

# **QUESTION BANK**

## **INDUSTRIAL ELECTRONICS**

### **UNIT-1**

#### **IMPORTANT QUESTIONS-**

#### **SHORT QUESTIONS-**

1. Define latching and holding currents as applicable to SCR.
2. What is need of series and parallel operation of thyristors?
3. Explain the basic principle of converters.
4. Compare the GTO and Triac.
5. Draw the V-I characteristic of TRIAC.
6. Explain the basic principle of Thyristor.
7. List the type of power diodes .
8. Name different power electronic circuits?
9. Compare MOSFET and BJT.

#### **LONG QUESTIONS-**

1. Describe the resistance firing circuit used for triggering SCRs. Is it possible to get a firing angle greater than  $90^\circ$  with resistance firing? Illustrate your answer with appropriate wave form.
2. Draw and explain steady state characteristic of Power MOSFET and IGBT.
3. Explain methods of turn on operation of GTO and TRIAC.
4. What is MCT? How is it differing from SCR?
5. What is the difference between current controlled transistors and voltage controlled transistors?
6. Explain the thyristor turn-on methods. What are the applications of thyristor?
7. Write a note on resistance capacitance firing circuit.

8. The voltage and current rating in a particular circuit are 3KV and 750A respectively. SCRs with a rating of 800V and 175A are available. Minimum derating factor is 15%. Determine the number of series and parallel units required.
9. Draw static v-I characteristics of SCR and explain its operation?
10. Explain triggering methods of thyristor.
11. Discuss two transistor analogy applied to thyristor

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### **INDUSTRIAL ELECTRONICS**

#### **UNIT-2**

#### **IMPORTANT QUESTIONS-**

##### **SHORT QUESTIONS-**

1. What is the need for controlling the voltage at the output terminals of the inverter.
2. List the applications of voltage source inverter.
3. Define input power factor?
4. What is the effect of freewheeling diode in circuit of 3- pulse mid point converter?
5. List applications of current source inverter?

##### **LONG QUESTIONS-**

6. Describe the working of a single phase full converter in the rectifier mode with RLE load. Derive an expression for the average output voltage in terms of source voltage and firing angle.
7. What do you mean by the three phase inverter? Explain its working with its output waveforms.

8. What is extinction angle and conduction angle? Explain the effect of freewheeling diode in a bridge rectifier connected to R-L load.
9. Explain the working of three phase bridge inverter with its different characteristics
10. Explain 1  $\phi$  half wave controlled rectifier with R-L load and freewheeling diode?
11. What are various performance factors of line commutated convertors?
12. Explain parallel inverters.

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### **INDUSTRIAL ELECTRONICS**

#### **UNIT-3**

#### **IMPORTANT QUESTIONS-**

#### **SHORT QUESTIONS-**

1. Why chopper based DC drives gives better performance than rectifies controlled drives?
2. Give two difference between two quadrant and four quadrant Drives.
3. What is current limit control?
4. List the advantages of current commuted chopper.
5. What is the principle of current limit control strategy?
6. List advantages of current commuted chopper?

## **LONG QUESTIONS-**

1. A dc chopper feeds power to an RLE load with  $R=2\Omega$ ,  $L = 10\text{mH}$  and  $E = 6\text{V}$ . If this chopper is operating at a chopping frequency of  $1\text{KHz}$  and with duty cycle of  $10\%$  from a  $220\text{ V}$  dc source, compute the maximum and minimum currents taken by the load.
2. A single phase full wave ac controller operates from  $230\text{V}$ ,  $50\text{ Hz}$  mains and feeds a resistive load whose value varies between  $1.15\text{ ohms}$  and  $2.30\text{ ohms}$ . Calculate:  
(i) RMS current rating of each SCR                      (ii) Average current rating of each SCR  
(iii) The maximum load power for  $\alpha = \pi/4$
3. Explain with the associated waveform, how power factor can be improved with symmetrical angle control scheme.
4. Explain the concept of step down cycloconverter. Enumerate the advantages and applications of cycloconverter
5. A  $220\text{ volts}$ ,  $1500\text{ rpm}$ ,  $10\text{ Amps}$  separately excited dc motor has an armature resistance of  $10\ \Omega$ . It is fed from a single phase fully controlled bridge rectifier with an ac source voltage of  $230\text{ volts}$ , at  $50\text{ Hz}$ . Assuming continuous load current, compute i). The motor speed at firing angle of  $30\text{ degrees}$  and torque of  $5\text{ Nm}$  ii). Developed torque at the firing angle of  $45\text{ degrees}$  and speed of  $1000\text{ RPM}$
6. Explain the operation of separately excited dc motor driven using a semiconverter.
7. Explain the principle of chopper operation. Also Explain the working of stepup chopper.
8. Explain the speed control of DC series motor using single phase full converter.
9. Explain four quadrant chopper drives.
10. Define 3-phase semi-converter drives.
11. Explain the basic principle of operation of step up and step down chopper with its V-I characteristics.
12. Discuss operation of single phase full converter drive with continuous and discontinuous load current?
13. The speed of a separated excited d.c motor is controlled through  $1-\phi$  half controlled converter from  $230\text{ V}$  mains. The motor armature resistance is  $0.5\text{ ohm}$  and motor constant  $k=0.4\text{ v-s/rad}$ . For load torque of  $20\text{ Nm}$  at  $1500\text{ r.p.m}$  and for constant armature current, calculate (m) Firing angle of the converter (n) RMS value of thyristor current (o) input power factor of the motor

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## INDUSTRIAL ELECTRONICS

### UNIT-4

#### **1. IMPORTANT QUESTIONS -**

##### **SHORT QUESTIONS-**

1. What is slip power recovery system?
2. A 3- $\phi$  induction motor having 4 poles is fed with 3- $\phi$ , 50Hz supply. Find the slip when the motor is running at 1600 rpm.
3. Discuss about the significance of rotor resistance control.
4. Write the differences between AC drives and DC drives.
5. What is the role of damper winding in a synchronous motor?
6. What are the advantages of induction motor over dc motor?

##### **LONG QUESTIONS-**

1. In static rotor-resistance control of a 3-phase SRIM, each diode in the rotor circuit conducts for  $120^\circ$ . Assuming ripple free rotor currents derive expressions for RMS value of rotor current referred to stator, fundamental component of rotor current and its value referred to stator.
2. A 500kw, 3-phase, 3.3kV, 50Hz, 0.8(lagging) power factor, 4 pole, star connected synchronous motor has following parameters:  $X_s=15\Omega$ ,  $R_s=0$ . Rated field current is 10A. Calculate (i) Armature current and power factor at half the rated torque and rated field current (ii) Field current to get unity power factor at the rated torque.
3. Enumerate the variable frequency control of an induction motor.
4. Draw a suitable diagram & explain working of slip power recovery system using commutator-less Kramer drive.
5. Explain the construction and working of three phase induction motor.
6. Discuss about any one method for speed control of induction motor.
7. Define speed control of induction motors. Define the method of resistance control.

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## **INDUSTRIAL ELECTRONICS**

### **UNIT-5**

#### **IMPORTANT QUESTIONS-**

#### **SHORT QUESTIONS-**

1. Write the short note on cooling and heatsinks.
2. What is snubber circuit? Explain with its circuit diagram.

#### **LONG QUESTIONS-**

1. Define  $di/dt$  and  $dv/dt$  protection of SCRs. What are the components used to protect SCR from  $dv/dt$  and  $di/dt$  in large values.
2. Briefly describe voltage protection and current protection.
3. Explain the current protection schemes for thyristors. Why it is required?