

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE, NOVEMBER – 2024**

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 the EMF equation of a transformer.
2. Define the voltage and current transformation ratio.
3. List out two applications of an autotransformer.
4. Define the term slip in an induction motor.
5. Write any two applications of induction motors. (5x2=10)

PART – B
(Maximum Marks : 30)

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

1. Derive the emf equation of an ideal transformer.
2. Explain the formation of three phase transformers by using three single phase transformers.
3. Why is the transformer rated in KVA instead of KW?
4. Explain with figure starting method of slip ring induction motor.
5. Define starting torque and obtain the condition for maximum torque of an induction motor.
6. Derive an equation for torque of an induction motor.
7. Explain the electrical braking of poly phase induction motors. (5x6=30)

PART – C
(Maximum Marks : 60)

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

UNIT – I

- III.** (a) A 50 Hz, single phase transformer has a turn ratio of 6. The resistances are 0.9Ω and 0.03Ω and reactance are 5Ω and 0.13Ω for high voltage and low voltage winding respectively. Find (a) the voltage to be applied to the high voltage side to obtain full load current of 200 A in the low voltage winding on the short circuit. (b) the power factor on the short circuit. (8)

- (b) Draw the sketch of a power transformer and explain the main parts. (7)

OR

- IV.** (a) Sketch the vector diagram of an ideal transformer when connected to an inductive load and explain the changes in primary and secondary current. (8)
- (b) The no load current of a transformer is 5A at 0.2 power factor when supplied at 240V, 50Hz. The number of turns on the primary winding is 250. Determine (a) the maximum value of flux in the core (b) the core loss and (c) magnetizing current. (7)

UNIT – II

- V.** (a) Explain the different cooling methods of transformers. (8)
- (b) Explain parallel operation of transformers. (7)

OR

- VI.** (a) Explain OC and SC test on single phase transformers. (8)
- (b) A single-phase transformer is rated at 40kVA. The transformer has full-load copper losses of 800 W and iron losses of 500 W. Determine the transformer efficiency at full load and 0.8pf. (7)

UNIT –III

- VII.** (a) Compare squirrel cage induction motor and slip ring induction motor. (8)
- (b) A 4 pole, 3-phase induction motor operates from a 50 Hz supply system. If the machine runs at 3% slip on full load, determine (i) Synchronous speed (ii) The rotor speed (iii) The frequency of rotor current at running condition (iv) The frequency of rotor current at standstill. (7)

OR

- VIII.** (a) Draw and explain the torque-slip characteristic of a 3 phase induction motor. (8)
- (b) Draw and explain the equivalent circuit of the induction motor. (7)

UNIT – IV

- IX.** (a) Explain no load and blocked rotor testing of the induction motor. (7)
- (b) Explain construction and working of a double cage induction motor. (8)

OR

- X.** (a) Explain DOL starter. (7)
- (b) Explain autotransformer method of starting a squirrel cage induction machine with a neat sketch. (8)
