

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2019

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. List two functions of yoke in a DC machine.
2. Define front pitch and back pitch.
3. Name any two method of improving commutation.
4. Write equation for back emf in a DC motor.
5. Write condition for maximum power developed in DC motor. (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. List classification of DC generator according to excitation and show its schematic diagrams.
2. A four pole generator, having wave-wound armature winding has 51 slots each contains 20 conductors. What will be the voltage generated in the machine when driven at 1500 rpm assuming the flux per pole to be 7 mWb ?
3. Explain why shunt generator failing to build up of voltage.
4. Explain working principle of DC motor.
5. Draw and mark the parts three point starter.
6. Illustrate the electrical characteristics of shunt motor.
7. Describe the construction and working of permanent magnet DC 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) A 4-pole lap-connected armature of a dc shunt generator is required to supply the loads connected in parallel. (i) 5kW geyser at 250V and (ii) 2.5 kW Lighting load also at 250V. The generator has an armature resistance of 0.2 Ohms and a field resistance of 250 Ohms. The armature has 120 conductors in the slots and runs at 1000 rpm. Allowing one volt per brush for contact drop neglecting the friction. Find armature current and flux per pole. 8
- (b) List the important points regarding simplex lap winding. 7

OR

- IV (a) Draw a developed diagram of a simple 2-layer lap-winding for a 4-pole DC generator with 16 coils. Hence, and mark the brushes. 8
- (b) Derive the emf equation of a DC generator. And write the emf equation of both lap and wave wounded. 7

UNIT — II

- V (a) Illustrate the commutation process in DC generators. 8
- (b) Define critical field resistance and critical speed of a DC shunt generator. 7

OR

- VI (a) Explain the parallel operation of shunt generators. 8
- (b) Illustrate open circuit characteristics of separately excited generator. 7

UNIT — III

- VII (a) Determine developed torque and shaft torque of 220V 4-pole series motor with 800 conductors wave-connected supplying a load of 8.2 kW by taking 45 A from the mains. The flux per pole is 25mWb and its armature circuit resistance is 0.6 Ohms. 8
- (b) Derive speed equation of DC motor. 7

OR

- VIII (a) Illustrate the methods of speed control of DC shunt motors. 8
- (b) Derive armature torque equation of DC motor. 7

UNIT — IV

- IX (a) Illustrate the mechanical and electrical characteristics of series motor. 8
- (b) State the losses in DC machines. 7

OR

- X (a) Illustrate Swinburne's test of DC machine. 8
- (b) Compute the condition for maximum efficiency. 7