Course Title	Power System Analysis
Course Code	EE5314
No. of Credit Hrs (Lecture + Tutorial + Lab)	3 (2+0+1)
No. of Contact Hrs (Lecture + Tutorial + Lab)	4 (2+0+2)
Level-Year	9/10- 5
Prerequisite (if any)	EE4403

1) Course Objectives:

The main objective of the course is to understand the fundamentals of both normal and abnormal operations of power systems. To analyze the normal operation using power flow calculations and the abnormal operation using symmetrical fault, symmetrical components and stability calculations. To gain the laboratory benefits of modeling an actual power system under different loading conditions. To familiarize the students about the nature of work in the field of operation, control and maintenance of power systems.

2) Expected Learning Outcomes:

1. **Define and explain** the basic fundamentals of three-phase power system calculations. **KLO1 [1]**
2. **Analyze** fault conditions in a power system and simulate them using power system software tools. **KLO3 [6]**
3. **Test and evaluate** power system performance using system simulators. **KLO3 [6]**
4. **Engage in self-directed learning** by applying simulation knowledge to experimental work in the graduation project when required. **KLO9 [7]**
5. **Select and employ** appropriate instruments and materials to meet experimental objectives. **KLO7 [5]**
6. **Communicate** technical results and experimental findings effectively through structured reports. **KLO8 [3]**

3) Course Contents:

1. Classification of Power System Stability.
2. Swing Equation.
3. Power Angle Equation/Power Angle Curve.
4. Transient Stability: Equal Area Criterion (EAC): Definition and Principle.
5. Swing Equation for Two-Machines System: Coherent and Non-Coherent Machine.
6. Steady State Stability of Power System: Small Disturbances.
7. System Modeling Under Fault Conditions, Fault Calculation using Z-bus, Circuit Breaker Selection.
8. Symmetrical Components, Sequence Networks of Loads, Sequence Networks of Series Impedances, Sequence networks of Machines, Sequence Networks of Transformers.
9. Symmetrical and Unsymmetrical Fault Analysis.
10. Power System Control: AVR and LFC.

4) Power system lab Contents:

1. Symmetrical and Unsymmetrical Fault Analysis.
2. Stability Simulation.
3. Active and Reactive Power Generator Control.
4. Characteristics of Isolated and Interconnected Systems.

5. Three-Phase Connections and Harmonic Problems.

5) Teaching Methods:

- Lectures and Discussion
- Videos
- Self-learning
- Laboratory demonstrations

6) Mode of Evaluation: Course Assessment Methods

- Quizzes and assignment
- Major Exams
- Final Exam
- Lab Work

Evaluation

- **Semester Work**

Major Exams	30%
Quizzes	5%
Assignments	5%
Lab/Tutorial	20%

- **Final**

Paper work	40%

7) Textbook(s):

1. J.D. Glover & M Sarma, "Power system analysis and Design", 3rd edition, PWS Publishing, 2002.
2. Saadat, "Power System Analysis", McGraw Hill, 2nd edition.

8) References:

1. S.A.Nasar and F.C.Trutt, "Electric Power Systems", CRC Press, 1999.
2. Grainger and Stevenson, "Power System Analysis", McGraw Hill
3. SARMA, "Electric Machines Steady State Theory and Dynamic Performance".