**E** **Reg. No. :** | | | | | | | | | | |

## Question Paper Code: 52S02

M.E. DEGREE EXAMINATION, MAY 2018

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)

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|---|---|---|---|---|
| 1. | (a) | (i) Draw speed –torque characteristics of DC series motor | CO1- U | (3) |
| | | (ii) What do you understand by Constant torque and Constant power drive? | CO1- U | (3) |
| | | (iii) Explain static Ward Leonard control method in speed control of DC motor | CO1- U | (14) |
| | | Or | | |
| | (b) | (i) List the types of speed control methods employed in DC motor. | CO1- U | (4) |
| | | (ii) What is meant by Regenerative braking? | CO1- U | (2) |
| | | (iii) Describe multi quadrant operation of DC motor in hoist application. | CO1- U | (14) |
| 2. | (a) | (i) List the drawbacks of rectifier fed dc drives. | CO2-U | (3) |
| | | (ii) What is the function of free wheeling diode? | CO2- U | (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. | CO2- U | (14) |
| | | Or | | |
| | (b) | (i) Write the expression for the average output voltage of a single phase and three phase full converter fed DC drive. | CO2- U | (2) |
| | | (ii) When is discontinuous conduction mode expected with the operation of converter fed DC drives? | CO2- U | (2) |

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| | | (iii) With neat diagram explain the various schemes used in multiquadrant operation of separately excited dc motor with regenerative braking. | CO2- U | (16) |
| 3. | (a) | (i) What are the methods of control strategies of chopper control? Which is best suited for DC motor control? | CO3- U | (4) |
| | | (ii) Explain the operation of the two quadrant chopper fed DC drive system. | CO3- U | (16) |
| | | Or | | |
| | (b) | (i) What is Time ratio control? | CO3-U | (2) |
| | | (ii) What are the advantages of operating choppers at high frequency? | CO3-U | (4) |
| | | (iii) Analyze the principle of operation of class A chopper control separately excited DC motor. | CO3-Ana | (14) |
| 4. | (a) | (i) Give the transfer function of converter. | CO4- U | (2) |
| | | (ii) Mention the types of current controllers. | CO4- U | (2) |
| | | (iii) Derive the transfer function of DC motor- load and converter system. | CO4-App | (16) |
| | | Or | | |
| | (b) | (i) Give the transfer function relating speed and field current of a DC motor. | CO4- U | (4) |
| | | (ii) Derive the transfer function of the speed controller. | CO4-App | (16) |
| 5. | (a) | (i) Write any two applications of microcomputer based motor drives. | CO5-U | (2) |
| | | (ii) Define phase Locked Loop control of dc drives. | CO5-U | (2) |
| | | (iii) Describe the dc motor speed control using phase locked loop technique | CO5-U | (16) |
| | | Or | | |
| | (b) | (i) Write the methods of speed detection. | CO5-U | (2) |
| | | (ii) What do you mean by digital control of dc drive? | CO5-U | (2) |
| | | (iii) With block diagram, explain micro-computer control of DC drives. | CO5-U | (16) |