Reg. No. : ☐☐☐☐☐☐☐☐☐☐

Question Paper Code: 22051

M.E. DEGREE EXAMINATION, MAY 2014.

Second Semester

Power Electronics and Drives

01PPE201-DC DRIVES AND CONTROL

(Regulation 2013)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions.

PART A - (10 x 2 = 20 Marks)

1. List the parts of electrical drives.

2. What are the methods of operation of electric drives?

3. Mention the drawbacks of rectifier fed dc drives.

4. What are the three intervals present in discontinuous conduction mode of single phase half and fully controlled rectifier?

5. What are the advantages in operating choppers at high frequency?

6. Why self commutated devices are preferred over thyristors for chopper circuits?

7. Define transfer function.

8. What are the advantages of using PI controller in closed loop control of dc drive?

9. Define Phase locked loop.

10. List some applications of DC drives.

PART - B (5 x 14 = 70 Marks)

11. (a) (i) Explain the different classes of Duty. (7)

(ii) Discuss about the guiding factors for selection of drives. (7)

Or

(b) Explain the constant torque and constant HP operations of DC drive. (14)

12. (a) Explain the motoring operation and braking operation of three phase fully controlled rectifier control of dc separately excited motor with aid of diagrams and waveforms. Also obtain the expression for motor terminal voltage and speed. (14)

Or

(b) A 200 V, 875 rpm, 150 A separately excited motor has an armature resistance of 0.06 Ω. It is fed from a 1ϕ fully controlled rectifier with an ac source voltage of 220 V, 50 Hz. Assuming continuous conduction, Calculate

(i) firing angle for rated motor torque and 750 rpm

(ii) firing angle for rated motor torque and (–500) rpm. (14)

13. (a) (i) Explain the two Quadrant operation by using Class-D and Class-C chopper with aid of diagrams and waveforms. (8)

(ii) Explain Time ratio control and Current limit control. (6)

Or

(b) A 230 V, 960 rpm and 200 A separately excited dc motor has an armature resistance of 0.02Ω. The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230 V. Assuming continuous conduction, Calculate

(i) duty cycle ratio of chopper for motoring operations at 350 rpm.

(ii) duty cycle ratio of chopper for braking operation at rated torque and 350 rpm.

(iii) If maximum duty ratio of chopper is limited to 0.95 and maximum permissible motor current is twice the rated, calculate the maximum permissible motor speed and power fed to the source. (14)

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14. (a) Explain the closed loop speed control of chopper fed DC drives. (14)

Or

(b) Obtain the equivalent circuit and transfer function of separately excited DC motors. (14)

15. (a) (i) Explain the microcomputer control of DC drive with neat diagram. (8)

(ii) Discuss about gate firing circuits for control of DC drives. (6)

Or

(b) Explain with neat flow chart, the constant horse power and load distributed operations. (14)

PART - C (1 x 10 = 10 Marks)

16. (a) Explain different types of electric drives and its applications to industry. (10)

Or

(b) Explain the loading of an electric motor and its duty cycle with neat diagram. (10)

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