

- (b) Compare the operation of VSI and CSI based drives. Which will be preferred for control of speed of Induction motor driving load having constant load torque ?
- (c) With schematic block diagram, explain the working of self-controlled current source Inverter fed synchronous motor.

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

PAPER ID : 2735

Roll No.

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**B. Tech.**

(SEM. VII) THEORY EXAMINATION 2011-12

**ELECTRIC DRIVES**

Time : 3 Hours

Total Marks : 100

Note :— Attempt all questions. Each question carries equal marks.

1. Attempt any **four** parts of the following : (5×4=20)

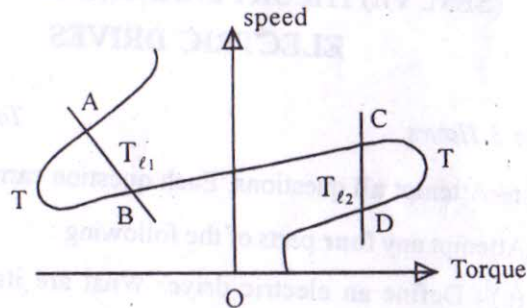
- Define an electric drive. What are its advantages and disadvantages ?
- How do you define passive and active load torques ? What are the differences between the two ?
- Explain the four quadrant operation of an electric drive.
- What are the disadvantages of the dc drives due to which the three-phase induction motor drive is fastly replacing it ?
- Discuss the closed loop scheme of a current source inverter fed asynchronous motor drive.
- A drive has following equations for motor and load torques :

$$T = (1 + 2 \omega_m) \text{ and } T_l = 3(\sqrt{\omega_m})$$

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

2. Attempt any **two** parts of the following : (10×2=20)

- (a) Derive the necessary relationship between the variation of electromagnetic torque and load torque with respect to speed for a stable operation of an electric drive. Comment on the stability of the operating points A, B, C and D.



- (b) Show that the condition of stability for large angular deviations of a synchronous machine is given by  $\frac{d\delta}{dt} = 0$ . Using this derive the equal area criterion for transient stability of a synchronous motor.
- (c) Explain the transient stability of an electric drive. How is it improved? What is the role of load equalization in performance of an electric drive?

3. Attempt any **two** parts of the following : (10×2=20)

- (a) Explain the thermal model of an electric drive for heating and cooling. What are continuous, short time and intermittent duties in terms of duties?

- (b) Explain the types of brakings of dc motors. Which one is usually employed and why?

- (c) A 230 V, 870 rpm, 100 A separating excited dc motor has an armature resistance of  $0.05 \Omega$ . 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.

4. Attempt any **two** parts of the following : (10×2=20)

- (a) Explain the dynamics during starting of a three-phase induction motor. What are the methods of reducing energy loss during starting? Explain.
- (b) Explain the slip power recovery scheme of a three-phase induction motor control. How static Scherbius drive is different from static Kramer drive?
- (c) What do you understand by single-phase half-controlled Rectifier control of dc separately excited motor? Explain it with the help of ckt diagram and waveforms, both in continuous and discontinuous condition mode.

5. Attempt any **two** parts of the following : (10×2=20)

- (a) Briefly explain the construction and principle of operation of a Switched Reluctance Motor.