

II B.Tech I Semester(RR) Supplementary Examinations, May/June 2010
ELECTRO MECHANICS-I
(Electrical & Electronic Engineering)

Time: 3 hours

Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

1. (a) State and briefly explain the various phenomenon useful for the electromechanical energy conversion in rotating mechanisms.
(b) Energy conversion devices make use of the magnetic field as a coupling medium rather than an electric field. Discuss. [8+8]
2. Design a simplex wave winding for a 35 slot, 4-pole d. c. machine with 35 Commutator bars. Give the brush positions and the winding scheme. [16]
3. (a) When are dummy coils used and which type of D.C. armature winding these will occur?
(b) Calculate the ampere turns for each commutating pole of an 8-pole generator with 107 slots, each containing 1000 ampere conductors. The interpole air-gap is 1.2 cm. The flux density in the air gap is to be 0.32 T. Neglect iron parts and leakage. [8+8]
4. (a) What is critical speed? How do you calculate the critical speed in the laboratory?
(b) What are the conditions to build up of emf in a shunt generator? [8+8]
5. (a) Develop the general expression for the speed of a motor in terms of supply voltage, armature resistance and flux per pole.
(b) Discuss the applications of series motors and compound motors. [8+8]
6. (a) Discuss about ward-Leonard system method of Speed Control of D.C. machines in detail.
(b) In a shunt machine, running at 500 rpm, the hysteresis and eddy current losses are 250W and 150W respectively. Find the speed at which the total core losses are reduced by 30%. [8+8]
7. (a) What do you mean by core losses in DC machines? And how these losses are assumed to be independent of load?
(b) The total core loss in its armature of a 6-pole, DC generator running at 600 rpm was found to be 200W. When the speed is increased to 900 rpm and the flux is decreased by 25% the total core loss become 220W. Calculate the Hysteresis and eddy current losses at 600 rpm. Take Steinmitz's constant as 1.6. [6+10]
8. (a) Mention the factors on which the hysteresis loss W_h and eddy current loss W_e in the armature of a DC machine depend upon. How these losses are reduced.
(b) The Hopkinson's test on two shunt machines gave the following results for full load:
Line voltage 250V, line current excluding field currents 50A motor armature current 380A; field currents 5A and 4.2A. Draw the circuit diagram and mark the values.
Assuming resistance of each machine as 0.02Ω , determine the efficiency of each machine. [6+10]
