C14–EE–**302**

4244

BOARD DIPLOMA EXAMINATION, (C–14)
MARCH/APRIL—2018
DEEE—THIRD SEMESTER EXAMINATION

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 three materials used for the parts of DC machine.

2. Define *(a)* pole pitch, *(b)* back pitch and *(c)* front pitch.

3. State the EMF equation and specify each variable.

4. State the advantages of flux control method of speed control for DC shunt motor.

5. What is demagnetization?

6. Define *(a)* critical speed and *(b)* critical field resistance.

7. State different torques in DC motors.

8. List the three applications of DC series motors.

9. Explain the necessity of speed control.

10. What do you understand by indirect testing?

<div align="center">

PART—B   10×5=50

</div>

Instructions : (1) Answer *any* **five** questions.

      (2) Each question carries **ten** marks.

      (3) Answers should be comprehensive and the 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.   5

  (b) A long-shunt compound generator delivers a load current of 400 A at a terminal voltage 250 V. Armature resistance is 0·04 ohm, shunt field resistance is 125 ohms and series field resistance is 0·01 ohm. Find the induced EMF. Allow drop of 1 V per brush.   5

12. A DC shunt generator supplies a full-load current of 120 A at 110 V. The shunt field resistance is 55 ohm and mechanical and core losses together are 600 W. If the full-load efficiency is 85%, calculate the armature resistance and efficiency at half the full load. Also find load current corresponding to the maximum efficiency.

13. *(a)* Derive the formulas for *(i)* ATd and *(ii)* ATc.

  (b) A DC shunt generator consists of 500 conductors, 6 poles, wave winding takes the total current of 200 A, the brush lead is 10 degrees. Find *(i)* ATd and *(ii)* ATc.

14. *(a)* Describe the procedure for drawing the OCC of a DC shunt generator with necessary sketches.

  (b) State the procedure to calculate critical speed.

15. *(a)* Classify the DC motors.

(b) Draw the equivalent circuits of various types of DC motors with EMF equations.

16. *(a)* Explain briefly voltage method of speed control of DC motors.

(b) A 200 V DC shunt motor running at 1000 r.p.m. takes an armature current of 17·5 A. It is required to reduce the speed to 600 r.p.m. What resistance must be inserted in the armature circuit if the original armature resistance is 0·4 ohm? Assume armature current is constant.

17. *(a)* State the necessity of starter.   3

(b) Draw a neat sketch of 3-point starter and explain its working.   4+3

18. Explain the procedure to conduct Swinburne test on a shunt motor.

★ ★ ★