22629

12425
3 Hours / 70 Marks

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

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

(2) Answer each next main Question on a new page.

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

(4) Figures to the right indicate full marks.

Marks

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

(a) Define Group drive and Multimotor drive.

(b) Draw speed torque characteristics of DC series motor.

(c) List any four advantages of converter controlled drives.

(d) Draw circuit diagram of single phase semiconverter drives.

(e) Draw block diagram of stator voltage control method of three phase induction motor.

(f) Enlist any four functions performed by microcontroller in speed control of drives.

(g) Draw a block diagram of microprocessor based DC motor controller.

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

(a) State the factors that should be considered for selection of drive.

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

(c) Describe the working of Class C chopper drive with neat diagram and waveforms.

(d) State the principle of slip power recovery system. Also draw its block diagram.

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

(a) Draw torque Vs speed/slip characteristics of Induction motor showing all regions. Explain it.

(b) Draw circuit diagram & Input/Output waveforms for single phase full wave converter.

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

(d) Describe role of drives in sugar mills.

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

(a) Identify the type of chopper drive for reversible regenerative braking of DC motor. Explain its working with quadrant diagram.

(b) With the help of block diagram, explain V/F control for speed control of Induction motor.

(c) Describe chopper controlled induction motor drive employing rotor resistance control technique.

(d) State the advantages of microcontroller based control drives.

(e) Describe the block diagram of synchronous motor drive using microcontroller.

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

(a) Describe the working of three phase dual converter with the help of neat diagram & waveforms.

(b) Explain with neat diagram and waveforms, the operation of class D chopper.

(c) Draw a neat diagram and explain the working of phase locked loop control of DC motor.

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

(a) A single phase full converter fed from 230 V, 50 Hz supply provides a variable voltage supply to armature of separately excited DC motor. The specifications of motor are 10 HP, 230 V, 1200 rpm, R_a = 0.25 Ω. Rated motor current is 40 A, motor voltage constant $k_a \phi$ = 0.172 V/rpm. The firing angle is 30º. For the rated motor current, calculate :

(i) Motor torque

(ii) Speed of the motor

(b) Give detailed classification of chopper based on Quadrants. Describe basic chopper circuit using SCR.

(c) List various stages involved in textile mill and its speed ratings and drives used at each stage.
