22629

21222

3 Hours / 70 Marks Seat No. | | | | | | | | |

15 minutes extra for each hour

Instructions : (1) All Questions are *compulsory.*

(2) Illustrate your answers with neat sketches wherever necessary.

(3) Figures to the right indicate full marks.

Marks

1. Attempt any FIVE of the following : **10**

(a) State the need of electric drives.

(b) Draw block diagram of the basic elements of electric drives.

(c) List the advantages of converter controlled drives.

(d) Draw the circuit diagram of single phase half wave controlled converter drive.

(e) Draw the circuit diagram of rotor resistance control method of Induction motor.

(f) State the advantages of microcontroller based system over electronic speed control systems.

(g) State the functions of microprocessor in drives.

2. Attempt any THREE of the following : **12**

(a) Describe the four quadrant operation of a hoist with speed torque characteristics.

(b) Compare single phase and three phase full converter drives (Any four points).

(c) State the role of drives in sugar mills.

(d) Draw labelled block diagram of Phase Lock Loop (PLL) control DC motor drive. State the function of each block.

3. Attempt any THREE of the following : **12**

(a) Draw speed torque characteristics of Induction motor showing all regions.

(b) Draw the circuit diagram of single phase dual converter drive and explain its operation.

(c) Compare Class A and Class B chopper drive (Any four points).

(d) Describe the working of V/F control method for speed control of Induction motor with neat block diagram.

4. Attempt any THREE of the following : **12**

(a) Identify type of Chopper for forward motoring and forward braking of DC motor. Justify your answer with neat sketch.

(b) State the sequence of stages involved in Textile mill and the types of drive used for it.

(c) Describe with diagram the operation of centrifugal solar powered pump drives.

(d) Draw and explain microprocessor based control of synchronous motor drives.

(e) Draw the block diagram of microprocessor based control of DC motor.

5. Attempt any TWO of the following : **12**

(a) A separately excited dc motor is fed from 230 V, 50 Hz supply via a 1ϕ half controlled bridge rectifier. Armature parameters are L = 0.06 H, R = 0.3 Ω, Ka = 0.9 V/A rad/s and Rf = 104Ω. The field current is also controlled by a semiconvertor and is set to a maximum possible value. T_L = 50 N-m at 800 rpm. The inductances of armatures and field circuits are sufficient enough to make the armature and field currents continuous and ripple free. Compute :

(i) Field current I_f ,

(ii) Firing angle of the converter in the armature circuit

(b) Draw and describe four Quadrant Chopper Drive.

(c) State the rating and specification of stepper motor. If there are 4 pairs of stator phases and 6 teeth on rotor, calculate step angle.

6. Attempt any TWO of the following : **12**

(a) Draw the circuit diagram and waveforms of 3ϕ semiconverter drive. State the equation of average armature voltage.

(b) Classify choppers based on quadrant of operation with neat diagram and waveform, explain the operation of basic chopper circuit using SCR.

(c) Compare between the stator voltage control, constant V/F control and rotor resistance control (Any four points).

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