

Course Objectives/Course Outline
Spokane Community College

Course Title: Transformers and Industrial Lighting

Prefix and Course Number: ELMT 252

Course Learning Outcomes:

By the end of this course, a student should be able to:

- perform the actual hookup and testing of basic single-phase and three-phase transformer connections.
- observe and demonstrate proper safety and maintenance techniques.
- service and repair industrial lighting systems.
- interpret and use the National Electric Code book.
- install service panels and electrical fittings.
- understand the operation of industrial lighting.
- demonstrate proper transformer connections
- test fuses in live circuits.
- describe transformer operations, types, and losses.
- connect single-phase transformers in series or parallel
- identify and test transformer maintenance problems
- describe the operation of an autotransformer.
- describe the effects of power harmonics.

Course Outline:

- I. Safety Precautions and Requirements
 - A. NEC Introduction
 - B. Lockout Procedures
 - C. Testing of Live Circuits
 - D. Safety
 1. hot sticks
 2. gloves
 3. mats
 4. cutouts
- II. Transformers
 - A. Operation
 - B. Open Secondary
 - C. Voltage and Current
 - D. Loaded Secondary
 - E. Turns Ratio Vs Voltage and Current
 - F. Transformer Types
 1. air-core
 2. iron-core
 3. autotransformer
 - G. Hysteresis Loss
 - H. Eddy Current Loss
 - I. Transformer Calculations
- III. Single-Phase Transformers
 - A. Physical Characteristics
 - B. Practical Connections
 - C. Insulator, Bushings, and Disconnects

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- D. Tap Changers
- E. Maintenance

- IV. Special Purpose Transformers
 - A. Autotransformers
 - 1. theory and operation
 - 2. uses and connections
 - B. Current Transformers
 - 1. theory and operation
 - 2. uses and connections
 - C. Potential Transformers
 - 1. theory and operation
 - 2. uses and connections
- V. Three-Phase Transformers
 - A. Construction
 - B. Connections (Wye, Delta, etc.)
 - C. Ratings
 - D. Voltage and Current Relationships
 - E. Grounding
 - F. National Electric Code (Article 450)
 - G. Harmonic Effect on Power Systems
- VI. Industrial Lighting
 - A. Theory of Lighting
 - B. Incandescent Lights
 - C. Fluorescent Lighting
 - D. Vapor Lighting
 - 1. mercury
 - 2. sodium
 - 3. halide
 - E. Maintenance/Repair
 - F. Photo Cell
 - 1. operation
 - 2. troubleshooting
- VII. Lab Experiments
 - A. Cutout Removal and Safety
 - B. Magnetic Force of Conductors
 - C. Magnetic Field Polarity
 - D. Transformer Excitation Current
 - E. Transformer Ratios
 - F. Transformer Paralleling
 - G. Transformer Polarities
 - H. Autotransformers
 - I. Three-Phase Voltage and Current Relationships
 - J. Wye – Wye Connection
 - K. Delta – Delta Connection
 - L. Open Delta – Open Delta Connection
 - M. Delta – Wye Connection
 - N. Wye – Delta Connection
 - O. Open Wye – Open Delta Connection
 - P. Transformer Grounding
 - Q. Zig Zag Grounds
 - R. Scott Tee Grounds