

Code: 9A02308

R09

B. Tech II Year I Semester (R09) Supplementary Examinations, May 2013

**ELECTRICAL MACHINES - I**

(Electrical &amp; Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions  
All questions carry equal marks

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- 1 Show that the torque developed in a doubly-excited magnetic system is equal to the rate of increase of field energy with respect to displacement at constant currents.
- 2 Explain in detail how direct quantity is obtained as an output in dc generator, with the help of neat sketches.
- 3 (a) What is the effect of armature reaction at leading and trailing pole tips of a dc generator? Explain with the help of neat sketches.  
(b) Discuss the methods to minimize the effect of armature reaction in brief.
- 4 What are the different types of self-excited dc generators? Obtain the terminal voltage and current expressions from the equivalent circuit representations of them.
- 5 (a) Draw and explain the load characteristics of a separately-excited dc generator.  
(b) Two dc shunt generator are operating in parallel. Their no-load voltages are 250 V and characteristics are linear. At 230 V, generator-1 can deliver 320 KW and generator-2 can deliver 610 KW. Find the total load 'P' and load supplied by each at 250 V.
- 6 A 240 V, 4-pole dc shunt motor has two-circuit armature winding with 500 conductors. The armature circuit resistance is  $0.22 \Omega$ , field resistance is  $150 \Omega$  and the flux per pole is  $0.02 \text{ Wb}$ . Neglect the armature reaction. Determine the speed and torque developed, if the motor draws 16 A from the mains.
- 7 The armature and field resistances of a 300 V, dc shunt motor are  $0.6 \Omega$  and  $260 \Omega$  respectively. When driving a load of constant torque at 600 rpm, the armature current is 25 A. If it is required to increase the speed from 600 rpm to 750 rpm, calculate the resistance to be connected in the shunt field circuit.
- 8 Explain the experimental procedure to conduct 'Retardation Test' on a dc shunt machine with the help of connection diagram. How the different losses are estimated from the test results?

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