Reg. No. | | | | | | | | | | | |

Question Paper Code : 87054

M.E. DEGREE EXAMINATION, MAY/JUNE 2016

Elective

Power Electronics and Drives

PX 7201 – SOLID STATE DC DRIVES

(Regulations 2013)

Time : Three Hours **Maximum : 100 Marks**

Answer ALL questions.

PART – A (10 × 2 = 20 Marks)

1. What are the advantages of electrical drives ?

2. Draw the mechanical characteristics of various types of dc motor.

3. What is phase control ?

4. What is the effect of current ripple in continuous current operation ?

5. What is time ratio control ?

6. Mention few applications of dc chopper.

7. Draw the equivalent circuit of motor.

8. What is current feedback ?

9. What is PLL control of dc drive ?

10. What are the disadvantages of analog control of electrical drives ?

PART – B (5 × 13 = 65 Marks)

11. (a) (i) Explain Ward- Leonard speed control of dc motor. (6)

(ii) List and explain classes of motor duty. (7)

OR

(b) (i) Explain the factor involved in the selection of motor rating for continuous duty load. (6)

(ii) Explain four quadrant operation of dc motor drive. (7)

12. (a) (i) Explain with relevant diagrams the single phase methods of phase control operation of a dc series motor. (5)

(ii) A separately excited dc motor operating from a single phase half controlled bridge at a speed of 1400 rpm has an input voltage of 330 sin 314t and a back emf of 80 V. The SCRs are fired symmetrically at $\alpha = 30$ in every half cycle. The armature has a resistance of 4Ω. Calculate the average armature current and the motor torque. (8)

OR

(b) Explain the operation of three phase dual converter fed dc drives. (13)

13. (a) (i) Explain with relevant diagrams the principle of operation of class A chopper control separately excited dc motor. (8)

(ii) Describe the control strategies involved in dc choppers to obtain a variable dc output voltage. (5)

OR

(b) (i) With necessary diagrams, explain the operation of four quadrant operation of dc motor. (7)

(ii) Brief in detail dynamic braking of dc motor using chopper. (6)

14. (a) (i) Derive the transfer function of separately excited dc motor. (6)

(ii) Obtain the linear transfer function model of power converter. (7)

OR

(b) Explain in detail the design of current controller of closed loop control system of dc separately excited dc motor. (13)

15. (a) Explain with a program flow chart the constant horse power micro computer control of dc drive. **(13)**

OR

(b) Explain with a program flow chart the load distributed operation micro computer control of dc drive. **(13)**

PART – C (1 × 15 = 15 Marks)

16. (a) What is a multiphase chopper ? Bring out clearly with appropriate waveforms the difference between the in-phase operation and phase shifted operation of a multiphase chopper. Also explain why is phase shifted operation always preferred. **(15)**

OR

(b) Derive the expressions for commutating components L and C for a voltage commutated chopper. Discuss the assumptions made. **(15)**

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