



**GLOBAL
INDUSTRIES
INTELLIGENCE**



POWER SYSTEM PROTECTION COURSE

10th - 14th NOVEMBER, 2024
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DAY 1

INTRODUCTION TO PROTECTION, PROTECTION REQUIREMENTS, AND DEFINITIONS

- Substation automation and protection system
- Numerical relay IEDs
- Power system protection
- What do we want to protect?
- Function of protection system
- Task of protection system
- Requirements on system protection
- The protection Chain
- CT
- PT
- Relay

Primary protection

Backup protection

Reasons for failure of primary protection

Methods of back up protection

Relay back up

Breaker back up

Remote back up

Time grading back up

Duplication principle

Definition of protection zones

Concept of overlapping zones

Example on determining

protection zones

NUMERICAL RELAYS HISTORY AND STRUCTURE

- Electromechanical relays
- Static relays
- Numerical relays
- MiCOM relays
- SIEMENS SIPROTEC relays
- ABB RELION relays
- Numerical relay architecture
- Analogue to digital and sampling
- Digital phasor measurement
- Calculated values in the numerical relays
- SIPROTEC relay hardware



DAY 2

POWER SYSTEM FAULTS, FAULT CRITERIA, AND PROTECTION ELEMENTS

- Power system faults types
- Power system faults statistics
- Faults in overhead transmission lines
- Faults in generator
- Faults in transformer
- Faults in motors
- Typical Fault criteria
- Overcurrent $I >$
- Earth-current $IE >$
- Current unbalance (negative sequence current $I2 >$)
- Undervoltage $U <$
- Overvoltage $U >$
- Over- and Under-frequency
- Leakage (Differential) current
- Under impedance $Z <$

PROTECTION SLD & PANELS

- Protection elements in a numerical relays IEDs
- Single Line Diagram
- Protection Single Line Diagram
- Trip table
- Protection diagram understanding



DAY 4

TRANSFORMER PROTECTION

- Transformer Faults
- Differential Protection
- Restricted Earth Fault Protection
- Thermal overload Protection
- Over-excitation Protection
- Overcurrent protection
- Earth fault protection
- Under and over voltage protection
- Transformer Protection Schemes
- Sample transformer relay configuration



BUSBAR PROTECTION

- Busbar Protection Introduction
- Bus Configuration
- Busbar Differential Protection
- Protection Zones
- Single busbar protection
- 1 and 1/2 CB bus protection
- Double Busbar protection
- 7SS85 Hardware
- SIP5 7SS85 Device Selection
- 7SS85 Online Configurator
- Centralized BB Config Procedure
- 7SS85 Config Centralized Sample
- Sample Centralized BB Config
- Disconnecter Image
- Check Zone
- End-Fault Protection in Busbar relay
- Circuit Breaker Failure in Busbar relay
- Sample busbar relay configuration



DAY 5

LINE PROTECTION

- Line modeling and parameters
- Line protection scheme
- Distance Protection
- Fault detection
- Loop calculation
- Characteristics
- Stepped Distance
- Zone and settings
- Load Encroachment
- Over/under reach
- Tele-Protection
- PSB Power Swing Blocking
- Short Line Protection
- SOTF Switch on to fault protection
- DEF Directional earth fault protection
- STUB protection
- Automatic recloser
- Fault Locator
- Sample transmission line relay configuration

Trainer Profile

Dr. Saeed Roostae

Sr. Technical Trainer in Power System Protection & Automation (IEC61850, SIPROTEC, ABB Relion, Omicron, SEL, GE, MiCOM, ETAP, Digsilent, PSCAD).



Dr. Saeed Roostae has Experience in Protection Relay IEDs, Substation Automation, IEC 61850 and Training Industry. Strong quality assurance professional with Ph.D. in Electrical Engineering from JMI (A central University), New Delhi, India. Expert in: DIGSI 4; DIGSI 5; OMICRON Test Universe; IEC 61850 System Configurator; SEL ACSELERATOR QuickSet; ETAP; PSCAD; OMICRON IEDScout; SIPROTEC 5; SIPROTEC 4; SEL Relays; OMICRON CMC; RTDS; Vizimax IEC 61850 Merging unit.

Highlights: Research in power system automation, specifically in substation automation, Power system protection, and smart grid Published more than technical 20 papers and E-books in the area of SAS, IEC 61850, and protection system Experimental works in: Protection relays (SEL and Siprotec products) Protection Relay test kit (OMICRON CMC-256 Plus) IEC61850 tools (IEDScout, IEC61850 configurator, GOOSE Air, and Merging Unit and IEC 61850-9-2) Knowledge based websites developed for researchers, trainee engineers, industry personals and students (www.FB.com/IEC61850 (with more than 3500 followers), www.Elec-Engg.com and www.ProtectionRelay.ir) to share the experiences Workshops, Tutorials and lectures Substation Automation Design and Configuration using IEC 61850 Devices Investigation and Design of Communication Requirements for SAS and Analysis of IEDs Data Research on protocol testing, and implementation.

Experience Highlights:

PLC installation PLC programming.
Industrial Automation.
Compact substation installation.
Power transformer installation.

Certifications:

- Power Quality
- Home Automation
- Labview
- Design and analysis of PIC
- Microcontroller, 250 hours, 96 of 100

Publications:

- TRANSFORMER TAP CHANGER USING IEC61850.
- Performance Evaluation of IEC 61850 GOOSE based distance protection for inter substation communication.
- Practical Consideration of IEC61850 in Interlocking Functions in Substation Automation System.
- Traveling-Waves-Based Ground Fault Location Using Zero-Sequence Detection and Wavelet Transform.
- Performance Evaluation of IEC 61850 GOOSE based distance protection for inter substation communication.

Education:

Doctor of Philosophy (Ph.D.), Electrical Engineering.
Master's degree, Electrical and Control Engineering.
Bachelor's degree, Electrical Engineering.

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10th - 14th NOVEMBER, 2024
Sheraton Hotel Muscat Oman
& Online on Zoom

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REGISTRATION DETAILS

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EMAIL

ORGANISATION

ADDRESS

TOWN STATE

COUNTRY POSTAL CODE

PHONE FAX

NATURE OF BUSINESS

REGISTRATION FEE:

Book and Pay Before 10th October @GBP 3200/person (Should be min. 3 participants)

Book and Pay After 10th October, 2024 @GBP 3595/person (Should be min. 3 participants)

Original Fee @GBP 3995/person (For single participant)

AUTHORIZATION:

Signature Date

Name Position

THIS BOOKING IS INVALID WITHOUT A SIGNATURE.

AUTHORIZATION SIGNATORY MUST BE AUTHORIZED TO SIGN ON BEHALF OF CONTRACTING ORGANISATION