

17667

11819

3 Hours / 100 Marks

Seat No.

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

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|---|--------------|
| 1. (A) Attempt any THREE : | 12 |
| (a) State advantages of electric motor as prime mover. | |
| (b) State the need of adjustable speed drives. | |
| (c) Enlist any eight functions of microcontroller in speed control of Drives. | |
| (d) Explain with neat diagram Single-phase Dual converter drive. | |
| (B) Attempt any ONE of the following : | 6 |
| (a) Explain with neat circuit diagram 3ϕ full wave converter drive using DC shunt motor and also explain the need of free wheeling diode. | |
| (b) Explain four quadrant operation of a drive with neat diagram. | |
| 2. Attempt any FOUR of the following : | 16 |
| (a) Draw and explain DC chopper using power MOSFET. | |
| (b) A single phase full controlled bridge rectifier fed from 230 V, 50 Hz supply. Find average armature voltage for $\alpha = 60^\circ$ & 120° . | |
| (c) Compare between mechanical braking and electrical braking with four valid points. | |
| (d) State any four the selection criterias of drives for a particular application. | |
| (e) Compare full converter drive and semi-converter drive on the basis of
(i) Quadrant operation (ii) Regenerative braking (iii) Motor heating (iv) power flow | |
| (f) State sequence of stages & drives used for them in Textile mills. | |

- 3. Attempt any FOUR of the following :** **16**
- (a) Compare DC shunt motor & DC series motor with Torque-Speed characteristics and application.
 - (b) Classify different types of chopper motor drives on the basis of Quadrant Operation.
 - (c) State the drives used in paper mill.
 - (d) State requirements of drives used for machine tool applications. Which type of motor is suitable for these applications ?
 - (e) Explain operation of microprocessor based speed control drive with block diagram.
 - (f) Compare AC drives with DC drives. (any four points)
- 4. (A) Attempt any THREE of the following :** **12**
- (a) Draw schematic diagram of speed control of stepper motor using micro-controller.
 - (b) List various methods of controlling speed of induction motor drives.
 - (c) List four advantages of converter fed induction motor.
 - (d) State any four advantages of microcontroller based drives.
- (B) Attempt any ONE :** **6**
- (a) State requirements of drives used in steel rolling mill. Which motor is used ?
 - (b) Explain rotor-resistance control of induction motor using chopper for speed control of induction motor.
- 5. Attempt any FOUR :** **16**
- (a) Explain single phase semi-converter drive for speed control of separately excited DC motor.
 - (b) Write the sequence of stages and drives used in each stage for Sugar mill.
 - (c) Explain stator voltage control method of induction motor with block diagram.
 - (d) Draw the block diagram and explain the working of phase locked loop control of DC motor drive.
 - (e) Draw the circuit diagram of three phase dual-converter drive and explain its operation.
 - (f) List any four advantages of induction motor drives over DC motor drives.

6. Attempt any FOUR :**16**

- (a) Draw neat block diagram of micro-computer based control of DC motor drive.
 - (b) Identify type of chopper used for large current applications. Justify with neat diagram & waveforms.
 - (c) Draw schematic arrangement of closed loop control by using PWM inverter for induction motor.
 - (d) Compare the following speed control method of induction motor, stator voltage control and V/F control.
 - (e) Describe working of two quadrant chopper drive with neat diagram.
 - (f) Which drives are used in Elevators & Why ? Justify your answer.
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