

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2022**

DC 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. State the names of type of winding used in DC Machine's armature.
2. In a dc generator, output is AC. Mention method used to convert it to DC.
3. Define critical field resistance.
4. State the EMF equation of induced emf in a DC Motor.
5. List any two application of DC Series motor. (5 x 2 = 10)

PART-B

[Maximum Marks: 30]

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

1. Derive EMF equation of a DC Generator.
2. Describe the working principle of single loop generator.
3. Explain various methods to improve communication.
4. Classify DC Motor based on field connection.
5. Explain the speed control methods of DC Shunt motor.
6. Explain power stages of DC Motor.
7. Draw a circuit for direct loading method to determine the efficiency of DC shunt 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) With neat sketch explain the constructional details of DC Generator. (8)

(b) A shunt generator delivers 450A at 230V and resistance of shunt winding and armature winding are 50 Ω and 0.03 Ω respectively. Calculate the generated emf. (7)

OR

- IV. (a) Classify DC Generators according to their field winding. (8)
(b) Calculate the voltage induced in the armature winding of a 4-pole, lap wound dc machine having 728 active conductors and running at 1800 rpm. The flux per pole is 30 m Wb. (7)

UNIT – II

- V. (a) Explain parallel operation of DC shunt machine. (8)
(b) Draw expected graph and explain internal and external characteristics of DC shunt generator. (7)

OR

- VI. (a) Draw expected graph and explain open circuit characteristics of DC shunt generator and state the method to find critical field resistance. (8)
(b) State applications of DC shunt, series, compound generators. (7)

UNIT- III

- VII. (a) Draw and explain the working of three point starter. (8)
(b) A DC motor take an armature current of 110A at 480V. Armature resistance is 0.2 ohm. The machine has 6pole and armature is lap connected with 864 conductors. The flux per pole is 0.05wb. (1) Calculate speed (2) the gross torque developed by the armature. (7)

OR

- VIII. (a) Derive armature torque equation of DC Motor. (8)
(b) A 440V shunt motor has an armature resistance of 0.8 Ω and field resistance of 200 Ω . Determine the back emf when delivering 10H. P at 85% efficiency. (7)

UNIT - IV

- IX. (a) Describe the working principle of permanent magnet DC motor. (8)
(b) Plot and explain performance characteristics of DC shunt motor. (7)

OR

- X. (a) Explain briefly the pre determination of efficiency of DC Machine. (8)
(b) In a brake test, the effective load on the brake pulley was 38.1 kg, diameter of the pulley is 63.5 cm and speed is 12rps. The motor took 49A at 220V. Calculate the BHP and efficiency. (7)
