

PEPE104 POWER SYSTEMS TRANSIENTS

Module-I

(12 Hours)

INTRODUCTION TO FAST TRANSIENTS:

Origin and nature of power system Transients, traveling waves on transmission system, the line equation, the shape attenuation and distortion of waves, reflection of traveling waves , successive reflections, traveling waves on multi conductor systems, transition points on multi conductor circuits.

LIGHTNING :

Charge formation , mechanism of lightning stroke. Mathematical model of lightning stroke.

Module-II

(12 Hours)

THEORY OF GROUNDS WIRES :

Direct stroke to a tower, effect of reflection up and down the tower , the counterpoise.

SWITCHING SURGES :

Normal frequency effects, high charging currents, cancellation waves, recovery voltage, restricting phenomena. Protection of transmission systems against surge.

HIGH FREQUENCY OSCILLATIONS AND TERMINAL TRANSIENTS OF TRANSFORMER

Module-III

(12 Hours)

INSULATION COORDINATION:

Insulation coordination procedures (IEC) for high voltage systems: Design criteria, classification of overvoltages, insulation design for switching, lightning and temporary overvoltages, pollution, application of arresters for protection of lines and stations, statistical methods of insulation coordination, risk of failure, test prescriptions. Insulation coordination procedures (IEC) for low voltage systems: representative overvoltages, selection of clearance and creepage distances, macro and micro environments, testing techniques, transient (switching and lightning) voltage surge suppression in industrial and commercial electrical installations, protection of electronic devices.

REFERENCES

1. Allan Greenwood , *Electrical Transients in power Systems* , Wiley Interscience, 1991
2. Lou Van Der Sluis, *Transients in power Systems* , John Wiley & Sons Ltd, 2001
3. R Rudenberg, *Transient Performance of Electric power systems, Phenomenon in Lumped Networks*, MGH, 1950
4. R Rudenberg, *Electric Stroke waves in power systems*, Harvard University press, Cambridge, Massachusetts, 1968
5. *Transmission Line Reference Book*, EPRI, USA, 1982