

Code :9A02308

**R9**

**II B.Tech I Semester(R09) Supplementary Examinations, May 2011**  
**ELECTRICAL MACHINES-I**

**(Electrical & Electronics Engineering)**

Time: 3 hours

Max Marks: 70

**Answer any FIVE questions**  
**All questions carry equal marks**

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1. (a) What is electromechanical energy conversion?  
(b) Develop the block diagram of general electromechanical energy conversion device using energy balance equation.
2. With the help of neat sketches show the constructional features of a dc machine and brief the function of each component of the machine.
3. What is Armature reaction? Explain in detail the phenomenon of armature reaction in a 2-pole dc generator with the help of neat sketches of flux distribution in space and relevant vector diagrams, before and after the armature reaction.
4. (a) What are the methods of excitation of dc generators? Explain with the help of diagrams.  
(b) A 6-pole generator has 1000 armature conductors and is wave-wound. If the flux per pole is 0.02 Wb and the speed is 500 rpm, calculate the emf generated. If the above machine is self-excited, and the armature and field resistances are  $0.5 \Omega$  and  $250 \Omega$  respectively, calculate the output current when the armature current is 40 A.
5. (a) Distinguish between external and internal characteristics of dc generators.  
(b) Draw the load characteristics of a separately-excited dc generator and explain.
6. (a) Explain in detail with the help of relevant flux distribution diagrams, the principle of operation of dc motor.  
(b) What are the basic requirements to produce torque in a dc motor?
7. Explain the different methods of speed control of dc shunt motors in detail with the help of diagrams.
8. (a) Discuss the various losses in dc machines in detail.  
(b) Compare Swinburne's test and Hopkinson's test conducted on dc machines. List the advantages and limitations of both.

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