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EX - 802

B.E. VIII Semester

Examination June, 2013

Electrical Drives

Time : Three Hours

Maximum Marks : 100 ***Minimum Pass Marks :35***

Note : 1. Attempt One Question from each unit.
2. All Questions carry equal marks.
3. Assume suitable data if missing.

UNIT - I

1. A d.c. motor is to be selected for driving a load having a large torque of short duration followed by a long no-load period. A fly wheel of suitable inertia is already mounted on the load shaft. Suggest the most suitable d.c. motor for this application and explain your choice.

OR

2. A 220V, 1200 r.p.m. 15A separately excited motor has armature resistance and inductance of 1.8Ω and 32 mH respectively. This motor is controlled by a single-phase fully controlled rectifier with an a.c. source voltage of 230V, 50Hz. Identify the modes and calculate developed torques for :
   i) $\alpha = 45^0$ and speed = 450 r.p.m.
   ii) $\alpha = 60^0$ and speed = 1500 r.p.m.

UNIT - II

3. A drive has following parameters: J = 10 kg-m^2, T = 100-0.1N, N-m, Passive load torque T_l = 0.05 N, N-m. Where N is the speed in r.p.m.

   Initially the drive is operating in steady-state. Now it is to be reversed. For this motor characteristic is changed to T = -100-0.1N, N-m. Calculate the time of reversal.

OR

4. How do you define passive and active load torques? What are the differences between the two? Can a motor-load system with a passive load torque have an equilibrium speed in quadrant II? What will be your answer if the load is active?

UNIT - III

5. A 440V, 50 Hz, 6 pole, 950 r.p.m, y-connected induction motor has following parameters referred to the stator : $R_S = 0.5\Omega$, $R'_r = 0.4\Omega$, $X_S = X'_r = 1.2\Omega$, $X_m = 50\Omega$. Motor is driving a fan load, the torque of which is given by $T_L = 0.0123\ W^2_m$. Now one phase of the motor fails. Calculate motor speed and current. Will it be safe to allow the motor to run for a long period?

Or

6. A 2200 V, 2600 Kw, 735 r.p.m, 50 Hz, 8 pole, 3-phase squirrel cage induction motor has following parameters referred to the stator:

   $R_S = 0.075\Omega$, $R'_r = 0.1\Omega$, $X_S = 0.45\Omega$, $X'_r = 0.55\Omega$. Stator winding is delta connected and consists of two sections connected in parallel.

   i) Calculate starting torque and maximum torque as a ratio of rated torque, if the motor is started by star-delta switching. What is the maximum value of line current during starting.

   ii) Calculate transformation ratio of an auto transformer as to limit the maximum starting current to twice the rated value. What is the value of starting torque.

UNIT - IV

7. Show that a variable frequency induction motor drive, develops at all frequencies the same torque for a given slip-speed when operating at constant flux.

OR

8. Why the slip-power recovery scheme is suitable mainly for drives with a low speed range? Explain with necessary diagrams.

UNIT - V

9. Why a synchronous motor does not have starting torque? How do you start a synchronous motor. Explain.

OR

10. What are the important features of a hysteresis synchronous motor? What are its applications?

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