

## 2.12 30303 ELECTRICAL MACHINES

### UNIT-1 D.C. GENERATOR:

- 1.1 Construction of D.C. machine
- 1.2 Lap and wave winding (Brief idea)
- 1.3 Principle of D.C. generator
- 1.4 Excitation methods and different types of D.C. Generator
- 1.5 E.M.F. equation
- 1.6 D.C. generator characteristics
- 1.7 Losses
- 1.8 Efficiency and condition for maximum efficiency
- 1.9 Concept of armature reaction
- 1.10 Effect of armature reaction on commutation and generated voltage.

### UNIT-2 D.C. MOTOR:

- 2.1 Different types of D.C. motor
- 2.2 Principle of D.C. motor
- 2.3 Concept of back emf
- 2.4 Torque, speed and power relations
- 2.5 Starters for D.C. shunt and compound motors
- 2.6 Characteristics of D.C. motor
- 2.7 Speed control of D.C. motor
  - 2.7.1 Field control
  - 2.7.2 Armature control
  - 2.7.3 Series parallel control
- 2.8 Testing of D.C. machine by
  - 2.8.1 Direct loading
  - 2.8.2 Swineburn's test
  - 2.8.3 Hopkinson's test and
  - 2.8.4 Calculation of efficiency as a generator and motor from above test

### UNIT-3 TRANSFORMER:

- 3.1 Construction of single phase and three phase transformer
- 3.2 Principle of operation
- 3.3 Emf equation and Turn ratio
- 3.4 Idea of leakage reactance
- 3.5 Transformer phasor diagram
  - 3.5.1 At no load
  - 3.5.2 At load (Lagging, Leading and UPF)
- 3.6 Equivalent circuit of single phase transformer
- 3.7 Losses, efficiency and regulation
- 3.8 Condition for maximum efficiency

- 3.9 All day efficiency
- 3.10 Transformer testing
  - 3.10.1 By direct loading
  - 3.10.2 By open circuit and short circuit test
    - 3.10.2.1 Determination of equivalent circuit parameters
  - 3.10.3 Back to back test
- 3.11 Parallel operation of single-phase transformer with equal and unequal voltage ratio.
- 3.12 Off load and on load tap changers
- 3.13 Auto transformer
- 3.14 Poly phase connection (Descriptive study)
  - 3.14.1 Scott connection
  - 3.14.2 Open-Delta connection
  - 3.14.3 Star-Star connection
  - 3.14.4 Delta - Delta connection
- 3.15 Parallel operation of 3-phase transformer

**Reference Books:**

1. Vidyut Engg.(S.I.Units) (Hindi) K.D.Sharma
2. Electrical Engg. part I& II (Hindi) D.R.Nagpal
3. Electrical Engg. (Hindi) J.B. Gupta
4. Electrical Technology S.L. Uppal
5. Electrical Technology B.L. Theraja
6. A Basic Course in Electrical Engg. Sharma & Gupta
7. Electric Machine P.S. Bimbra
8. Electric Machine Nagrath & Kothari

