EE 531: POWER SYSTEM TRANSIENTS (3-0-0: 3)

Introduction to Transients

Introduction to simple transients in R-L, R-C, RLC Circuit, Origin and nature of power system transient and surges, Equivalent circuit representations, Lumped and distributed circuit parameters, Switching and Lightning overvoltage.

Switching Transients in Power Systems

Resistance switching, Capacitance switching, current chopping in circuit breakers, load switching, Transformer magnetising Inrush Currents, Short line fault condition

Travelling Waves

Wave equation, Reflection and Refraction of Travelling Waves, Attenuation and Distortion of Electromagnetic Waves, Behaviour of travelling waves at line termination, switching operations involving transmission lines, Lattice diagram

Lightening Transients

The Mechanism of Lightning, Wave-shape of the Lightning Current, Direct and Indirect Lightning Stroke, Interaction between lightning and power system.

Insulation Coordination

Basic concept of insulation coordination and insulation level, Statistical approach to insulation coordination, Correlation between insulation and protection levels

Protection of Equipment against Transient Overvoltage

Protection of transmission lines against lightning, Surge suppressors and lightning arrestors, Surge capacitor and reactor, Surge protection of rotating machines, Transient voltages and grounding practice

Modeling and Behavior of Power Equipment under Transient Condition

Modeling of transformer, overhead transmission lines, cables, generators, motors**,** Numerical techniques for transient analysis

Text Books and References

1. A. Greenwood, “Electrical Transients in Power System”, Wiley & Sons Inc. New York.
2. E. Kuffel, W.S.Zangeal & J. Kuffel, “High Voltage Engineering: Fundamentals”, Newnes.
3. L. V. Sluis, “Transients in power systems”, John Wiley & Sons Ltd.
4. R.D. Begamudre, “Extra High Voltage AC Transmission Engineering”, NewAge International.