



C09-EE-304

**3242**

**BOARD DIPLOMA EXAMINATION, (C-09)  
MARCH/APRIL—2017  
DEEE—THIRD SEMESTER EXAMINATION**

DC MACHINES AND BATTERIES

Time : 3 hours ]

[ Total Marks : 80

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**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 long-shunt generator. Also write the current and voltage equation.
2. State Fleming's right-hand rule with figure.
3. List the advantages of parallel operation of DC generators.
4. Draw the external and internal characteristics of a separately excited DC generator.
5. Plot the characteristics of long-shunt compound motor.
6. Draw the power stage diagram of DC motor.
7. Briefly explain the protective devices used in DC starters.

- \* 8. State the reason why a 3 point starter is replaced by a 4 point starter.
9. List the types of storage cells.
10. List the applications of maintenance free batteries.

**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) Derive the EMF equation of a DC generator. 5  
 (b) A shunt generator delivers 50 A at 230 V and the resistance of the shunt field and armature are 50 and 0.03 respectively. Calculate the generated EMF. 5
12. (a) Write about EMF commutation with neat figure. 5  
 (b) List the advantages and disadvantages of carbon brushes. 5
13. (a) What are meant by demagnetization and cross-magnetization effects in a DC generator? 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
- \* 14. A 4-pole DC shunt motor has a flux per pole of 0.04 Weber's and the armature is lap wound with 720 conductors. The shunt field resistance is 240 ohms and the armature resistance is 0.2 ohm. Brush contact drop is 1 V/brush. Determine the speed of the machine when running, (i) as motor taking 60 A, and (ii) as generator supplying 120 A. The terminal voltage in each case is 480 V. 10

- \* 15. (a) Explain the speed control of DC shunt motor by use of armature control method. 5
- (b) Explain with circuit diagram, how to control the speed of a DC series motor using armature diverter method. 5
16. Explain the method of conducting brake test on DC shunt motor with neat diagram. 10
17. (a) Explain with figure charging of batteries by constant current method. 5
- (b) Explain with figure charging of batteries by constant voltage method. 5
18. (a) Classify the DC generators based on excitation and draw the schematic diagrams. 5
- (b) Define (i) Ampere-hour efficiency, and (ii) Watt-hour efficiency.  $2\frac{1}{2}+2\frac{1}{2}$

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