Transformers (ELPT 2323)

Credit: 3 semester credit hours (2 hours lecture, 3 hours lab)

Prerequisite/Co-requisite: NONE

Course Description

Transformers types, construction, connections, protection, grounding, and associated safety procedures.

Required Textbook and Materials

1. Electrical Essentials For Powerline Workers, Wayne Van Soelen
2. OSHA handouts
3. Handout literature

Course Objectives

How transformers operate and the operating characteristics of various transformer types; compute transformer sizes for various applications; summarize National Electric Code (NEC) regulations governing the installation of transformers; explain the types and purposes of grounding transformers; and demonstrate proper safety procedures.

1. The student will describe how transformers operate.
2. The student will describe the operating characteristics of various types.
3. The student will learn to accurately calculate transformer power, voltage, and current.
4. The student will learn to draw diagrams of transformer connections.
5. The student will learn to properly connect various transformer installations.
6. The student will compute transformer sizes needed for various applications.
7. The student will learn to explain types and purposes of grounding transformers.
8. The student will summarize National Electric Code (NEC) regulations governing the installation of transformers.

Course Outline

I. Transformer construction
- A. main parts
- B. name plate
- C. oil
- D. CSP transformer

II. Types of Transformers
- A. function of each transformer type
- B. Application

III. Magnetism
- A. magnetic field
- B. induction

IV. Turn Ratio
- A. finding voltage and current change

V. Transformer Connections
- A. grounding
- B. neutrals
- C. primary and secondary

VI. Three Phase Transformers

Approved mm/yyyy

A. wye connections
B. delta connections
C. grounding
D. three phase voltage
E. ferroresonance

VII. Autotransformers and Voltage Regulators
A. Autotransformer theory
B. Autotransformer application

VIII. Voltage Regulators
A. Regulator construction
B. Regulator functions
C. Control panel functions
D. Cascading regulators
E. Bypass procedures

IX. Capacitors
A. Capacitor theory
B. Capacitor function
C. Safe capacitor operation

Grade Scale

90 – 100	A
80 – 89	B
70 – 79	C
60 – 69	D
0 – 59	F

Course Evaluation

Final grades will be calculated according to the following criteria:

Activity	***Percentage***
Daily Grades	10%
Exam 1 – Single phase	20%
Exam 2 - Three phase	20%
Exam 3 – Regulators	15%
Practical 1 – Banks	20%
Practical 2 - Regulators	15%
Total	***100%***

Grade points will be awarded in accordance with the college catalog

1. Assignments are due on the due date assigned. Late assignments are not accepted.
2. Tests must be taken on the announced date.
3. Daily grades include participation in classroom labs and skill level evaluations.

Course Requirements:

1. Describe Transformer parts and function of each
2. Calculate three phase and single phase transformer loads and size
3. Calculate turn ratio, voltage and current for transformers
4. Demonstrate proper connections and grounding on single phase transformers
5. Demonstrate proper connections and grounding on three phase transformers
6. Describe function of autotransformers and voltage regulators
7. Properly set and check control functions on voltage regulators

8. Demonstrate safe bypass procedure on voltage regulators
9. Describe function and safe operation of capacitors

Attendance Policy

1. Class attendance is important to obtain the educational objectives of this course. Prospective employers may also review your attendance records. Regular attendance and being on time for classes will have a positive effect on your academics and employment opportunities.
2. Two absences will result 1 letter grade drop, three absences drop 2 letter grades.
3. **Four absences result in an F for the semester.**

Course Policies

1. No food or drinks in class.
2. Daily lab grades cannot be made up.
3. No make ups for lab tests.
4. Any written test retake has an 80 point maximum grade.
5. LIT is a tobacco free campus - no tobacco products allowed
6. Students must have and wear **all required clothing including climbing boots at all times,** and have PPE and tools for participation in ***class and Lab.***
7. Students must follow safety rules and procedures at all times. Failure to follow safety rules will require disciplinary action not limited to expulsion from LIT.
8. Turn off all Cell Phones during class and when on the field. Unauthorized cell phone use will result in a 0 for the daily grade.
9. Do not bring children to class.
10. Cheating of any kind will not be tolerated. Students caught cheating or helping someone to cheat can and will be removed from the class for the semester. Cheating can result from expulsion from LIT.
11. If you wish to drop a course, the student is responsible for initiating and completing the drop process. If you stop coming to class and fail to drop the course, you will earn an 'F' in the course.
12. Internet Usage
    a. Classroom computers have access to the internet.
    b. Student usage of the internet will be monitored.
    c. Proper usage of the internet will be allowed. Used for classroom research or as directed.
    d. Any unauthorized use of the internet will not be tolerated.
    e. Improper usage of the internet, such as profanity, pornography, gambling, etc… will result in disciplinary action not limited to expulsion from LIT.

Disabilities Statement

The Americans with Disabilities Act of 1992 and Section 504 of the Rehabilitation Act of 1973 are federal anti-discrimination statutes that provide comprehensive civil rights for persons with disabilities. Among other things, these statutes require that all students with documented disabilities be guaranteed a learning environment that provides for reasonable accommodations for their disabilities. If you believe you have a disability requiring an accommodation, please contact the Special Populations Coordinator at (409) 880-1737 or visit the office in Student Services, Cecil Beeson Building.

Course Schedule

Week	Topic	Reference
1	Course introduction and policies • Lecture • Lab: Basic parts	Handouts
2	Single phase transformers • Lecture • Lab: Perform transformer connections	Chapter 10, 1-6
3/4	Single phase transformers • Lecture • Lab: Perform transformer connections	Chapter 10, 1-6
5/6	Single phase transformers • Lecture • Lab: Calculate loads, measure voltages and current	Chapter 10, 1-6
7/8	Three phase transformers • Lecture • Lab: Draw transformer connections	Chapter 10, 7-9
9/10/11	Three phase transformers • Lecture • Lab: Perform transformer connections	Chapter 10, 7-9
12/13	Voltage Regulators • Lecture • Lab: Regulator parts/function	Chapter 8, 1-7
14/15	Voltage Regulators • Lecture • Lab: Regulator parts/operation	Chapter 8, 1-7
16	Capacitors • Lecture • Lab: Connections and operation	Chapter 8, 8-9

Contact Information:

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