

Introduction to Protective Relay - Virtual

3 Days, 2.1 CEUs

It is extremely important to ensure the availability of electrical energy without interruption to every load connected to the power system. Electromechanical protective relays are commonly used to protect lines and substation equipment against overloads, faults and abnormal conditions. Each relay performs a certain function and responds in a specific manner to a certain change in the circuit.

This Introduction to Protective Relays course is designed for anyone who has an interest in understanding the basics of protective relaying, interest in becoming a qualified relay technician, or gaining an understanding of where protective relay schemes and programs fit in the overall power delivery system.

Learning Objectives

To receive 2.1 CEUs, participants must attend 3 days of virtual classes (21 contact hours) and attain a minimum grade of 80% on the final exam. Upon completion of this course the participants will demonstrate that they are able to:

- Establish roles and responsibilities of protective relay systems and elements.
- Describe functions and roles of instrument transformers.
- Identify the protective relay zones and their application.
- Review standard maintenance procedures for protective relay systems.

SCOPE

Day 1* (7 contact hours)

- I. Introduction (0.5 hr)
- II. Introduction to Protective Relays
 - A. Classes of Relays
 - B. Identification and Physical Location
 - C. Coordination
 - D. Focus of Protection
 - E. Zones of Protection
- III. Protective Relay Technology
 - A. Electromechanical Relays
 - B. Solid-State Relays
 - C. Microprocessor Relays
 - D. ANSI/IEEE numbers
- IV. Three Phase Power Systems
 - A. Basics of Three-Phase Systems
 - B. Vector diagrams
 - C. Phase Sequence

Day 2 (7 contact hours)

- V. Instrument Transformers
 - A. Current Transformers
 - B. CT Connections

- C. Types of Current Transformers
- D. CT Ratios
- E. Determining CT Polarity
- F. Measuring Current
- G. Shorting CT Secondary Current Circuits
- H. Operation of Current Transformers at Excessive Burden or Open-Circuit Voltage
- I. CT Nameplate Data
- J. Potential Transformers (PT)
- K. PT Connections
- L. PT Ratios
- M. Determining PT Polarity
- N. PT Nameplate Data
- O. Understanding CTs and PTs in a Schematic
- VI. Capacitive Voltage Transformers
 - A. Purpose
 - B. Classification
 - C. CCVT Operation Principles
 - D. CCVT Components
 - E. Application: High-Voltage Transmission (115 kV – 500 kV)
 - F. Nameplate Data

Day 3 (7 contact hours)

- VII. Single-Line Diagrams
 - A. Purpose
 - B. Types
 - C. Symbols, Device Numbers, and Abbreviations
 - D. Interpretation
- VIII. Relay Settings and Coordination Studies
 - A. Relay Settings
 - B. Short-Circuit Analysis
 - C. Coordination Studies
 - D. Coordination Through timing
 - E. Coordination Through Zone application
 - F. Calculating Relay Settings
- IX. Conclusion (1 hour)
 - A. Review
 - B. Exam

*Class scheduling times may vary based on discussions and size of class

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