Printed Pages: 4 NEN 701/NEE 701

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 2012376 Roll No. | | | | | | | | | | |

B.TECH.

Regular Theory Examination(Odd Sem-VII), 2016-17

ELECTRIC DRIVES

Time : 3 Hours *Max. Marks : 100*

Section - A

1 **Attempt all parts of the following :** **(10×2=20)**

a) What is meant by the nature,of load torque?

b) What are the disadvantages of dc drives?

c) Classify various mechanical loads on the basis of their torque-speed characteristics.

d) Explain why the characteristics of a dc series motor is suitable for traction applications?

e) What are the advantages and disadvantages of electrical braking?

f) What are the problems faced in case a motor of wrong rating is chosen?

g) On what factors does the rate of rise of temperature depend?

h) Why the thyristor control is preferred over Ward Leonard system of speed control?

5. A 30 kW, 400V, 3 – ϕ, 4-Pole, 50 Hz induction motor has full-load slip of 5%. If the ratio of standstill reactance to resistance per rotor phase is 4, estimate the plugging torque at full speed.

6. Discuss Static Rotor Resistance Control of Induction motor with suitable circuit diagram.

7. Describe the construction and principle of operation of a switched reluctance motor (SRM).

8. Explain the chopper control techniques for separately excited dc motor under different modes of operation.

9. Explain the operation of 1 - ϕ half controlled rectifier fed separately excited dc motor under continuous and discontinuous modes of operation. Write the mathematical expression and draw speed characteristics for different delay angles.

Section - C

Attempt any **two** questions from this section

(2×15=30)

10. Draw the torque-speed characteristics of an induction motor with constant V/f control for speed variation from very low up to the base speed. Also describe an open loop scheme for Induction motor with V/f control.

i) Suggest suitable motors for textile and paper mill drive applications.

j) Why the cooling time constant of a rotating machine is usually larger than its heating time constant?

Section - B

Attempt any five questions from this section.

(5×10=50)

2. Derive the relationship between the variation of electromagnetic torque and load torque with respect to speed for a stable operation of an electric drive. What are the drawbacks of steady state stability over transient stability?

3. A drive has following equations for motor and load torques : $T = (1 + 2\omega_m)$ & $T_l = 3\sqrt{\omega_m}$

Obtain the equilibrium points and determine their steady-state stability.

4. A 230 V, 870 rpm, 100 A separately excited dc motor has an armature resistance of 0.05 ohm. It is coupled to an overhauling load with a torque of 400 N-m. Determine the speed at which motor can hold the load by regenerative braking.

11. A 440V, 50 Hz, 6-pole, Y-connected wound rotor motor has the following parameters :

$R_s = 0.5\,\Omega$, $R'_r = 0.4\,\Omega$, $X_s = X'_r = 1.2\,\Omega$, $X_m = 50\,\Omega$

Stator to rotor turn ratio is 3.5.

Motor is controlled by static rotor resistance control. External resistance is chosen such that the breakdown torque is produced at standstill for a duty ratio of zero. Calculate the value of external resistance. How duty ratio should be varied with speed so that the motor accelerates at maximum torque.

12. Discuss static Scherbius scheme for speed control of a slip ring induction motor. Draw a neat circuit diagram of the complete scheme. Mention one main advantages of this scheme compared to rotor resistance control.