UNIT I

Chapter 1 : Overview Of Sub-Stations **1-1 to 1-20**

Need of electrical substation. Factors governing the selection of the site of the sub-station, Classification of sub-station based on voltage level, indoor and outdoor, configuration, application various symbols used in single line diagram.

Conductor used in main bus Auxiliary bus for 11KV, 33KV, 132KV Substation.

Typical earth resistance values of various substation and Structures as per IE Rules:-11KV, 33KV, 132KV substation and double pole structure, transmission tower (tower foot Resistance).

General safety rules to be followed to minimize the risk of electrical hazards in Substation

UNIT II

Need for pole mounted and plinth mounted substation

11KV/ 440 volt Pole mounted substation equipment and accessories- functions and rating of three phase distribution transformer, Lightning arrester(LA), Metering Current transformer(CT), Metering voltage transformer(PT), Air Break Switch(AB switch), Drop Out fuse, insulators and distribution box.

Layout and single line diagram of pole mounted substation.

Insulation resistance measurement.

Earthing - equipment earthing and system earthing.

Earth resistance measurement and method of improving earth resistance

Routine, preventive and breakdown maintenance

Safety practices followed during routine, preventive and breakdown maintenance.

UNIT III

Need of 33KV/11KV substation.

33KV/11KV Substation Equipment Accessories, Functions and Rating of : power transformer, Lightning arrester (LA), Instrument transformer- Current transformer(CT) and Potential Transformer(PT), HT Fuses, Isolating switches(Isolator), Insulators, Control and relay Panel, station transformer, capacitor Bank, Battery and Charger and circuit Breaker.

Layout and single line diagram of 33KV Substation.

Earthing : Equipment earthing and system earthling.

Routine, Preventive and Breakdown maintenance.

BDV(break down Voltage) Test on Power transformer oil.

Safety Practices Followed during Routine, Preventive and breakdown Maintenance.

Fire-fighting Equipment For The different situations In the substation.

UNIT IV

Need of 132KV/33KV substation, 132KV/33Kv Substation Equipment and Accessories , Functions and rating of power transformer, Lightning arrester(LA), Instrument Transformer - Current transformer(CT) , Potential transformer(PT), Capacitor voltage transformer(CVT) ,HT Fuses, Isolating switches(Isolator), Insulators, control and relay Panel, Station transformer, Capacitor Bank, Battery Charger, Wave Trap/wave Drum, power line carrier communication(PLCC) & Circuit breaker.

Single line diagram of 132KV/33KV substation, Earthing :- Equipment Earthing and system earthing. Step potential, touch potential, Mesh Potential, transferred Potential, earth Mat Or Grid. Routine, Preventive & Breakdown maintenance, Safety Practices Followed during Routine, Preventive and breakdown Maintenance, Firefighting Equipment For The different situation In the substation. Non-contact type Thermal sensor to locate and record Hot spot In Substation

UNIT V

Need Of gas Insulated Substation (GIS), Essential parts of GIS, Advantages of GIS, Drawback of GIS, Single Line diagram of GIS, Partial discharge monitoring, Routine, Preventive & Break down maintenance of GIS, Safety Practices Followed during Routine, Preventive and breakdown Maintenance, Firefighting equipment used in GIS.

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