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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2023

INDUCTION MACHINES

[Maximum Marks: **100**] [Time: **3** Hours]

PART-A

[Maximum Marks: **10**]

I. (Answer ***all*** questions in one or two sentences. Each question carries ***2*** marks)

1. Write about an ideal transformer.
2. State the working principle of transformer.
3. Write about All day efficiency of a transformer.
4. Write the equation for speed of rotating magnetic field in a 3 phase induction motor.
5. Write any two applications of induction motor. (5 x 2 = 10)

PART-B

[Maximum Marks: **30**]

II. (Answer ***any five*** of the following questions. Each question carries ***6*** marks)

1. Draw the vector diagram of a single phase transformer with lagging pf load.
2. Derive the condition for obtaining maximum efficiency of a transformer.
3. Explain parallel operation in a single phase transformer.
4. Explain the torque slip characteristics of a 3 phase induction motor.
5. Draw the power stages of induction motor.
6. Draw equivalent circuit of a double cage induction motor.
7. Explain Electrical braking in an induction motor. (5 x 6 = 30)

PART-C

[Maximum Marks: **60**]

(Answer ***one*** full question from each Unit. Each full question carries **15** marks)

UNIT – I

III. a. A 25-kVA transformer has 500 turns on the primary and 50 turns on the secondary winding. The primary is connected to 3000V, 50-Hz supply. Find the full-load primary and secondary currents, the secondary e.m.f. and the maximum flux in the core. Neglect leakage drops and no-load primary current. (8)

b. Derive emf equation of a single phase transformer. (7)

OR

IV. a. Describe the construction of single phase transformer. (8)

b. A 100 kVA, 1100/220 V, 50 Hz, single-phase transformer has a high voltage winding resistance of 0.1 ohm and a leakage reactance 0.40 ohm. The low voltage winding resistance is 0.006 ohm and leakage reactance is 0.015 ohm. Find the equivalent winding resistance, reactance and impedance referred to the H.V. and L.V. sides. (7)

UNIT – II

V. a. Derive the equation for saving of copper in autotransformer. (8)

b. Describe the OC Test of a transformer. (7)

OR

VI. a. Obtain the equivalent circuit of a 200/400-V, 50-Hz, 1-phase transformer from the following test data :

O.C test: 200 V, 0.7 A, 70 W - on L.V. side
S.C. test: 15 V, 10 A, 85 W - on H.V. side
Calculate the secondary voltage when delivering 5 kW at 0.8 p.f. lagging, the primary voltage being 200V (8)

b. Explain the different cooling methods of a transformer. (7)

UNIT- III

VII. a. Describe the production of rotating magnetic field in a three phase induction motor. (8)

b. Derive torque equation for a three phase induction motor. (7)

OR

VIII. a. Derive the condition and expression for maximum torque in a three phase induction motor. (8)

b. 3-phase, 50-Hz, 8-pole, induction motor has full-load slip of 2%. The rotor resistance and stand still rotor-reactance per phase are 0.001 ohm and 0.005 ohm respectively. Find the ratio of the maximum to full-load torque and the speed at which the maximum torque occurs. (7)

UNIT - IV

IX. a. Describe the blocked rotor test of 3 phase induction motor. (8)

b. Explain star delta starter. (7)

OR

X. a. Describe the Kramer system speed control of induction motor. (8)

b. Explain DOL starter. (7)

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