EE 213 (R-22)

Total No. of Questions : 10] [Total No.of Pages : 02

II/IV B. Tech. DEGREE EXAMINATIONS, AUGUST - 2024

First Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

ELECTRICAL MACHINES - I

Time : **Three Hours** Maximum : **70** Marks

Answer ONE Question from each Unit. 5x14=70 M

All Questions carry equal marks.

UNIT - I

1. a) Explain the B-H curve of magnetic materials.

   b) Explain flux-linkage vs current characteristics of magnetic circuits.

(OR)

2. a) Explain magnetic characteristics of linear and non-linear magnetic circuits and derive the energy stored in magnetic circuits.

   b) Write short notes on galvanometer coil and relay contact.

UNIT - II

3. Explain the basic construction of DC machine with neat sketch mentioning all the parts.

(OR)

4. a) Derive the expression for back EMF of a DC machine.

   b) Write short notes on lap and wave winding.

UNIT - III

5. a) What are the losses that occur in dc machines ? Derive the condition for maximum efficiency in a dc generator.

   b) A dc shunt motor is running at 1200 rpm and it has an armature resistance of 0.15Ω. The current taken by the armature is 60 A when the applied voltage is 220 V. If the load is increased by 30%, find the variation in the speed.

(OR)

P.T.O.

6. a) Explain the speed torque characteristics of DC shunt, series and cumulative compound motors.

   b) A 240 V shunt motor has an armature resistance of 0.2 Ω and takes armature current of 20 A on full-load. The electromagnetic torque being constant, by how much must the flux be reduced to increase the speed by 40% ?

UNIT - IV

7. a) Explain about core and shell type of transformers and their relative merits with respect to other.

   b) Derive the EMF equation of a transformer.

(OR)

8. A 4.5 kVA, 400/210 V, 50 Hz single phase transformer has the following test data :

   O.C. test (1.v.side) 210V, 1A, 0 W

   S.C. test (h.v. side) 15 V, 10.8A, 100 W.

   Calculate (i) Equivalent circuit referred to 1.v side and (ii) Secondary load voltage on full load at 0.8 power factor lagging (iii) Efficiency of transformer at 3/4 th load and 0.7 power factor (lag).

UNIT - V

9. a) Explain the concept of Scott connection (three phase to two phase) conversion with a neat circuit diagram.

   b) A balanced 3-phase, 250 kW load at 415 V and 0.88 power factor lagging is to be supplied from a two-phase 1100 V supply. Determine voltage and current rating of each winding of Scott connected transformers and kVA rating of each unit.

(OR)

10. a) Explain about on load and off load tap changers provided in a 3-phase transformers.

    b) Draw the connection diagrams and explain the features of Y-Y, Y-Δ, Δ-Y and Δ-Δ three-phase connections.