

Electrical Drives & Their Control

P. Pages : 2

AHK/KW/19/2239

Time : Three Hours

1061

Max. Marks : 80

- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Assume suitable data whenever necessary.
 9. Illustrate your answers whenever necessary with the help of neat sketches.

- 1.** a) How are electrical drives classified? Explain their classification in brief with their advantages and disadvantages. **7**
- b) A 25 hp, 500V, 4 pole, 50 Hz cage Induction motor with mesh connected stator takes a full load current of 30A and has a slip of 4%. The impedance per phase is 3.5Ω . Calculate starting torque and starting current taken from the supply if motor is started by-
- i) Direct switching
 - ii) A star delta starting
 - iii) Auto transformer starting with 70% tapping.
- OR**
- 2.** a) Explain briefly the field control in dc series motor. A dc series motor runs at 1000 rpm taking 100A at 400V. A diverter having double the resistance of field winding is then connected in parallel with it. Estimate the change in speed if torque varies as the square of the speed. Assume unsaturated field and neglect losses. **8**
- b) A 500V, 45kW, 600 rpm dc shunt motor has full load efficiency of 90%. The field resistance is 200Ω and the armature resistance is 0.2Ω . The field current is maintained constant. Armature reaction and brush drop may be neglected. Calculate the rated armature current & hence find the speed under each of following conditions at which machines develops an electromagnetic torque equal to rated value. **6**
- i) Regenerative braking – no external resistance.
 - ii) Plugging – external resistance of 5.5Ω inserted.
 - iii) Dynamic braking – external resistance of 2.6Ω inserted.
- 3.** a) Explain RMS horse power rating of motor. A motor has to perform the following duty cycle. **7**
- 100 Hp for 10 mins
No load for 5 mins
60 Hp for 8 mins
No load for 4 mins
- which is repeated indefinitely. Determine suitable size of continuously rated motor.
- b) A motor fitted with a flywheel supplies a load torque of 150 kg-m in 15 sec. During the no load period the flywheel regains its original speed. The motor torque is required to be limited to 85 kg-m. Determine moment of inertia of the flywheel. The speed of motor is 500 rpm and it has slip of 10% on full load. **6**

OR

