



C20-EE-302

7246

**BOARD DIPLOMA EXAMINATION, (C-20)
OCTOBER/NOVEMBER—2023**

DEEE - THIRD SEMESTER EXAMINATION

ELECTRICAL MACHINES—I (DC MACHINE)

Time : 3 Hours]

[Total Marks : 80

PART—A

3×10=30

Instructions : (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answers should be brief and straight to the point and shall not exceed five simple sentences.

1. State the functions of commutator and yoke.
2. State Fleming's right hand rule.
3. Compare lap winding wave windings in any three aspects.
4. List out any three applications of DC compound generator.
5. State the conditions for parallel-operation of DC generator.
6. List the different losses in DC motors.
7. Classify the DC motors based on excitation.
8. State the necessity of speed control of DC motors.
9. List different types of starters for DC motors.
10. List different testing methods DC motors.

PART—B

8×5=40

- Instructions :** (1) Answer **all** questions.
(2) Each question carries **eight** marks.
(3) Answers should be comprehensive and criterion for valuation is the content but not the length of the answer.

- 11.** (a) Derive the condition for maximum efficiency of a DC generator.

(OR)

- (b) A long shunt compound generator supplies a load of 25 kW at a terminal voltage of 500 V. The armature, series field, shunt field resistances are 0.03 ohm, 0.04 ohm and 250 ohm respectively. Calculate the emf generated, if the brush drop is 4V per brush.

- 12.** (a) (i) State the conditions for build up of EMF of a DC generator.
(ii) Define critical field resistance and critical speed of a DC generator.

(OR)

- (b) A 4-pole generator has a wave wound armature with 722 conductors and it delivers 100 A on a full load. If the brush lead is 8 degree. Calculate the armature demagnetising and cross-magnetising amp-turns per pole.

- 13.** (a) Derive the torque equation of a DC motor.

(OR)

- (b) A 440 V shunt motor has armature resistance of 0.8 ohm and field resistance of 200 ohm. Determine the back emf when giving an output of 7.46 kW at 85% efficiency.

- 14.** (a) Explain the flux control method of speed control of DC motor with a neat sketch.

(OR)

- (b) Explain the working of 3-point starter with a neat sketch.

15. (a) Explain the method of conducting Hopkinson's test on DC motor.

(OR)

- (b) In a brake test on a small DC shunt motor the speed was 1400 rpm. The load on one side of the brake band was 2.8 kg. The diameter of the brake pulley was 15 cm. If the input current was 1.8 A at 250 V. Calculate the torque and efficiency.

PART—C

10×1=10

- Instructions :** (1) Answer the following question.
(2) The question carries **ten** marks.
(3) Answer should be comprehensive and the criterion for valuation is the content but not the length of the answer.

16. Discuss the process of commutation of DC generator with a neat sketch.

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