11718

3 Hours / 100 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. (A) Attempt any THREE : **12**

(a) State the need of adjustable speed drives.

(b) List advantages of electrical braking system.

(c) Draw the block diagram of phase locked loop control of D.C. motor.

(d) Draw circuit diagram of single-phase semi-convertor and draw its voltage and current waveforms.

(B) Attempt any ONE : **6**

(a) Explain with diagram four quadrant operation of a motor driving hoist.

(b) Compare between single phase and three phase drivers on the basis of following factors :

(i) Value of ripple frequency

(ii) Motor current

(iii) Motor performance

(iv) Use for large horsepower drives

(v) Cost of drives

(vi) Harmonic contents and motor heating

2. Attempt any FOUR: **16**

(a) Explain starting of electric motors. State different methods of starting of electric motors.

(b) With suitable block diagram describe role of drives in different sections of Hot Rolling Mill.

(c) Draw circuit diagram of D.C. chopper using power MOSFET and explain its operation briefly.

(d) State the advantages of converter fed induction motors over direct line fed motors.

(e) With neat block diagram explain working of PWM control of induction motor.

(f) With neat circuit describe the working of two quadrant class B chopper drive.

3. Attempt any FOUR : **16**

(a) Describe the operation of four-quadrant transistorized chopper drive with circuit diagram.

(b) Explain the working of multi-phase chopper drives with circuit and waveforms.

(c) Draw circuit of 3-phase full converter drive for the D.C. motor.

(d) Compare D.C. shunt & D.C. series motors.

(e) Compare A.C. drives and D.C. drives on the basis of any four valid points.

4. (A) Attempt any THREE : **12**

(a) With circuit diagram and waveforms explain working of single phase full wave converter.

(b) Explain with diagram operation of stator voltage control method of speed control of induction motor.

(c) With block diagram explain operation of stepper motor drive employing micro-controller.

(d) State the drawback or limitations of conventional motor speed control methods as compared to micro-controller based system.

(B) Attempt any ONE : **6**

(a) Explain speed control methods of induction motor using chopper controlled resistance in rotor circuit.

(b) In paper mill, describe the drives required for making pulp from raw material and for converting pulp into paper.

5. Attempt any FOUR : **16**

(a) A semiconverter operated from single phase 230 V, 50 Hz supply drives 10 HP motor at 200 V running with speed 1500 RPM, separately excited d.c. motor. The rated armature current is 40 A. The motor has R_a = 0.5 Ω & L_a = 10 mH $K_a \phi$ = 0.2 V/rpm. Find out the following at $\alpha = 30°$ (i) Average armature voltage (ii) Buck emf of motor (iii) speed of motor (iv) motor torque.

(b) Compare between stator voltage control method and rotor resistance control method of speed control methods of induction motor.

P.T.O.

(c) Draw block diagram & explain marking of closed loop control of synchronous motors.

(d) Describe requirement of drives for sugar mill.

(e) State the method of braking of electric motors.

(f) Explain frequency control method to control the speed of induction motor.

6. Attempt any FOUR : **16**

(a) State advantages of microcontroller / microprocessor based control for drives over conventional methods.

(b) Which type of drive motor is suitable for machine tool application ?

(c) Write different eight stages involved in textile mill and requirement of speed at each stage.

(d) What factors are considered for selection of drive for particular application ?

(e) State importance of phase failure protection in three phase drives.
