

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

**DC MACHINES**

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

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

1. Define DC Generator.
2. Define armature reaction.
3. Define critical speed.
4. Write the formula for back e.m.f. and their units.
5. List the various methods of testing DC Motors.

(5×2 = 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 a DC generator.
2. Classify D C Generators based on their field excitation with the aid of diagrams.
3. Describe various methods to improve commutation.
4. Explain the open circuit characteristic of a dc shunt generator.
5. Draw and explain three point starter.
6. List the advantages and disadvantages of PMDC motor.
7. Explain the various losses in a dc machine.

(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 yoke and armature of a DC Generator with sketch.   | 8 |
|     | (b) Calculate the e.m.f. generated by a 6 pole lap wound armature with 65 slots and 12 conductors per slot, when driven at 1000 rpm. The flux per pole is 0.02 Webber. | 7 |

OR



- IV (a) Compare lap and wave windings. 8
- (b) A short Shunt generator supplies a current of 100A at a voltage of 220V. If the shunt, series armature resistances are 50ohm, 0.025 ohm and 0.05 ohm respectively. Calculate :
- (i) Generated e.m.f.
- (ii) Power delivered. Allow a brush drop of 1 V per brush. 7

## UNIT — II

- V (a) Explain commutation with a neat sketches. 8
- (b) Plot the internal and external characteristics of a DC Shunt generator. 7

OR

- VI (a) Define critical field resistance and explain how it can be obtained. 8
- (b) Explain the necessity and conditions for parallel operation of DC Shunt generators. 7

## UNIT — III

- VII (a) Briefly explain the working of a DC Motor. 8
- (b) Draw the diagram for Ward Leonard method of speed control. 7

OR

- VIII (a) Derive the torque equation of a DC Motor. 8
- (b) A DC motor takes an armature current of 110 A at 480 V. The armature resistance is 0.22 ohm. The machine has 6 poles and the armature is lap connected with 864 conductors. The flux per pole is 0.05 Wb. Calculate the gross torque developed by the motor. 7

## UNIT — IV

- IX (a) Draw the electrical and mechanical characteristics of a DC Series motor. 8
- (b) Derive the condition for maximum efficiency of a DC Machine. 7

OR

- X (a) Explain the Swinburnes test on a DC Motor with diagram. 8
- (b) List the various applications of DC Shunt Motors. 7