

Question Paper Code : 71510

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2015.

Sixth Semester

Electrical and Electronics Engineering

EE 2352/EE 62/10133 EE 602 — SOLID STATE DRIVES

(Regulation 2008/2010)

(Common to PTEE 2352/10133 EE 602 — Solid State Drives for B.E. (Part-Time)
Sixth Semester Electrical and Electronics Engineering – Regulation 2009/2010)

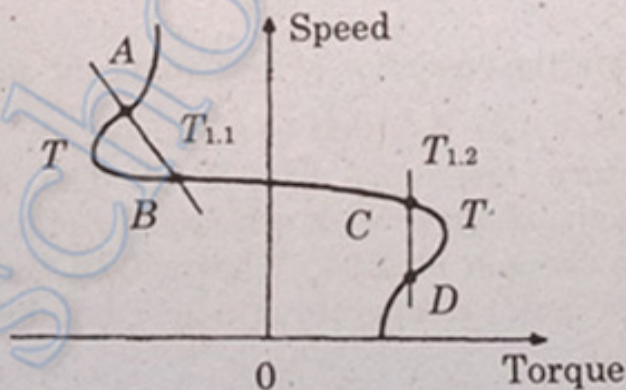
Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. The Fig shows plots of speed Vs motor and load torques. Comment on the stability of the operating points A, B, C and D.



2. What are active and passive load torques? Give examples.
3. What are the drawbacks of rectifier fed DC drives?
4. Can a semi converter fed DC drive operated in quadrant IV? Justify your answer.
5. What are the roles of inner current control and outer speed control loops?
6. State the methods of speed sensing.

8. Compare static Kramer and Scherbius system.
9. Why a self controlled synchronous motor is free from hunting oscillations?
10. Why v/f ratio is kept constant upto base speed and V constant above base speed in variable frequency control?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Draw and explain the speed-torque characteristics of various types of loads. (8)
- (ii) Explain in detail about the multi quadrant dynamics of electric drives. (8)

Or

- (b) Explain how the following speed transitions are carried out : (5 + 5 + 6)
- (i) Increase in speed in same direction.
- (ii) Decrease in speed in same direction.
- (iii) Speed reversal.

12. (a) Explain the steady state analysis of the single phase fully controlled converter fed separately excited DC motor drive for continuous current mode. Also explain its operation in motoring and regenerative braking mode. (16)

Or

- (b) (i) Explain the operation of four quadrant dc chopper drive. (10)
- (ii) A 220 V, 20 A, 1000 rpm separately excited dc motor has an armature resistance of 2.5Ω . The motor is controlled by a stepdown chopper with a frequency of 1 kHz. The input dc voltage to the chopper is 250V. What will be the duty cycle of the chopper for the motor to operate at a speed of 600 rpm delivering the rated torque? (6)

13. (a) From basic principles derive the transfer function for separately excited DC motor load system. (16)

Or

- (b) (i) Explain the step by step procedure for the design of current controller. (8)
- (ii) Explain the closed loop speed control for armature voltage control and field weakening mode for a DC drive. (8)

inverter controlled synchronous motor drive for low speed applications? (6)

(ii) Explain the principle of vector control of induction motor drive. (10)

Or

(b) Explain the four modes of operation of a static Scherbius drive. (16)

15. (a) (i) Explain marginal angle control of synchronous motor drive. (12)

(ii) What is meant by a commutatorless DC motor. (4)

Or

(b) (i) Write in detail about power factor angle control of synchronous motors. (6)

(ii) With necessary diagram explain the closed loop speed control of load Commutated inverter synchronous motor drive. (10)

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