23124
3 Hours / 70 Marks

Seat No. | | | | | | | | |

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

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

(3) Figures to the right indicate full marks.

(4) Assume suitable data, if necessary.

Marks

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

(a) State the need of electric drive.

(b) Draw speed-torque characteristic of DC motors.

(c) Compare Single phase SCR drives and Three phase SCR drives with any two performance parameters.

(d) Draw circuit diagram of single phase semi-converter drive.

(e) List different speed control methods used for three phase induction motors.

(f) State the ratings & specifications of stepper motor drive.

(g) State the selection criteria of microcontroller for electric drives.

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

(a) Explain the block diagram of basic elements of electric drives.

(b) Compare half wave converter drive & full wave converter drive with four factors / points.

(c) Draw and describe class B chopper drive.

(d) With neat diagram explain stator voltage control method using thyristor circuit of three phase induction motor.

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

(a) State the selection criteria for the given type of electric drive.

(b) Draw the circuit of a three phase full converter drive. Draw the output waveform for voltage & current.

(c) Draw and describe class A chopper drive.

(d) Which type of drives are suitable for steel rolling mill ? Justify your answer.

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

(a) Explain the operation of basic chopper circuit using SCR.

(b) Which type of drives are used in sugar mill ? Explain with different stages.

(c) With neat diagram explain the operation of roto resistance control using chopper for speed control method of AC motors.

(d) With neat diagram explain the operation of stepper motor drive employing microcontroller.

(e) Describe microprocessor based speed control method used for DC motor with neat diagram.

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

(a) Draw the circuit diagram of single phase dual converter using SCR and describe its operation with waveforms.

(b) Draw and describe four quadrant operation of chopper drive with waveforms.

(c) State any two advantages of microcontroller based drive. Draw labelled block diagram of Phase Lock Loop (PLL) control DC motor drive and state function of each block.

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

(a) Compare stator voltage control, constant V/F control and rotor resistance control. (Any 4 points)

(b) Explain with diagram/sketch the operation of chopper controlled D.C. drive in solar and battery powered vehicles.

(c) The single phase dual converter operated from 230-V, 50 Hz supply and the load resistance is R = 10 Ω. The circulating inductance is $L\gamma$ = 40 mH; delay angle is $\alpha_1 = 60°$. Calculate the peak circulating current and the peak current, I_P of this converter circuit.
