

Course name : Power System Protection (PSP)

Program: Ph.D.

Year: 2023-24

Semester: II

Course: POWER SYSTEM PROTECTION

Credits: 04

Hours: 30

Course Context and Overview (100 words): This course will cover up-to-date technology in the field emphasizing the current practice in Indian systems and also make aware of the current challenges in the power system protection.

Prerequisites Courses: POWER SYSTEM ENGINEERING

Course outcomes (COs):

On completion of this course, the students will have the ability to:
CO1 An in-depth understanding of Phasor measurement techniques.
CO2 Applications of Directional Relaying, Distance Relaying and Overcurrent protection.
CO3 to understand CT and CVT response, Transformer protection.
CO4 motivation for Network Protection with Renewable sources.
CO5 Introduction Synchrophasor technology application.

Course Topics:

Topics	Lecture	Hours
Unit 1: Introduction		3
1.1 Faults in Power System	2	
1.2 Elements and Features of Protection	1	
Unit 2: Phasor measurement techniques		4
2.1 Frequency Response of Phasor Estimation Techniques	1	
2.2 In the Presence of Decaying DC	1	
Unit 3: Overcurrent protection		1
3.1 Overcurrent Relay Characteristics	1	
3.2 Overcurrent Relay Coordination	1	
Unit 4: Directional Relaying		3
4.1 Introduction to Directional Relaying.	2	
4. Positive Sequence, Negative and Zero Sequence Directional Relay	1	

Unit 5: Distance Relaying 1		2
5.1 Introduction to Distance Relay	1	
5.2 Distance Relay Implementation	1	
Unit 6: Distance Relaying 2		4
6.1 Effect of Fault Resistance	1	
6. Adaptive Distance Relaying	1	
Unit 7: CT and CVT response		1
7.1 Current Transformer , Capacitor Voltage Transformer	1	
Unit 8: Transformer protection		2
8.1 : : Introduction to Transformer Protection	2	
8.2 CT Saturation, Negative Sequence Differential and Restricted Earth Fault Relay	2	
Unit 9: Differential protection of Line		2
9.1 Line Differential	2	
Unit 10: Network Protection with Renewable sources		3
10.1 Protection Challenges of Distribution and transmission Systems with Renewables	2	
Unit 11: Travelling wave approach		2
11.1 Traveling Wave Basics	1	
Unit 12: Synchrophasor technology application		3
12.1 Wide Area Measurement Basics		

Reference Books:

COMPUTER RELAYING FOR POWER SYSTEMS- A. G. Phadke and J S Thorp, John Wiley and Sons Ltd 2009

MODERN SOLUTIONS FOR PROTECTION, CONTROL, AND MONITORING OF ELECTRIC POWER SYSTEMS

POWER SYSTEM RELAYING- S. H. Horowitz and A. G. Phadke, John Wiley and Sons Ltd 2008

NUMERICAL DIFFERENTIAL PROTECTION: Principles and Applications. G. Ziegler, 2012, Wiley

Evaluation Method:

Item	Weightage (%)
Assignments	20
Midterm	30
Final Examination	50

Prepared by: Course Instructor name.

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