22629

24225

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.

(5) Use of Non-programmable Electronic Pocket Calculator is permissible.

(6) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

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

(a) State the types of Electric Drives.

(b) List the duty class of motor.

(c) State the types of SCR controlled drives.

(d) Draw only circuit diagram of three phase full wave converter.

(e) List various methods for speed control of AC drives.

(f) State any four advantages of microprocessor based drives.

(g) State any two ratings and specifications of stepper motor.

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

(a) Describe with block diagram the basic elements of electric drive.

(b) Draw circuit diagram of three phase dual converter using SCR, also draw its voltage and current waveforms.

(c) Classify the Chopper drives. Draw only circuit diagram of class D chopper.

(d) Explain with neat diagram the operation of Rotor resistance control using chopper of three phase induction motor.

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

(a) Describe the speed-torque characteristics of three phase induction motor.

(b) Compare semi-converter drives and full converter drives on the basis of :

(i) Quadrant of operation

(ii) Regenerative braking

(iii) Power flow

(iv) Motor heating

(c) Draw and describe class A chopper drive.

(d) Explain with neat block diagram the operation of constant V/F control method.

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

(a) Draw and describe class B chopper drive.

(b) State the sequence of stages and drives required in sugar mill.

(c) Explain with neat block diagram the operation of stator voltage control method for three phase induction motor.

(d) With the help of block diagram, explain Phase Lock Loop (PLL) control DC motor drive.

(e) Draw and explain the block diagram of synchronous motor drive using microcontroller.

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

(a) The speed of 10 HP, 230 volt, 1200 RPM separately excited DC motor is controlled by single phase full converter. The rated motor current is 40 A and armature resistance Ra is 0.25 Ω. The motor voltage constant $K a \phi = 0.182$ volt/rpm. For the value of $\alpha = 45°$, calculate the following :

(i) Average armature voltage

(ii) Back emf of the motor

(iii) Speed of motor

(iv) Torque of motor

(b) State a chopper drive suitable for forward motoring and braking. Draw its circuit diagram and waveform.

(c) Describe with diagram, the operation of solar and battery powered vehicles.

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

(a) Draw circuit diagram of single phase semi-converter using SCR and describe its working with voltage and current waveforms.

(b) Draw and describe four-Quadrant chopper drive.

(c) State the sequence of stages involved in Textile Mill. Which type of drive/motor are used in each stage ?
