Substation Maintenance
Course Design
2013 -2014

Course Information
Division: Industrial Technology Education
Course Number: ELT 191
Title: Substation Maintenance
Credits: 3
Developed by: Charles A. Smith
Lecture/Lab Ratio: 2 Lecture/2 Lab
Transfer Status:

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Activity Course: No
CIP Code: 47.0105
Assessment Mode: Pre/Post Test (50 Questions/100 Points)
Semester Taught: Fall
GE Category: None
Separate Lab: No
Awareness Course: No
Intensive Writing Course: No

Prerequisites
ELT 110, ELT 111, and ELT 112

Educational Value
A. To general education: Elective Credit
B. To other courses or curricula: This course is a curriculum requirement for the Electrical and Instrumentation Technician AAS degree.

Description
This course will introduce the student to the various types of electrical power distribution substations employed by many industrial and utility companies. It will also cover substation switching configurations, distribution substation configurations, substation components, switchgear maintenance and testing, circuit breaker fundamentals, maintenance and testing, and storage batteries maintenance and testing. Fundamentals of protective relays and testing are also covered as well as transformer testing and transformer oil and gas testing procedures.

Supplies
None
Competencies and Performance Standards

1. Comprehend the Purpose and Operation of a Substation

   Learning objectives
   
   What you will learn as you master the competency:
   
   a. Types of Substations
   b. Substation Switching Configurations
   c. Distribution Substation Configurations
   d. Substation Components
   e. Substation Metering
   f. Substation Relaying

   Performance Standards
   
   Competence will be demonstrated:
   
   o in class discussion
   o in group practice
   o on written tests

   Criteria - Performance will be satisfactory when:
   
   o learner completes written test to 70% correct
   o learner demonstrates proper use and maintenance techniques
   o learner demonstrates the use and interpretation of Electrical Substation Blueprints

2. Evaluation of Substation Maintenance and Testing

   Learning objectives
   
   What you will learn as you master the competency:
   
   a. Switchgear Maintenance and Testing
   b. Circuit Breaker Fundamentals, Maintenance and Testing
   c. Storage Batteries Maintenance and Testing
   d. Metering and Relaying Testing and Calibration
   e. Ground Testing
   f. Transformer Testing
   g. Transformer Oil and Gas Testing

   Performance Standards
   
   Competence will be demonstrated:
   
   o in class discussion
   o in group practice
   o on written tests
   o learner completes written test to 70% correct

   Criteria - Performance will be satisfactory when:
   
   o learner demonstrates proper use and maintenance techniques
   o learner demonstrates the use and interpretation of Electrical Substation blueprints
Types of Instruction
Lecture / Modeling
Electrical lab assignments
Group Practice
Individual projects / presentation

Grading Information
Grading Rationale
Final Exam - 35%
Chapter Exams - 35%
Lab Activities - 20%
Attendance - 10%

Grading Scale
A  90%-100%
B  80%-89%
C  70%-79%
D  60%-69%
F  Below 60%