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C09–EE–304

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BOARD DIPLOMA EXAMINATION, (C–09)

MARCH/APRIL—2014

DEEE—THIRD SEMESTER EXAMINATION

DC MACHINES AND BATTERIES

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. A 4-pole DC generator having a wave wound armature conductors has 51 slots with each slot containing 20 conductors. Find the EMF generated when the machine is driven at 1500 rpm assuming flux per pole 60 mWb.

2. Draw the schematic diagram of DC series generator. Also write the current and voltage equation.

3. Draw the external and internal characteristics of a separately excited DC generator.

4. Write the function of equalizing ring. Where is it used?

5. Write the principle of working of DC motor.

6. Draw the power stage diagram of DC motor.

7. State the reason why a 3-point starter is replaced by a 4-point starter.

8. List the different methods of speed control of DC shunt motor.

9. List the applications of maintenance-free batteries.

10. List the applications of lead acid cell.

PART—B

10×5=50

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. Explain, with neat figures, the conversion of DC with the help of split rings. 10

12. *(a)* What is meant by demagnetization and cross-magnetization effect in a DC machine? 5

(b) A 250 V, 25 kW, 4-pole DC generator has 328 wave connected armature conductors, when the machine is delivering full-load, the brushes are given a lead of 7·2 electrical degrees. Calculate—*(i)* demagnetizing AT/pole and *(ii)* cross-magnetizing AT/pole. 5

13. *(a)* Write about EMF commutation with neat figure. 6

(b) List the advantages and disadvantages of using carbon brushes. 4

14. Classify the DC motors and derive the torque equation of a DC motor. 10

15. Explain the Ward Leonard system of speed control with a neat circuit diagram. 10

16. *(a)* Draw the performance characteristics of DC shunt motor. 5

(b) List the applications of shunt and series motors. 5

17. *(a)* Explain with figure, charging of batteries by constant current method. 5

(b) Calculate the efficiencies of an accumulator which is charged in 8 hours by 30 A at an average p.d. of 2·2 V and is discharged in 9 hours by 24 A at an average p.d. of 1·9 V. 5

18. *(a)* Write about dynamically induced EMF and derive 'e = BLV sin '. 5

(b) Write the precautions to be taken during charging of secondary cells. 5

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