



C09-EE-304

3242

**BOARD DIPLOMA EXAMINATION, (C-09)
MARCH/APRIL—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 separately excited d.c. generator and also write the current and voltage equation.
2. List the basic requirements for generation of EMF.
3. Define commutation.
4. List the applications of d.c. generator.
5. Plot the characteristics of short-shunt compound motor.
6. Draw the power stage diagram of d.c. motor.
7. List different methods of speed control of d.c. series motor.

8. Why do series motors have high starting torque?
9. State the factors affecting capacity of the battery.
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 4-pole 250-V d.c. long-shunt compound generator supplies a load of 10 kW at the rated voltage. The armature, series field and shunt field resistances are $0.1 \ \Omega$, $0.15 \ \Omega$ and $250 \ \Omega$ respectively. The armature is lap wound with 50 slots, each slot containing six conductors. If the flux per pole is 50 mWb, calculate the speed of the generator.
12. (a) Explain critical resistance and critical speed.
(b) Explain OCC of a separately excited d.c. generator with circuit diagram.
13. (a) What are meant by demagnetization and cross-magnetization effects in a d.c. machine?
(b) An 8-pole lap-connected d.c. 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 four segments from the no-load neutral axis, estimate the demagnetizing and cross-magnetizing AT/pole.
14. A 230-V d.c. shunt motor takes 5 A at no-load and runs at 1000 r.p.m. Calculate the speed when loaded and taking a current of 30 A. The armature and field resistances are $0.2 \ \Omega$ and $230 \ \Omega$ respectively.

- 15.** (a) Why is ^{*}starter required for starting a d.c. motor?
(b) Write the function of No-volt Coil (NVC) and Overload Coil (OLC) in a 4-point starter.
- 16.** (a) Write briefly about necessity of starter to start a d.c. motor.
(b) Draw the performance characteristics of d.c. series motor.
- 17.** (a) Explain with figure charging of batteries by constant current method.
(b) Explain with figure charging of batteries by constant voltage method.
- 18.** (a) Classify the d.c. generators based on excitation and draw the schematic diagrams.
(b) A battery of 4 lead-acid cells in series is to be charged and the only available source is 210 V d.c. supply. The desired charging current is 0.5 A and each cell on charge has an e.m.f. of 2.5 V. If an electric lamp is used as the controlling resistance for the circuit, what voltage and size of the lamp will be necessary?

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