POWER SYSTEM PROTECTION AND SWITCHGEAR

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PRE-REQUISITES : Fundamentals of Power System

INTENDED AUDIENCE : Electrical Engineering, Electrical and Electronics Engineering

INDUSTRIES APPLICABLE TO :

1. ABB India Limited.
2. Semmens India Limited.
3. L&T Limited.
4. SEL Limited.

COURSE OUTLINE :

This course is to be prepared to serve as an introductory course for power system protection and switchgear for under graduate and post graduate students of various technical universities. It aims to give a comprehensive up-to-date presentation of the role of protection safety system, switchgears and its advances in modern power system. It begins with a state-of-the-art survey of theories and methods of protection and switchgear. In continuation, it provides a theoretical summary along with examples of real-life engineering applications to a variety of technical problems. In this point of view, the said course bridges the gap between the theoretical advances, experimental validations and practical engineering in real life

ABOUT INSTRUCTOR:

Prof. Bhaveshkumar R. Bhalja is working as a Professor, Department of Electrical Engineering, Indian Institute of Technology (IIT) Roorkee, Roorkee, India. He has a teaching experience of more than 20 years. He has published more than 150 papers in journals at international and national levels. He received Fulbright Nehru Academic and Professional Excellence Fellowships and worked as a visiting scholar at the Department of Electrical and Computer Engineering, Texas A & M University, College Station, Texas, US for a period of 9 months in 2018-19 in the area of “Fault Detection using Synchrophasor”. He has been awarded “Young Engineers Award”, “Certificate of Merit Award” and “Pandit Madan Mohan Malviya Memorial Prize” by Institution of Engineers, India in 2009, 2007 and 2016, respectively. He has been awarded “Hari-ohm Ashram Prerit Inter-University Smarak Trust Award” by Sardar Patel University, Vallabh Vidyanagar, Anand, India in 2009. One of his paper titled “Miscordination of Relay in Radial Distribution Network Containing Distributed Generation” also got Best Poster award at IEEE Conference on Recent Advances in Intelligent Computational Systems, Sep 22-24, 2011, Trivandrum, India. He has written books on Protection and Switchgear, Oxford University Press, New Delhi, India, 2nd Edition, 2018 and Transmission Line Protection Using Digital Technology, Springer Science Business Media Singapore Pte. Ltd; Singapore, January 2016. He has also delivered popular NPTEL course on “Power System Protection and Switchgear” in 2020. Currently, he is also holding a position of Associate Dean of Academic Affairs (Evaluation) of IIT Roorkee. He is involved in many research and development projects of DST, CSIR, CPRI and National High Speed Rail Corporation Limited. He is also associated with auditing and testing of 400 kV and 765 kV sub-stations of India. Further, he is having many consultancy projects related to the development of PMUs based set-up and FPGA controllers. His research interests include Digital Protection & Automation, Smart Grid Technologies and Applications, Distributed Generation, Micro-grid, Power Quality Improvement, Phasor Measurement Unit, Condition Monitoring of Electrical Apparatus and Application of Artificial Intelligence. He has guided more than 50 UG projects, 28 M. Tech. Dissertations 12 doctoral students. He is a Senior Member of IEEE and Fellow of IE and ISTE. He is working as an Associate Editor of IET Generation Transmission and Distribution and Canadian Journal of Electrical and Computer Engineering, IEEE Canada, Canada.

COURSE PLAN :

Week 1: Fundamentals of Protective Relaying

Week 2: Current based Relaying Scheme

Week 3: Current based Relaying Scheme and Protection of Transmission Lines using Distance Relays

Week 4: Protection of Transmission Lines using Distance Relays and Carrier Aided Schemes for Transmission Lines

Week 5: Carrier Aided Schemes for Transmission Lines and Auto-reclosing and Synchronizing

Week 6: Protection of Generators, Transformers, and Induction Motors

Week 7: Protection of Busbars, Protection against Transients and Surges along with System Response to Severe Upsets and Arc Interruption Theory in Circuit Breaker

Week 8: Arc Interruption Theory in Circuit Breaker, Types of Circuit Breakers and Testing, Commissioning and Maintenance of Relays