Name of Examination: B. Tech. (Makeup- 2017)

Branch: Electrical & Electronics Engg.

Semester: IV

Title of Course: Electrical Machines-I

Course Code: EEB251

Time: 3 Hrs

Maximum Marks: 50

Note: Attempt 5 questions. All questions carry equal marks.

Q1. (A) Describe the different losses taking place in a transformer and explain the procedure for separating hysteresis and eddy current loss. Also derive the condition for maximum efficiency of the transformer.

(B) Derive and plot the relation between (i) Speed-Armature current, (ii) Torque-Armature current and (iii) Speed-Torque for each of the following motors: (a) DC Shunt Motor (b) DC Series Motor and (c) DC Compound Motor.

Q2. (A) Explain the working of a single phase transformer with neat circuit diagram.

(B) Explain the working principle of (a) DC Motor and (b) DC Generator with neat circuit diagram.

Q3. (A) Explain Ratio and polarity test on single phase transformer.

(B) A single phase transformer has 1000 turns primary and 200 turns secondary and draws no-load current of 3 Amps at 0.2 lagging power factor at supply voltage of 2.2 kV. A load at secondary draws a current of 250 amps at 0.8 p. f. lagging. The primary and secondary winding resistances are 0.72 ohms and 0.025 ohms respectively and their leakage reactance are 0.92 ohms and 0.036 ohms respectively. Determine the primary current, power factor, and secondary terminal voltage

Q4. The results of open circuit and short circuit test on a 25- KVA, 440/220 V 60 Hz transformer is as follows:

OC TEST: 220 V, 9.6 Amp, 710 W

SC TEST: 42 V, 57 Amp, 1030 W

(i) Obtain the parameters of the equivalent circuit referred to high voltage and low voltage side. (ii) Draw the equivalent circuit referred to primary and secondary side, and (iii) Draw the phasor diagram for leading power factor load.

Q5. (A) Explain armature reaction and the methods to limits its effect

(B) A dc shunt motor runs at 1200 rpm on no-load drawing 5A from 220V mains. Its armature and field resistances are 0.25 ohms and 110 ohms respectively. When loaded, the motor draws 62 amps from the mains. What would be its speed? Assume that the armature reaction demagnetizes the field by 5%. Also calculate the internal torque developed at no-load and at full load. What is the motor shaft torque at load?

Q6. A 75 kVA single phase transformer has 500 turns primary and 100 turns secondary. The primary and secondary winding resistances are 0.4 ohms and 0.02 ohms respectively and their leakage reactance are 1.5 ohms and 0.045 ohms respectively. The supply voltage is 2200 V. Calculate (a) equivalent impedance referred to the primary, (b) voltage regulation and secondary terminal voltage for full load at power factor of (i) 0.8 lagging and (ii) 0.8 leading.

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