

Sample Test Paper - I

Course Name : Diploma in Industrial Electronics

Course Code : IE / IU

Semester : Sixth Semester for IE & Seventh for IU

Subject Title : Industrial Drives

Marks : 25

17667

Time : 1 Hour.

Q.1 Attempt any THREE

09 Marks

- Draw and explain block diagram of the Basic elements of electric drives.
- Draw the torque – speed characteristics of DC shunt motor and write its importance in drive.
- Draw circuit for speed control of a separately excited DC motor using ac to dc converter.
- State different requirements of adjustable drives.

Q.2 Attempt any TWO

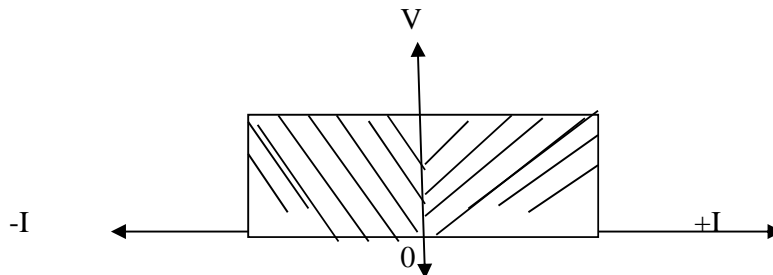
08 Marks

- List any four advantages of converter controlled drives over chopper drives.
- Draw the circuit diagram of DC chopper using POWER MOSFET. Describe its operation with voltage and current waveforms.
- List out different factors considered for selection of electric drive.

Q.3 Attempt any TWO

08 Marks

- Sketch quadrant diagram for four quadrant chopper Drive and write action of drive in each quadrant.
- State any four advantages of electrical braking in drives.
- Identify the chopper type for the following diagram quadrant operation. State the drive for which this chopper is suitable? Why it is suitable?



Sample Test Paper - II

Course Name : Diploma in Industrial Electronics

Course Code : IE / IU

Semester : Sixth Semester for IE & Seventh for IU

Subject Title : Industrial Drives

Marks : 25

17667

Time : 1 Hour.

Q.1 Attempt any THREE

09 Marks

- State any three advantages of converter fed induction motor.
- Draw a block diagram of microprocessor based DC motor controller
- Write different stages and drives required for sugar mills.

Q.2 Attempt any TWO

08 Marks

- Draw a circuit diagram of rotor resistance control method for induction motor.
- A semi converter operated from single phase 230 volt, 50 Hz supply drives a 10HP, 200 volt, 1500rpm, separately excited DC motor. The rated armature current is 40A, the motor parameters $R_a=0.05\text{ohm}$, $L_a=10\text{mH}$. $K_a\phi$ constant $=0.2\text{V/rpm}$. Find out the following parameters $\alpha = 30^\circ$
 - average armature voltage,
 - back emf of motor
 - speed of motor
 - motor torque.
- Which are the requirements for reversing cold rolled mills motor drives?

Q.3 Attempt any TWO

08 Marks

- Draw the block diagram of constant V/F control using a square wave inverter.
- With the help of block schematic explain the use of phase lock loop (PLL) for speed control of DC motors.
- List the selection criteria of microprocessor/microcontroller for electric drives.

Sample Question Paper

Course Name : Diploma in Industrial Electronics

Course Code : IE / IU

Semester : Sixth Semester for IE & Seventh for IU

Subject Title : Industrial Drives

Marks : 100

17667

Time: 3 Hours

Instructions:

1. All questions are compulsory
2. Illustrate your answers with neat sketches wherever necessary
3. Figures to the right indicate full marks
4. Preferably, write the answers in sequential order.

Q.1 A) Attempt any THREE

12 Marks

- a) State the need of electric drives.
- b) List four types of braking systems used in induction motors.
- c) Draw the block diagram of microcomputer based speed control of AC drive.
- d) Draw circuit diagram of single phase dual converter and draw its voltage and current waveforms.

Q.1 B) Attempt any ONE

06 Marks

- a) Illustrate drives stability with the help of torque – speed characteristics.
- b) Compare semi converter drives and full converter drives on the basis of
 - 1) Quadrant operation
 - 2) Regenerative braking
 - 3) Power flow
 - 4) harmonic contents
 - 5) Peak motor current
 - 6) motor heating

Q.2 Attempt any FOUR

16 Marks

- a) State any four requirements of adjustable drives.
- b) List no of stages involved in paper mill. Which type of motor/drives used at each stage?
- c) Compare PWM control and variable frequency control strategies of a chopper (any four factors).
- d) List advantages of induction motor drive over DC motor drive.
- e) Describe the working of voltage / frequency control using square wave inverter.
- f) Chopper based drives are more preferable to converter based drives, give any four reasons

Q.3 Attempt any FOUR

16 Marks

- a) Describe the working of two quadrant operation of DC drive.
- b) Sketch the circuit diagram and write operation of current limit control (CLC) method for chopper with voltage and current waveforms.
- c) Draw power circuit of 3 phase semi converter drive for the DC motor.
- d) State suitable type of chopper for very large load current requirement, justify with neat sketch.
- e) Compare AC drives and DC drives on the basis of
 - 1) Type of motor
 - 2) Speed of operation
 - 3) Power circuit used
 - 4) Applications.

Q.4 A) Attempt any THREE**12 Marks**

- Draw block diagram of converter based DC drive and state function of each block.
- List any four advantages of converter fed induction motor.
- Describe role of microprocessor for speed control of DC motor with neat diagram
- List any four advantages of microcontroller based system over conventional electronic speed control systems.

Q.4 B) Attempt any ONE**06 Marks**

- Describe the four quadrant operation of induction motor with speed torque characteristics.
- Which type of drive/motor used in steel rolling mill at each stage? State specifications of drive at each stage.

Q.5 Attempt any FOUR**16 Marks**

- A three phase half controlled bridge rectifier fed from 230 volts, 50 Hz supply provides a variable voltage supply to the armature of a separately excited DC motor. The specifications of motor are- $R = 0.02 \Omega$ (Ohms), $L = 0.002$ H, the constant of motor – 2.25 V /rad. Rated current 500A. determine the firing angle α so that the motor runs at rated speed of 1500 rpm
- A four pole 1440 rpm three phase induction motor is operated from per phase voltage of 240 V 50 Hz and driving a constant torque load. Calculate the following at frequency 25 Hz. $\Phi_{ag} = 4.8$. Calculate- i) supply voltage / phase ii) slip iii) slip frequency and iv) slip at 25 Hz.
- Draw labeled block diagram of PWM control method of induction motor. Write any two advantages of it.
- List different requirements of motors used for machine tools.
- What do you mean by plugging of DC series motor?
- Draw labeled block diagram field oriented control CSI fed induction motor and state the function of microcontroller in it.

Q.6 Attempt any FOUR**16 Marks**

- Draw labeled block diagram of phase lock loop (PLL) control DC motor drive. State function of each block.
- Which type of drive motor is suitable for Robotic Arm? Explain its working with diagram.
- Which procedure is adopted to achieve soft start of induction motor using thyristor circuit? Justify your answer.
- Write different eight stages involved in textile mill and its speed ratings at each stage.
- What is cyclo converter drive? Write principle of operation of low speed AC motor with cyclo converter. Draw its output wave forms for single phase.