



Department of Electrical Engineering Technology
University of Sargodha

Course Title: ET-325 Power System Analysis

Faculty : Dr. Waseem Aslam

Designation: Assistant Professor

Course Objective:

This course has been designed to introduce the importance of analyzing various aspects of power system. It covers power flow studies and fault analysis of both symmetrical and unsymmetrical faults in power networks. This forms the basis for power system operation, control and protection.

ET-325 Power System Analysis 3(3+0)

Generalized Circuit Constants:

General circuit equation, generalized constants of simple networks, constants of combined networks, measurement of generalized circuit constants, numerical problems

Representation of Power Systems: One-line diagram, impedance and reactance diagram, percent or per-unit quantities, selection of base and change in base of p.u. quantities, per unit representation of single phase transformer, per unit reactance diagram of a power system, per unit impedances of three winding transformers.

Symmetrical Three Phase Faults: Symmetrical three phase faults on an unloaded synchronous machine, short circuit currents and reactances of synchronous machines, internal voltages of loaded machines under transient conditions, fault calculation and numerical problems.

Symmetrical components: Symmetrical components of unsymmetrical phasors, power in terms of symmetrical components; sequence networks positive, negative and zero sequence networks, unsymmetrical series impedances

Unsymmetrical faults: Unsymmetrical faults on unloaded generators, unsymmetrical faults on power systems; single line-to-ground faults; line to-line faults, double line-to-ground faults, double line to line faults.

Power system stability: Steady state and transient stability, swing equation, equal area criterion of stability and its application, demonstration problems.

Recommended Books:

- 1). Power System Analysis by Stevenson
- 2). Power System Analysis Hadi Sadat

Class Attendance: Minimum 80% is mandatory to appear in the examinations.

Distribution of Marks:

Theory (100%)

<u>Quizzes/ Assignments</u>	20%
<u>Mid Term Examinations</u>	30%
<u>Final Examination</u>	50%

Weekly Lecture Plan

Week	Topics
01	Introduction, Power in single phase AC circuits,
02	Power triangle, Complex power
03	General circuit equation, generalized constants of simple networks,
04	Constants of combined networks, measurement of generalized circuit constants, numerical problems.
05	One-line diagram, impedance and reactance diagram.
06	Percent or per-unit quantities, selection of base and change in base of p.u. quantities.
07	Per unit representation of single phase transformer.
08	Per unit reactance diagram of a power system, per unit impedances of three winding transformers.
09	Mid Term Examination
10	Symmetrical three phase faults on an unloaded synchronous machine, short circuit currents and reactance of synchronous machines, fault calculation and numerical problems.
11	Symmetrical components: Power in terms of symmetrical components; sequence networks positive, negative and zero sequence networks
12	Unsymmetrical series impedances, Unsymmetrical faults on unloaded generators,

	Unsymmetrical faults on power systems.
13	Single line-to-ground faults, Line to-line faults, Practice Problems.
14	Double line-to-ground faults, double line to line faults, Practice Problems.
15	Steady state and transient stability Power Stability Problems.
16	Rotor Dynamics & SWING Equation, Problems.
17	Equal area criterion of stability and its application
18	Final Term Examination