B.E. 3rd Semester (ECE) Examination,

December–2013

ELECTROMECHANICAL ENERGY CONVERSION

Paper–EE-205-E

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *Attempt any **five** questions.*

1. (a) Compare and contrast electrical circuit and magnetic circuit. 10

   (b) A flux density of 1.2 wb/m^2 is required in the 2 mm airgap of an electromagnet having an iron path l metre long. Calculate the magnetizing force and current required if the electromagnet has 1273 turns. Assume relative permeability of iron to be 1500. 10

2. (a) Explain the concept of torques and forces in a system with permanent magnets. 10

   (b) What is concept of co energy ? Explain it with help of example. 10

3. (a) With the help of neat sketch explain working of C.T. and also give applications. 10

   (b) Define Voltage regulation of a transformer and obtain expression. 10

4. (a) Explain load characteristics of compound generator. 10

   (b) A 4 pole lap wound 750 rpm dc shunt generator has an armature resistance of 0.4 ohm and field resistance of 200 ohm. The armature has 720 conductors and the flux per pole is 30 mwb. If the load resistance is 15 ohm, determine the terminal voltage. 10

5. (a) Compare squirrel cage and slipping induction motor. Also explain working principle of induction motor. 10

   (b) Sketch and explain torque speed characteristics of 3 phase induction motor. 10

6. A 525 hp, 3Phase induction motor is working on full load at 0.85 p.f with an efficiency of 93%. It is connected in parallel with a 450 hp synchronous motor having an efficiency of 89%. Both the motors are supplied by 2.2kV. 3 phase supply. The synchronous motor has Ra/ph = 0.5 ohm and Xs/Ph = 3 ohm. The power factor of the combined parallel circuit is 0.947 lag. Calculate

   (a) power factor of synchronous motor

   (b) induced back emf of synchronous motor

   (c) angle of retardation of synchronous motor. 20

7. (a) Draw only the phasor diagrams of a synchronous motor at

(i) Under excited

(ii) Normal excited and const load

(iii) Overexcited state. 10

(b) How V curves of synchronous motor can be obtained ? Discuss their importance also. 10

8. Write short notes on : 10×2=20

(a) Universal motor

(b) DC machine.