

# AMSE05 ELECTRICAL TECHNOLOGY AND SAFETY

## UNIT-1 CONSTRUCTION AND PRINCIPLE OF OPERATION OF D.C MACHINES

- 1.1 E.m.f equation of a generator- use of interpoles- characteristics of shunt, series and compound generators- starting and speed control- losses and efficiency.
- 1.2 Construction and Principle of operation of single phase transformers- e.m.f equation - phase diagrams - equivalent circuit-regulation- losses and efficiency.
- 1.3 Protective relays- Requirement of relay - types of protection – classification-distance relay, differential relay, state relays.

## UNIT-2 SYNCHRONOUS MACHINES

- 2.1 Types- e.m.f equation- winding factors- armature reaction and leakage resistance. Synchronous motor- methods of starting- applications.
- 2.2 Induction Motors- Construction and principle of operation- equivalent circuit- Torque- slip characteristics- method of starting- applications.
- 2.3 Circuit breakers- function of switch gear- arc phenomenon- initialization of an arc- arc interruption- recovery voltage and restriking voltage- MCB and ELCB. Faults in power systems- causes- types.

## UNIT-3 FUSES

- 3.1 Types- selection- advantages and disadvantages.
- 3.2 Grounding- neutral grounding- solid grounding- resistance grounding- arc suppression coil grounding.
- 3.3 Equipment grounding for safety - grounding substation- grounding of line structure. Earthing
- 3.4 Effect of electric and magnetic fields- Human safety aspects- effect of current and voltage on human beings- typical V-I characteristics of skin- Electric shocks and their prevention.
- 3.5 Insulation- classes of insulation- FRL Simulation- continuity test.

## UNIT-4 SAFETY DURING INSTALLATION OF PLANT AND EQUIPMENT

- 4.1 Safe sequences in installation- risk during installation.
- 4.2 Safety during testing and commissioning.
- 4.3 Test on relays- protection and interlock systems for safety.
- 4.4 Hazardous zones- classification of hazardous zones.
- 4.5 Intrinsically safe and explosion proof electrical apparatus. Selection of equipment in hazardous area.
- 4.6 Electrical fires- hazards of static electricity. Safe procedures for electrical maintenance statutory requirements. Safety provisions in Indian Electricity Act & Rules.

### References Books:

1. H. Cotton: Electrical Technology, Wheeler Publishing Company.
2. S.L. Uppal: A Textbook of Electrical Engineering, Khanna Publishers, Delhi.
3. NSC, Chicago : Accident Prevention Manual for Industrial Operations