# Power System Protection and Reliability

## Lecture Notes from NPTEL

|  |  |
| --- | --- |
| **Module 1 : Fundamentals of Power System Protection** |  |
| Lecture 1 : Introduction | [Lecture-1.pdf](Lecture%20Notes/Lecture-1.pdf) |
| Lecture 2 : Protection Paradigms - Apparatus Protection | [Lecture-2.pdf](Lecture%20Notes/Lecture-2.pdf) |
| Lecture 3 : Protection Paradigms - System Protection | [Lecture-3.pdf](Lecture%20Notes/Lecture-3.pdf) |
| Lecture 4 : Desirable Attributes of Protection | [Lecture-4.pdf](Lecture%20Notes/Lecture-4.pdf) |
| **Module 2 : Current and Voltage Transformers** |  |
| Lecture 5 : Introduction to CT | [Lecture-5.pdf](Lecture%20Notes/Lecture-5.pdf) |
| Lecture 6 : CT Tutorial | [Lecture-6.pdf](Lecture%20Notes/Lecture-6.pdf) |
| Lecture 7 : CT Saturation and DC Offset Current | [Lecture-7.pdf](Lecture%20Notes/Lecture-7.pdf) |
| Lecture 8 : Introduction to VT | [Lecture-8.pdf](Lecture%20Notes/Lecture-8.pdf) |
| Lecture 9 : VT Tutorial | [Lecture-9.pdf](Lecture%20Notes/Lecture-9.pdf) |
| **Module 3 : Sequence Components and Fault Analysis** Selected topics from ECE496: Power Fault Analysis |  |
| Lecture 10 : Sequence Components | [Lecture-10.pdf](Lecture%20Notes/Lecture-10.pdf) |
| Lecture 11 : Sequence Components (Tutorial) | [Lecture-11.pdf](Lecture%20Notes/Lecture-11.pdf) |
| Lecture 12 : Sequence Modeling of Power Apparatus | [Lecture-12.pdf](Lecture%20Notes/Lecture-12.pdf) |
| Lecture 13 : Sequence Modeling (Tutorial) | [Lecture-13.pdf](Lecture%20Notes/Lecture-13.pdf) |
| **Module 4 : Overcurrent Protection** |  |
| Lecture 14 : Fuse Protection | [Lecture-14.pdf](Lecture%20Notes/Lecture-14.pdf) |
| Lecture 15 : Fundamentals of Overcurrent Protection | [Lecture-15.pdf](Lecture%20Notes/Lecture-15.pdf) |
| Lecture 16 : PSM Setting and Phase Relay Coordination (Tutorial) | [Lecture-16.pdf](Lecture%20Notes/Lecture-16.pdf) |
| Lecture 17 : Earth Fault Protection using Overcurrent Relays | [Lecture-17.pdf](Lecture%20Notes/Lecture-17.pdf) |
| **Module 5 : Directional Overcurrent Protection** |  |
| Lecture 18 : Directional Overcurrent Relaying | [Lecture-18.pdf](Lecture%20Notes/Lecture-18.pdf) |
| Lecture 19 : Directional Overcurrent Relay Coordination (Tutorial) | [Lecture-19.pdf](Lecture%20Notes/Lecture-19.pdf) |
| Lecture 20 : Directional Overcurrent Relay Coordination in Multi-loop Systems | [Lecture-20.pdf](Lecture%20Notes/Lecture-20.pdf) |
| **Module 6 : Distance Protection** |  |
| Lecture 21 : Introduction to Distance Relaying | [Lecture-21.pdf](Lecture%20Notes/Lecture-21.pdf) |
| Lecture 22 : Setting of Distance Relays | [Lecture-22.pdf](Lecture%20Notes/Lecture-22.pdf) |
| Lecture 23 : Pilot Protection with Distance Relays | [Lecture-23.pdf](Lecture%20Notes/Lecture-23.pdf) |
| **Module 7 : Out of Step Protection** |  |
| Lecture 24 : Power Swings and Distance Relaying | [Lecture-24.pdf](Lecture%20Notes/Lecture-24.pdf) |
| Lecture 25 : Analysis of Power Swings in a Multi – Machine System | [Lecture-25.pdf](Lecture%20Notes/Lecture-25.pdf) |
| Lecture 26 : Power Swing Detection, Blocking and Out-of-Step Relays | [Lecture-26.pdf](Lecture%20Notes/Lecture-26.pdf) |
| **Module 8 : Numerical Relaying I : Fundamentals** |  |
| Lecture 27 : An Introduction | [Lecture-27.pdf](Lecture%20Notes/Lecture-27.pdf) |
| Lecture 28 : Sampling Theorem | [Lecture-28.pdf](Lecture%20Notes/Lecture-28.pdf) |
| Lecture 29 : Least Square Method for Estimation of Phasors - I | [Lecture-29.pdf](Lecture%20Notes/Lecture-29.pdf) |
| Lecture 30 : Least Square Method for Estimation of Phasors - II | [Lecture-30.pdf](Lecture%20Notes/Lecture-30.pdf) |
| Lecture 31 : Fourier Algorithms | [Lecture-31.pdf](Lecture%20Notes/Lecture-31.pdf) |
| **Module 9 : Numerical Relaying II : DSP Perspective** |  |
| Lecture 32 : Fourier Analysis | [Lecture-32.pdf](Lecture%20Notes/Lecture-32.pdf) |
| Lecture 33 : Discrete Fourier Transform | [Lecture-33.pdf](Lecture%20Notes/Lecture-33.pdf) |
| Lecture 34 : Properties of Discrete Fourier Transform | [Lecture-34.pdf](Lecture%20Notes/Lecture-34.pdf) |
| Lecture 35 : Computation of Phasor from Discrete Fourier Transform | [Lecture-35.pdf](Lecture%20Notes/Lecture-35.pdf) |
| Lecture 36 : Fast Fourier Transform | [Lecture-36.pdf](Lecture%20Notes/Lecture-36.pdf) |
| Lecture 37 : Estimation of System Frequency | [Lecture-37.pdf](Lecture%20Notes/Lecture-37.pdf) |
| **Module 10 : Differential Protection of Bus, Transformer and Generator** |  |
| Lecture 38 : Bus Protection | [Lecture-38.pdf](Lecture%20Notes/Lecture-38.pdf) |
| Lecture 39 : Transformer Protection | [Lecture-39.pdf](Lecture%20Notes/Lecture-39.pdf) |
| Lecture 40 : Generator Protection | [Lecture-40.pdf](Lecture%20Notes/Lecture-40.pdf) |
|  |  |