7246

BOARD DIPLOMA EXAMINATION, (C-20)

MAY—2023

DEEE - THIRD SEMESTER EXAMINATION

ELECTRICAL MACHINES—I (DC MACHINES)

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. List the materials used for *(a)* yoke, *(b)* brush and *(c)* commutator.

2. State the working principle of a DC generator.

3. Draw the power flow diagram of a DC generator.

4. Define commutation and list the methods of improving commutation.

5. State the conditions for building up e.m.f in a DC generator.

6. List the applications of DC motors.

7. Why does series motor have high starting torque?

8. List the different types of starters for DC motor.

9. What is the necessity of speed control of DC motor?

10. State the advantages of Swinburne's test.

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)* Classify the DC generators along with voltage and current equations showing diagrammatically. 8

(OR)

(b) An eight-pole DC generator has 960 armature conductors and flux per pole 20 mWb. Calculate the e.m.f generated when running at 500 rpm, if the armature is

(i) Lap connected

(ii) Wave connected 4+4

12. *(a)* Derive an expression for demagnetizing ampere-turns/pole and cross-magnetizing ampere-turns/pole. 8

(OR)

(b) Explain the internal and external characteristics of a DC shunt generator. 8

13. *(a)* Derive the torque equation of a DC motor. 8

(OR)

(b) A DC series motor takes 40 A at 220 V and runs at 800 rpm. If the armature and field resistances are 0·2 Ω and 0·1 Ω respectively and the iron and friction losses are 0·5 kW, find *(i)* the torque developed in armature and *(ii)* output of the motor. 4+4

14. *(a)* Explain the various methods of speed control of DC series motor. 8

(OR)

(b) Draw the neat sketch of a S-point starter and explain it. 8

15. *(a)* Explain the method of conducting brake test on DC compound motor. 8

(OR)

(b) A 440 V DC shunt motor takes no load current of 2·5 A. The resistances of shunt field and armature are 550 Ω and 1·2 Ω respectively. The full load line current is 32 A. Determine the full load output and efficiency of the motor. 4+4

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 reason for drooping of speed in the characteristics of DC generator.

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