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

Question Paper Code: 52252

M.E. DEGREE EXAMINATION, JUNE 2016

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 1 = 5 Marks)

1. The load cycle for a motor driving a power press will be

   (a) variable load (b) continuous
   (c) continuous but periodical (d) intermittent and variable load

2. Three phase fully controlled converter is a

   (a) single quadrant converter (b) two quadrant converter
   (c) three quadrant converter (d) four quadrant converter

3. Self commutated devices are preferred over thyristors for chopper circuits because they

   (a) can be commutated by a slow power control signal
   (b) need not require commutation circuit
   (c) both (a) and (b)
   (d) none of these

4. The closed loop feedback involved in DC drive uses

   (a) Torque feedback and voltage feedback
   (b) Current feedback and speed feedback
   (c) Torque feedback and voltage feedback
   (d) Torque feedback ad current feedback

5. Which of the following motor drives are best for the rolling mills?

(a) Single phase motors (b) Squirrel cage induction motors
(c) Slip ring induction motors (d) DC motors

PART B - (5 x 3 = 15 Marks)

6. Classify the different types of load applied in electrical drives.

7. Why regenerative braking is not possible in DC series motor?

8. Sketch the speed-torque characteristics of chopper controlled DC shunt motor..

9. Write the significance of speed loop in closed loop control.

10. Distinguish between analog and digital control of DC drive.

PART C - (5 x 16 = 80 Marks)

11. (a) Explain the various methods of variable armature voltage for speed control, when the input supply is DC. (16)

Or

(b) (i) Discuss the operation of ward Leonard method for speed control of DC motor. (8)

(ii) With neat circuit arrangement explain the different types of braking suitable for separately excited DC motor. (8)

12. (a) Explain in detail the multiquadrant operation of separately excited DC motor fed from fully controlled converter. (16)

Or

(b) A three phase fully controlled bridge rectifier is fed from a three phase balanced supply at 415 *V* and 50 *Hz*. The load consists of 15 Ω resistor and a large smoothing inductance causing a perfect smoothing. Determine the average value of load voltage, current and power dissipation for a firing angle of $\alpha = 60^{o}$ and power factor. Assume the thyristor and supply to be ideal. (16)

13. (a) Explain the four quadrant operation of chopper circuit with suitable diagrams and wave forms. (16)

Or

(b) Explain the operation of CLASS-A chopper for DC motor and derive an expression for average load current and average load voltage. (16)

14. (a) Explain the operation of closed loop speed control scheme of electric drive system with inner current control loop. Also mention the advantages of inner current loop in improving the drive performance. (16)

Or

(b) Discuss in detail performance comparison of P, PI and PID controllers used in closed loop control of DC drive system. (16)

15. (a) Explain the working principle of micro-computer based speed control system for the control of separately excited DC motor. (16)

Or

(b) Explain the following in detail

(i) Speed detection (8)

(ii) PLL based speed control (8)

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