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Question Paper Code: 52522

M.E. DEGREE EXAMINATION, MAY 2017

Second Semester

Power Electronics and Drives

15PPE202 - DC Drives and Control

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (5 x 20 = 100 Marks)

1. (a) (i) List the drawbacks of armature resistance control. (3)
(ii) What are the functional elements of an electrical drive? (3)
(iii) Discuss various types of electric braking employed in DC drives. (14)
(or)
- (b) (i) Classify the types of motor duty (4)
(ii) What do you mean by multiquadrant operation? (2)
(iii) Describe multiquadrant operation of DC motor in hoist application. (14)
2. (a) (i) List the drawbacks of rectifier fed dc drives (3)
(ii) What is the function of free wheeling diode? (3)
(iii) Explain the operation of a single phase fully controlled converter fed separately excited DC motor with neat waveforms and derive the speed torque characteristics. (14)
(or)
- (b) (i) Write the expression for the average output voltage of a single phase and three phase full converter fed DC drive. (2)
(ii) When is discontinuous conduction mode expected with the operation of converter fed DC drives? (2)

(iii) With neat diagram explain the various schemes used in mult iquadrant operation of separately excited dc motor with regenerative braking. (16)

3. (a) (i) What is meant by duty cycle? (2)

(ii) What are the methods of control strategies of chopper control? Which is best suited for DC motor control? (4)

(iii) Explain the operation of the two quadrant chopper fed DC drive system (14)

(or)

(b) (i) What is Time ratio control? (2)

(ii) What are the advantages of operating choppers at high frequency? (4)

(iii) Analyze the principle of operation of class A chopper control separately excited DC motor. (14)

4. (a) (i) Give the transfer function of converter. (2)

(ii) Mention the types of current controllers. (2)

(iii) Derive the transfer function of DC motor- load and converter system. (16)

(or)

(b) (i) Give the transfer function relating speed and armature current of a DC motor. (2)

(ii) Give the transfer function relating speed and field current of a DC motor. (2)

(iii) Derive the transfer function of the speed controller (16)

5. (a) (i) Write any two applications of microcomputer based motor drives. (2)

(ii) Define phase Locked Loop control of dc drives. (2)

(iii) Describe the dc motor speed control using phase locked loop technique. (16)

(or)

b) (i) Write the methods of speed detection. (2)

(ii) What do you mean by digital control of dc drive? (2)

(iii) With block diagram, explain micro-computer control of DC drives . (16)