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C09–EE–304

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BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2016

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

2. Write the principle of working of a DC generator.

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

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

5. Classify DC motors.

6. Draw the power stage diagram of a DC motor.

7. List different methods of speed control of a DC series motor.

8. Write any two differences between 3-point and 4-point starters.

9. State the applications of nickel iron cell.

10. List the parts of a lead-acid battery.

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. A long shunt compound generator gives 240 V at full-load output of 100 A. The resistance of various windings of the machine are armature 0·1 , series field 0·02 , shunt field 100 , windage and friction losses are 500 W. Calculate the full-load efficiency of the machines.

12. *(a)* Derive the cross magnetizing AT required to overcome cross magnetizing. 5

(b) A 250-V, 25kW, 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;

(ii) cross magnetizing AT/pole. 5

13. *(a)* Write about the e.m.f. commutation with neat figure. 5

(b) List the advantages and disadvantages of carbon brushes. 5

14. Write the voltage and current equations with circuit diagram for different types of DC motor.

15. Explain the starting method of DC series motor using drum control starter with neat diagram.

16. Explain the method of conducting brake test on DC series motor with neat diagram.

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

(b) Write about the indications of fully charged lead-acid battery. 5

18. *(a)* Classify the DC generators based on excitation and draw the schematic diagrams. 5

(b) An alkaline cell is discharged at a steady current of 4 A for 12 hours and the average terminal voltage being 1·2 V. To restore it to its original state of charge, a steady current of 3 A for 20 hours is required and the average terminal voltage being 1·44 V. Calculate the ampere-hour efficiency and watt-hour efficiency in this particular case. 5

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