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M.E. Second Semester (Electrical & Elect.) (New - CGS)

13291 : Elective-I : Power Electronics controlled Drives : 2 EEEME 4

P. Pages : 2 | AU - 3404

Time : Three Hours | Max. Marks : 80

* 1 0 3 5 *

Notes : 1. Due credit will be given to neatness and adequate dimensions.
2. Assume suitable data wherever necessary.
3. Use of pen Blue/Black ink/refill only for writing the answer book.

SECTION - A

1. a) Explain with necessary diagram the converter configuration for a four quadrant DC motor Drive. 6

   b) A 200 V, 10.5 A, 200 RPM shunt motor has the armature and field resistance of 0.5Ω and 400Ω respectively. It drives a DC load whose torque is constant at rated motor torque. Calculate motor speed if the source voltage drops to 175 volts. 7

OR

2. a) Give details about control modeling of the three - phase converter. Also draw its necessary diagram. 6

   b) Explain in detail four Quadrant operation of a DC motor Drive. 7

3. a) Explain the steady state analysis of Chopper - controlled DC motor drive with necessary diagram. 7

   b) A step up chopper is used to deliver load voltage of 500 V from 220 V DC source. If the blocking period of the thyristor is 80μsec, compute the required pulse width. 7

OR

4. a) A 220 V, DC source is connected to a separately excited DC motor through a chopper operating at 500 Hz. The load at torque at 150 rpm is $35\mu m$. The motor torque has $La = 2mH, R_A = 0\Omega, R_f = 1\Omega, Km = 1.3V\,sec/rad.$ motor and chopper losses are neglected. Calculated, 7
   i) minimum and maximum valve of armature current excursion.
   ii) obtain expression for armature current during ON & OFF period of chopper cycle.

   b) Explain the principle of operation of four quadrant chopper circuit. 7

5. a) Compare Scherbius and Kramer drive system. Show that the Scherbius drive can operate in the sub - synchronous and super - synchronous range of operation. 6

   b) Develop a flow chart for slip power recovery controlled induction motor drives steady state performance. 7

OR

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6. a) Explain in detail with neat diagram torque speed characteristics with phase control Induction motor drives. **6**

   b) Explain why the drives based on slip energy recovery principle are more efficient than the drive based on the rotor resistance control technique. **7**

SECTION - B

7. a) Describe the working principle of voltage source Inverter Driven Induction motor. **6**

   b) Discuss how the speed of a three - phase induction motor can be controlled by varying the frequency of the applied voltage. **7**

OR

8. a) For a frequency controlled induction motor explain the terms in details, the constant slip - speed control and constant Air Gap Flux Control. **6**

   b) Explain the advantages of variable frequency induction motor drives. **7**

9. a) In what way speed control for a.c. motors differ from that of d.c. motor? Also explain what do you mean by vector control. **7**

   b) Describe the detail working principal of Indirect vector control scheme and give necessary comments on its implementation. **7**

OR

10. a) Explain with block diagram the direct vector control scheme. **7**

    b) Explain a current source indirect vector control scheme. **7**

11. a) Explain in detail the design of current and speed controllers. Support your answer with any application. **7**

    b) Explain how the sensor less control of PMBDCM drive works. **6**

OR

12. a) What do you mean by 'Phase Advancing"? Explain. **6**

    b) Discuss the merits & demerits of the PMBDCM drive with split supply converter. **7**

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