

Mercer County Community College

Division of Business and Technology

UTI 105

Inside Plant Operations

COURSE DESCRIPTION:

Provide participants with knowledge & skills in electrical energy industry operations of switching stations and substations, including safe work practices/procedures, terms, one-line diagrams, types of stations, safety tagging, interrupting control prints, basic test equipment and communications.

Text: References & Textbooks:

Handouts Reference Guides
Substation Operations Manual
Substation Maintenance Manual

Prerequisites: UTI 103 Fundamentals of Power Alternating Current”

Credits: 7 Lecture Hours: 6 Studio/Lab Hours 2

Food and drink are strictly prohibited in classrooms as per health and safety laws. Students may not bring in chemicals or cleaning fluids without the appropriate MSD sheets.
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Course Coordinator: Dominick DeFino

Revised: 10/23/02

Course Objectives:

- Conduct inspection of personal protective equipment including: hard hat, safety glasses, flame retardant clothing, primary high voltage rubber gloves and protectors, & dielectric footwear, for damage and use - during appropriate exercises, in accordance with criteria in Substation Maintenance/Relay Test Manual – Safety Section.
- Accurately identify safety tags & tape/rope used to warn personal of potential hazards, including Blocking, Caution, Defective Equipment, Permissive, and Workers Blocking in accordance with the Substation Maintenance/Relay Test Manual – Safety Section.
- Identify potential environmental/health/safety /security concerns for personal entering and working within substations & switching station, including appropriate personal protective equipment or actions to minimize potential hazards.
- Identify different circuit designations for the all voltage levels within PSE&G transmission, subtransmission, and distribution system.
- Accurately identify different types of substations & switching configurations and equipment utilized within Company & Customer stations on the one-line diagrams using references within the Substation Maintenance/Relay Test Manuals.
- Perform a three-point test to verify lack of potential on substation/switching station equipment using the Tri-Tector/Famec test equipment and appropriate personal protective equipment in accordance with the test instrument manufacturer and Substation Handbook – Safety Section.
- Participate in a Tailboard Conference which provide pre/post job briefing communications on job assignment issues, including individual duties, identification of potential hazards, expectations, re-enforces safety guidelines, indicated personal protective equipment requirements and allows each associate to question/review safe work practices.
- Identify & define the function of a Station Control Switch, on the operation of equipment and alarms for Automatic, Local, & Manual positions, in accordance with Substation Maintenance/Relay Test Manual, Section E 2.01
- Perform an inspection, setup and operate an aerial lift to perform work aloft, including positioning, stabilizing using outriggers, conducting drift test, & rescuing an associate stranded aloft, in accordance with Company and equipment manufacturers standards.
- Accurately perform simulated acceptance and/release of a typical outage request communication via telephone or radio, including all repeating & questioning for verification in accordance with switching authority procedures.
- Utilize station one diagrams & reference manual to accurately indicated the clearance points and placement of safety tags to perform the following tasks:
 - Clear 4 KV Transformer OCB for maintenance
 - Clear 4 KV Feeder Position for Station Equipment Maintenance
- Trace the basic electrical control wiring on print/schematic for the closing, tripping and alarm operations of a 4 KV breaker, including identification of components on panel & prints, using appropriate reference materials.

Evaluation Procedure:

Grading Criteria for Participants

The participants will be individual evaluated on the course content utilizing the following criteria:

- Attendance - Mandatory
- Average of Quizzes = 30 % of Total Grade
- Final Examination = 70 % of Total Grade

Course/Instructor Evaluation

The course and instructor evaluation will consist of the following:

- End of Course Reaction Survey which will ask the participant opinion of the course based on within the objectives and outline
- Overall performance of as indicated by participants completion of quizzes, practical & laboratory exercises and final exam
- Instructor observations by PSE&G – Technical Training team to ensure consistence of instructional quality

Course Content Outline - “Inside Plant Operations” UTI 105

- I. Introduction & Orientation
 - a. Course Objectives *Lecture 100%*
 - b. Schedule (Lecture/Discussion & Laboratory Exercises) *Lecture 100%*
 - c. Evaluation System & Grading Criteria *Lecture 100%*
 - d. General Safety Characteristics *Lecture 100%*
 - i. Responsibilities
 - ii. Personal Protective Equipment
 - e. Overview of Electric Energy System *Lecture*
100% Safety Procedures & Equipment Identification
 - f. General Safety Guidelines/Procedures *Lecture 100%*
 - g. Safety Tagging System – Terminology *Lecture 100%*
 - h. Substation & Switch Yard Equipment *Lecture 80% - Laboratory 20%(1hr)*
- II. Substation & Switching Station Hazards *Lecture 100%*
 - a. Quiz on Previous Material
 - b. Substation & Switching Station Hazards
 - c. Three Point Potential Testing Procedures
- III. Station Types
 - a. Station Control Switch - Operation *Lecture 100%*
 - b. Substation Types – Class A & B *Lecture 100%*
 - c. Three Point Potential Testing Procedures/Exercise *Lecture 90% - Laboratory 10% (1hr)*
- IV. Station Types
 - a. Quiz on Previous Material *Lecture 100%*
 - b. Substation Types – Class C, CS, CN, & H *Lecture 100%*
 - c. Three Point Potential Testing Procedures/Exercise *Lecture 90% - Laboratory 10%(1hr)*

- V. Station Types & Loop System
 - a. Loop Distribution System
 - b. Station Types - Unit/Transfer/Sectionalize *Lecture 100%*
 - c. Three Point Potential Testing Procedures/Exercise *Lecture 90% - Laboratory 10% (1hr)*

- VI. Safety Tagging
 - a. Quiz on Previous Material *Lecture 100%*
 - b. Safety Practices Before Starting Work *Lecture 100%*
 - c. Safety Tagging System *Lecture 100%*
 - d. Tagging Simulation Exercises #1 *Laboratory 100% (2 hrs)*

- VII. Safety Tagging
 - a. Tagging Simulation Exercises #2 *Laboratory 100% (2 hrs)*
 - b. Tagging Exercises in Station *Laboratory 100% (5 hrs)*

- VIII. Aerial Lift – Operations
 - a. Quiz on Previous Materials *Lecture 100%*
 - b. Aerial Lift – Operations *Lecture 10% Laboratory 90% (5 hrs)*

- IX. Communications & System Protection
 - a. Communications Procedures *Lecture 100%*
 - b. System Protection - Introduction *Lecture 100%*

- X. System Protection *Lecture 100%*
 - a. Quiz on Previous Materials
 - b. System Protection – Equipment
 - c. Breaker Control Functions

- XII. Print Reading
 - a. Quiz on Previous Materials *Lecture 100%*
 - b. Wiring & Schematic Symbols *Lecture 100%*
 - c. Wire Tracing Demonstration *Laboratory 100% (1.5 hrs)*
 - d. Wire Tracing Practical Application *Laboratory 100% (1.5 hrs)*

- XIII. Wire Tracing Exercise – 4KV Breaker *Laboratory 100%*

- XIV. Print Reading
 - a. Quiz on Previous Materials *Lecture 100%*
 - b. Wire Tracing Exercise – 4KV Breaker *Laboratory 100% (6 hr)*

- XV. Final Exam *Lecture 100%*
 - a. Complete & Review Final Examination
 - b. Course Evaluation
 - c. Performance Review