

II B.Tech.(CCC) Supplementary Examinations, December 2008
ELECTROMECHANICS
(Electrical & Electronic Engineering)

Time: 3 hours

Max Marks: 100

Answer any FIVE Questions
All Questions carry equal marks

1. The armature core of a 4-pole d. c. machine has 31 slots each designed to accommodate 4 coil sides of a simplex wave winding. The winding has total of 496 conductors. Find:
 - (a) Total number of coils
 - (b) Turns per coil
 - (c) Commutator pitch
 - (d) Back, front and total pitches and
 - (e) Number of commutator segments. [4+4+4+4+4]
2. (a) How do you classify the compound generators.
(b) What are the various characteristics of compound generators. Explain them briefly? [8+12]
3. (a) Discuss the applications of shunt and series motors.
(b) A 500 V-D.C. shunt motor takes a current of 5A on no-load. The resistances of the armature and field circuit are 0.22 ohms and 250 ohms respectively. Find:
 - i. The efficiency when loaded and taking a current of 100A.
 - ii. The percentage change of speed. State precisely the assumptions made. [8+12]
4. (a) Explain the limitations of permanent magnetic machines.
(b) Explain the operation of permanent magnet synchronous machines. [20]
5. (a) Derive the equation for saving in copper in using Auto transformer when compared to two winding transformer.
(b) Obtain the equivalent circuit of an auto transformer. [10+10]
6. (a) Explain how the torque is produced in the rotor of an induction motor.
(b)
 - i. Show that the relative speed between resultant rotor field and resultant stator field of a 3-phase induction motor is zero,
 - ii. Derive the expression for the rotor e.m.f and rotor current of an induction motor. [20]
7. (a) Describe with physical concepts, the hunting phenomenon in synchronous machines.

- (b) Explain how and why hunting is objectionable? What are the various causes of hunting? How can it be reduced? [8+12]
8. (a) Compare various types of single phase induction motors in terms of construction and performance
- (b) The resistance and inductive reactance of each winding of a 50Hz single phase capacitor induction motor are 80 ohms and 237.5 ohms respectively. Additional resistance "R" and a capacitor "C" are in series with one winding in order to achieve a phase difference of 90 degrees while both windings carry equal current. Calculate the values of R and C. [10+10]
