relative weight %	Week No	Assess What
Quizzes	10.00		
Assignment	5.00		
Final Written exam	40.00		
Lab Experiment	10.00		

Lab project	5.00		
Mid-Term Exams	30.00		

Recommended books :

J. D. Glover, M. S. Sarma and T. J. Overbye, "Power System Analysis and Design", Cengage Learning, 6th Edition, 2017.