



C09-EE-304

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**BOARD DIPLOMA EXAMINATION, (C-09)
MARCH/APRIL—2018
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.

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1. State Fleming's right-hand rule with figure.
2. List the losses incurred in DC machine.
3. Define armature reaction.
4. Write the function of equalizing ring. Where is it used?
5. Write the principle of working of DC motor.
6. Plot the electrical and mechanical characteristics of DC series motor.
7. What is the necessity of starter to start a DC motor?

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8. List the different methods of speed control of DC series motor.
9. List the parts of a lead acid battery.
10. Write the materials used for each part in 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 4-pole 250 V DC long shunt compound generator supplies a load of 10 kW at the rated voltage. The armature, series field and shunt field resistances are 0.1 Ω, 0.15 Ω and 250 Ω respectively. The armature is lap wound with 50 slots, each slot containing 6 conductors. If the flux per pole is 50 mWb, calculate the speed of the generator.

12. (a) Derive the demagnetizing AT required to overcome demagnetizing effect.

(b) An 8-pole lap connected DC shunt generator delivers an output of 240 A at 500 V. The armature has 1408 conductors and 160 commutator segments. If the brushes are given a lead of 4 segments from the no load neutral axis, estimate the demagnetizing and cross-magnetizing AT pole.

13. (a) Explain the working of welding generator. 6

(b) Explain OCC of a separately excited DC generator with circuit diagram. 4

14. (a) Draw the power stage diagram of DC motor.

(b) A 440 V shunt motor has armature resistance of 0.8 ohms and field resistance of 200 ohms. Determine the back e.m.f., when giving an output of 7.46 kW at 85% efficiency.

15. Explain ^{*} 3-point starter with a neat diagram.
16. Explain the method of conducting Hopkinson's test with a neat diagram.
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. 6
(b) A 1.2 V fully charged cell is discharged at a uniform rate of 40 A for 6 hours at an average terminal p.d. of 1 V. It is then charged at a uniform rate of 50 A for 5 hours to restore to its original state. Calculate (i) ampere-hour efficiency and (ii) watt-hour efficiency. 4

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