

EE-501: Switchgear and Protection

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UNIT-I

Fuse, H.R.C. fuse, Isolators, Theory of arc formation, properties of arc, Arc interruption theories. Circuit constants and circuit conditions, Restriking voltage transient Rate of Rise of Restriking voltage (RRRV), Current Chopping, Duties of switch-gear, Resistance switching, Circuit breaker rating.

UNIT-II

Construction and Operation of Air-break circuit breakers (CBs), Oil CBs, Single and Multi-break construction, Air-blast CB, Recent development in circuit breakers, Vacuum Breaker, Sulphur Hexa-phloride CB's, DC circuit breaker, Comparative merits and demerits of CBs.

UNIT-III

Need for protective relaying, Protective Zones, Primary and back up protection, Desirable Properties of protective relaying, Principle and operation of Electromagnetic and Induction type Relays, Relay settings, Directional, Distance, Differential, Overcurrent and earth fault relays, Static Relays, Numerical Relays/IEDs (Intelligent Electronic Devices).

UNIT-IV

Scheme of protection of Generator, Transformer, Bus-Zone, Transmission line. Merz-Price circulating current scheme, Restricted earth fault protection, Negative Sequence Protection, Bucholz relay, Translay scheme, pilot protection.

UNIT-V

Lightning and switching surges, dynamic overvoltages, ground wire, transmission reflection, refraction and attenuation of surges, spark gap, arresters, surge absorbers, BIL, insulation coordination, grounding of power system.

Additional topics:

Substation Automation SCADA System

TEXT/REFERENCE BOOKS

1. Suni S. Rao, "Switchgear and Protection", Khanna Publishers, New Delhi.
2. C. R. Mason, "The Art and Science of Protective Relaying", New Age International, New Delhi.
3. C. L. Wadhwa, "Electrical Power Systems", New Age International, New Delhi.
4. C. L. Wadhwa, "Generation, distribution and utilization of electric energy", New Age Publications, New Delhi.

Websites:

www.nptel.ac.in
<http://www.mnre.gov.in/>