

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018

INDUCTION MACHINES

[Time : 3 hours

(Maximum marks : 100)

[Note :—A4 size graph sheet to be supplied.]

PART — A

(Maximum marks : 10)

Marks

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

1. State the working principle of a 1ϕ transformer.
2. Define the term transformation ratio of a 1ϕ transformer.
3. State the voltage regulation of a transformer.
4. Name the two types of rotors used in a 3ϕ induction motor.
5. Write any two methods of measuring slip in a 3ϕ induction motor.

(5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. Explain the working principle of a 1ϕ transformer.
2. Derive the e.m.f equation of a 1ϕ transformer.
3. Derive the equation of saving of copper in auto transformer.
4. Explain the construction and working of any one instrument transformer.
5. Obtain the expression for rotor current frequency in a 3ϕ induction motor.
6. Explain how rotor rotates in a 3ϕ induction motor.
7. Draw the diagram of Kramer system of speed control in 3ϕ induction motor.

(5×6 = 30)

PART — C

(Maximum marks : 60)

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

UNIT — I

- III (a) Explain the construction of a single phase transformer. 7
- (b) A 25 kVA transformer has 500 turns on the primary and 50 turns on the secondary. The primary is connected to a 3000V, 50Hz supply. Neglect the leakage drops and no-load primary currents. Find.
- (i) the full load primary and secondary currents (ii) the secondary induced emf (iii) the maximum flux in the core. 8

OR

- IV (a) Draw and explain the vector diagram of a transformer with resistance and leakage reactance on resistive load. 7
- (b) A 30 kVA, 2400/120 V, 50 Hz transformer has primary resistance and leakage reactance are 0.1 ohm and 0.22 ohm respectively. The secondary has 0.035 ohm resistance and 0.012 ohm leakage reactance. Find the equivalent winding resistance, reactance and impedance referred to the (i) Primary (ii) secondary. 8

UNIT — II

- V (a) Obtain the approximate equivalent circuit of single phase transformer. 7
- (b) Explain the OC and SC tests in a transformer. 8

OR

- VI (a) Find the all-day efficiency of 500 kVA distribution transformer whose copper loss and iron loss at full load are 4.5kW and 3.5kW respectively. During a day of 24 hours it is loaded as under :

No. of hours	Loading in kW	Power factor
6	400	0.8
10	300	0.75
4	100	0.8

- (b) Draw any four 3 ϕ transformer connections. 8

UNIT — III

- VII (a) Explain the main parts of a 3 ϕ induction motor. 7
- (b) If an emf in the stator of an 8-pole induction motor has a frequency of 50 Hz and that in the rotor is 1.5 Hz. Calculate the speed of the motor and its slip. 8

OR

- VIII (a) Explain the production of rotating magnetic field in a 3 ϕ induction motor. 7
- (b) A 3 ϕ , 4-pole, 400V, 50 Hz induction motor, when running on full load, the frequency of the rotor emf is found to be 2.5 Hz. Calculate : (i) synchronous speed (ii) slip (iii) rotor speed at full load 8

UNIT — IV

- IX (a) Explain the no load and blocked rotor tests of a 3 ϕ induction motor with diagrams. 8
- (b) Draw the diagram of Scherbius system of speed control in induction motor. 7

OR

- X (a) List any three applications of 3 ϕ induction motor. 3
- (b) A 3 ϕ , 400V induction motor gave the following test readings :
No load: 400V, 1250W, 9A: short circuit: 150V, 4kW, 38A.
Draw the circle diagram. If the normal rating is 14.9kW,
find (i) the full load value of current (ii) power factor (iii) slip. 12