

2. Syllabus copy

Electrical Substation Design and Equipment Elective

PE 845 EE

UNIT-I

Introduction to AIS and GIS: Introduction – characteristics – comparison of Air Insulated Substation (AIS) and Gas Insulated Substation (GIS) – main features of substations, Environmental considerations, Planning and installation- GIB / GIL

UNIT-II

Major Equipment and Layout of AIS and GIS: Major equipment –Bus bars, Circuit Breakers, Isolators, CT, PT and CVT, Wave traps, Transformers and transmission lines, design features –Sag –Tension calculations and wind force calculations equipment specification, substation switching schemes- single feeder circuits; single or main bus and sectionalized single bus-double main bus-main and transfer bus- main, reserve and transfer bus- breaker-and-a- half scheme-ring bus

UNIT-III

Insulation Coordination of AIS and GIS: Introduction – stress at the equipment – insulation strength and its selection – standard BILs – Application of simplified method – Comparison with IEEE and IEC guides.

UNIT-IV

Grounding and Shielding: Definitions – soil resistivity measurement – ground fault currents – ground conductor – design of substation grounding system – shielding of substations – Shielding by wires and masts. Reflection and refraction of waves on transmission line.

UNIT-V

Control room layout, reactive compensation equipment, shunt capacitor and static VAR systems, HTLT circuit Breaker, selection and sizing, Substation Automation, selection and sizing of lighting protection and selection of luminaries

Suggested Readings:

1. Andrew R. Hileman, “Insulation coordination for power systems”, Taylor and Francis, 1999.
2. M.S. Naidu, “Gas Insulation Substations”, I.K. International Publishing House Private Limited, 2008.
- Klaus Ragallar, “Surges in high voltage networks” Plenum Press, New York, 1980.

3. "Design guide for rural substation", United States Department of Agriculture, RUS Bulletin, 1724E300, June 2001