

17667

11920

3 Hours / 100 Marks

Seat No.

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- 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.
 - (5) Assume suitable data, if necessary.
 - (6) Use of Non-programmable Electronic Pocket Calculator is permissible.
 - (7) Mobile Phone, Pager and any other Electronic Communication devices are not permissible in Examination Hall.

Marks

1. a) **Attempt any THREE of the following:** **12**
 - (i) State four advantages of electric motor as prime mover.
 - (ii) State the need of electric drive.
 - (iii) State any four functions of micro processor in drives.
 - (iv) Compare 1ϕ and 3ϕ full converter drive. (any four points)

- b) **Attempt any ONE of the following:** **6**
 - (i) Draw and explain block diagram of the basic elements of electric drive.
 - (ii) Explain the working of 1ϕ semiconverter drive with neat diagram. Also draw voltage and current waveform.

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- 2. Attempt any FOUR of the following:** **16**
- a) Mention four important factors to select a drive.
 - b) List various stages involved in textile mill and state its speed rating at each stage.
 - c) Mention the various electric braking methods of DC motor. Explain any one of them.
 - d) List different methods of speed control of Induction motor.
 - e) A 3ϕ induction motor is wound for 4 poles and is supplied from 50 Hz system. Calculate synchronous speed.
 - f) Sketch quadrant diagram of four quadrant chopper drive and write action of drive in each quadrant.
- 3. Attempt any FOUR of the following:** **16**
- a) State suitable type of chopper for forward motoring and forward braking. Draw its quadrant operation.
 - b) Explain the operation of DC chopper using power MOSFET.
 - c) Draw block diagram of converter based DC drive and state function of each block.
 - d) State suitable type of chopper for very large load current requirement, justify with neat sketch.
 - e) Compare AC and DC drive. (any four points.)
- 4. a) Attempt any THREE of the following:** **12**
- (i) Draw and state the importance of phase failure protection in 3ϕ drive.
 - (ii) State any four advantages of converter fed induction motor.
 - (iii) List any four advantages of micro processor based system over conventional speed control system.
 - (iv) Draw only block diagram of micro processor based DC motor controller.

- b) **Attempt any ONE of the following:** **6**
- (i) Explain four quadrant operation of drive.
 - (ii) Explain the different stages involved in paper making. Also state drive/motor used in each stage.
- 5. Attempt any FOUR of the following:** **16**
- a) A semi converter operated from single phase 230v, 50Hz AC supply drives a 10HP, 200V, 1500RPM. seperately excited dc motor. The rated armature current is 40A, the motor parameters are $R_a = 0.5\Omega$, $L_a = 10\text{mH}$, $k_a\phi = 0.2 \text{ v/rpm}$. Find out the following a + $\alpha = 30^\circ$
 - (i) Average armature voltage.
 - (ii) Back emf of the motor
 - (iii) Speed of the motor
 - (iv) Motor torque
 - b) Describe working of PWM control method of Induction motor.
 - c) Explain rotor resistance control method of induction motor using DC chopper.
 - d) State the operation of different stages involved in sugar mill.
 - e) Draw diagram of 3 ϕ full converter drive. State the equation for average armature voltage.
 - f) List the four ratings and four specifications of stepper motor.
- 6. Attempt any FOUR of the following:** **16**
- a) Draw and explain working of PLL control of DC drives.
 - b) Explain microprocessor based stepper motor system with neat diagram.
 - c) With the help of block diagram explain v/f control method using square wave inverter.
 - d) List different requirements of motor used for machine tools.
 - e) Compare stator voltage control and constant v/f control method of speed control of induction motor.
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