Wollo University

Kombolcha institute of Technology

Department of Electrical and Computer Engineering

Course Name: Introduction to power system	**Instructor:** -Asefa & Abadi
Course Code: ECEg 3154	**Contact Hrs (per weak):** 7hrs
ECTS Credit:6	**Pre-requisites:** Intr. to Electrical machine
Semester: II	**Academic year:** 2019/2020G.C
Year: 3rd year electrical and computer Eng	**Email:** asefasisay581@gmail.com
Target Group: 3rd year Electrical	& abeyloveb@gmail.com

Course Objectives & Competences to be Acquired

- To review electrical energy generation from conventional and non-conventional energy sources.
- To provide understanding of power transmission systems and calculation of transmission line parameters.
- To analyze characteristics and performance of power transmission lines.

Course Content

Chapter

1. **Fundamental of Power Systems**
   AC and DC transmission, single-phase and three-phase transmission, complex power, structure of a power system, introduction to power transformers, CTs and PTs etc.
2. **Representation of power system component**
   Single-phase solution of balanced three-phase networks, one-line diagram and impedance or reactance diagram, per unit (PU) system.
3. **Transmission Line Parameters**
   Resistance of transmission lines, skin effect and proximity effect; inductance of single-phase two-wire line, composite conductor lines, three-phase line with unsymmetrical spacing, double circuit three-phase lines and bundled conductors; capacitance of a two-wire line, three-phase line with equilateral and unsymmetrical spacing, effect of earth on transmission line capacitance.
4. **Mechanical Design of Transmission Lines**
   Sag and tension calculations, effect of wind and ice, stringing chart, sag template.
5. **Characteristics and Performance of Power Transmission Lines**
   ABCD constants, representation of transmission lines, Short, medium and long transmission lines, steady-state performance – efficiency and regulation.
6. **Overhead Line Insulators**
   Types of insulators, potential distribution over a string of insulators, methods of equalizing potential.
7. **Corona**
   Disruptive critical voltage, corona loss, line design based on corona, advantages and

disadvantages of corona.

8. **Underground Cables**

   Types of cables, capacitance of single-core and three-core cables, insulation resistance of a cable, power factor and heating of cables.

Teaching & Learning Methods: lectures supported by tutorials and assignments

Assessment/Evaluation & Grading System:

Continuous Assessment 50%

Final Examination 50%

References:

1. John Grainger (Author), Jr., William Stevenson: Power System Analysis, McGrawHill Science/Engineering/Math; 1 edition (January 1, 1994)
2. Alexandra Von Meier: Electrical Power System A Conceptual Introduction, WileyIEEE press July 11,2006
3. Arthur R. Bergen, Vijay Vittal: Power Systems Analysis, Prentice Hall; 2nd edition (August 6, 1999)
4. Dr. George G. Karady, Dr. Keith E. Holbert, Electrical Energy Conversion and Transport: An Interactive Computer Based Approach, Wiley IEEE Press, 2005.
5. Syed Nasar, Electrical Power Systems (Schaum's Outline Series), McGraw-hill Publishing Company, 2004.
6. C. L. Wadhwa, Electrical Power Systems, New Age International Publishers, 2004.

Course policy

All students are expected to abide by the code of conduct of students throughout this course.

- Academic dishonesty, including cheating, fabrication, and plagiarism will not be tolerated.
- Class activities will vary day to day, ranging from lectures to discussions.
- Students will be active participants in the course.
- Students are required to submit and present the assignments provided according to the time table indicated.
- **75% of class attendance is mandatory!**
- Active participation in class is essential.
- **Cell phones MUST be turned off before entering the class.**