

Scheme – G
Sample Question Paper

Course Name : Diploma in Electrical Engineering

Course Code : EE / EP

Semester : Sixth

Subject Title : Power Electronics

Marks : 100

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. Assume suitable data if necessary.
5. Preferably, write the answers in sequential order.

Q1. (A) Attempt any THREE

12 Marks

- a) Name the regions indicated by letters A, B, C and D in the figure 1.

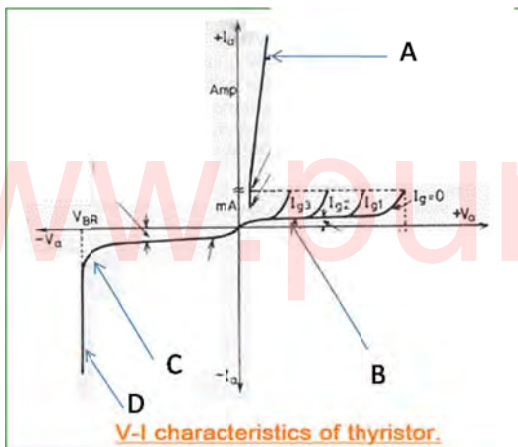


Figure 1

- b) State the necessity of converter and give the classification of controlled converter.
- c) State the criteria for selection of single phase and three-phase inverter for required application.
- d) State the principle of application of chopper and list the various control techniques of chopper.

Q.1 (B) Attempt any ONE

06 Marks

- a) Identify the power electronic devices shown in figure 2 and Classify them as unidirectional and bidirectional devices.

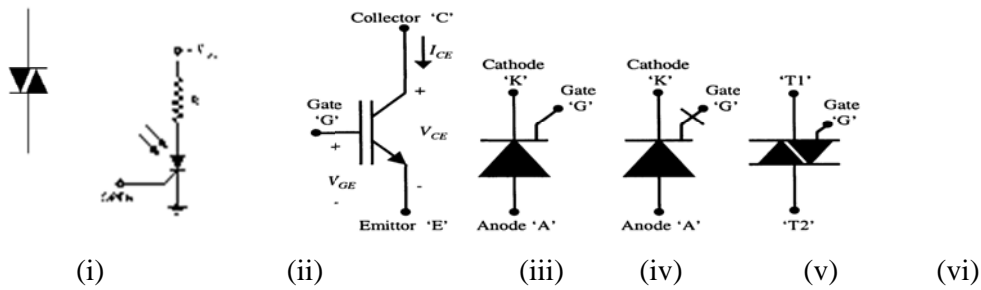


Figure 2

b) Write the specifications/ratings of SCR (i) Voltage (ii) Current (iii) Power (iv) Temperature.

Q.2 Attempt any FOUR

16 Marks

- a) State the various gate triggering methods of SCR. Describe any one method.
- b) Compare single phase and three phase converter on the basis of - RMS value, Average value, Ripple factor and Efficiency.
- c) Draw the circuit diagram and current and voltage waveforms of series inverter and draw its configuration.
- d) State the classification of chopper according to the direction of output voltage and current.
- e) State the basic principle of AC and DC machines.
- f) Describe the speed control of DC series motor with single phase half controlled converter.

Q.3 Attempt any FOUR

16 Marks

- a) State the principle of operation and construction of SCR.
- b) Describe the single phase full wave controlled converter with resistive load.
- c) Describe the principle of operation of inverter.
- d) Describe the working of chopper with the help of circuit diagram and output voltage waveforms.
- e) Describe the circuit diagram and operation of DC static circuit breaker.

Q.4 (A) Attempt any THREE

12 Marks

- a) State the various methods of speed control of induction motor and describe any one of them.
- b) State the description and classification of inverter according to the method of commutation.
- c) Describe the operation of basic parallel inverter.
- d) Describe the principle of dielectric heating. Give any two application.

Q.4 (B) Attempt any ONE

06 Marks

- a) Study the converter configuration shown in figure 3, Identify the configuration and answer the following questions.
 - (i) State sequence of triggering of SCRs.
 - (ii) Draw current path In all the stages.

- (iii) State function of D_m shown in the figure.
- (iv) Draw load voltage and load current waveforms.
- (v) Describe operation of converter.

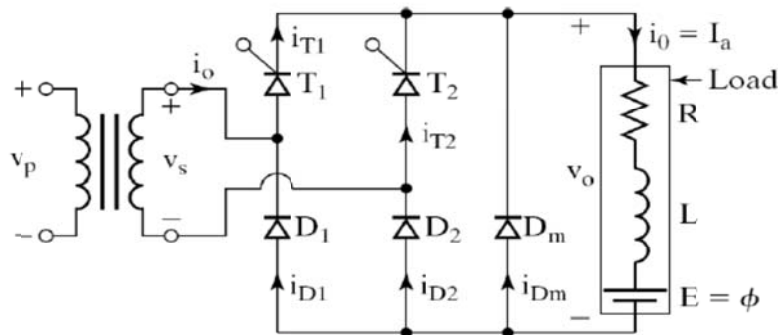


Figure 3

- b) Describe the principle of operation of cycloconverter with its input and output waveforms.

Q.5 Attempt any FOUR

16 Marks

- a) State the classification of chopper commutation methods and describe any one of them.
- b) “Freewheeling diode improves the power factor of the system” Justify the answer
- c) Describe the harmonic reduction by single pulse width modulation method.
- d) Describe the principle of induction heating. State the merits and demerits of induction heating over conventional methods.
- e) Describe the working of chopper fed DC series motor, with the help of suitable circuit diagram.
- f) Draw the circuit diagram and describe the operation of electric welding control using SCR.

Q.6 Attempt any FOUR

16 Marks

- a) State the effect of source impedance on converter operation.
- b) List the commonly used PWM control technique of inverter and describe any one of them.
- c) Draw a schematic of step down and step up chopper.
- d) Describe the basic principle of Static VAR compensator.
- e) Describe the working of Jones chopper, with the help of circuit diagram and output voltage waveforms.

Scheme – G
Sample Test Paper - I

Course Name : Diploma in Electrical Engineering

Course Code : EE / EP

Semester : Sixth

Subject Title : Power Electronics

Marks : 25

17638

Time: 1 Hour

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. Preferably, write the answers in sequential order.

Q1. Attempt any THREE

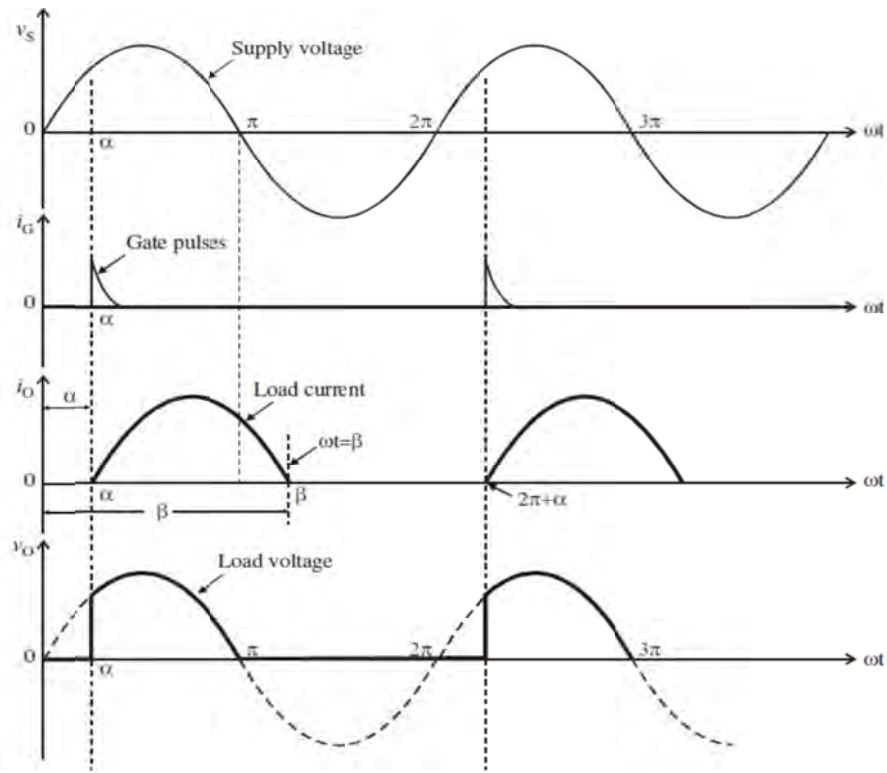
9 Marks

- a) Draw a block diagram of power electronic system and state the function of each block.
- b) Compare Transistor and Thyristor on the basis of- Construction, Forward voltage drop and Current and voltage rating.
- c) What is firing angle?
- d) Draw input and output waveforms of Cycloconverter with pure resistive load.

Q2. Attempt any TWO

8 Marks

- a) Describe the dv/dt triggering method of SCR.
- b) Draw a symbol of SCR and define (i) Holding current (ii) Latching current (iii) Gate current with respect to SCR.
- c) Study the in figure 1 which indicates the wave shapes of converter. Answer the following questions.
 - (i) Name the converter and Identify and name the components of load.
 - (ii) State frequency of gate pulse.
 - (iii) What is α and β indicated in the wave shape?
 - (iv) Name the component which has given zero load voltage between $\omega t = \pi$ and $\omega t = \beta$ even though load current has positive value. Describe its operation.



I.

Figure 1

Q3. Attempt any TWO

8 Marks

- State various methods of turning OFF of SCR and describe any one of them.
- Describe the effect of freewheeling diode with the help of simple circuit.
- Describe the working of three phase fully controlled bridge converter with Resistive load.

Scheme – G
Sample Test Paper - II

Course Name : Diploma in Electrical Engineering

Course Code : EE / EP

Semester : Sixth

Subject Title : Power Electronics

Marks : 25

17638

Time: 1 Hour

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. Preferably, write the answers in sequential order.

Q1. Attempt any THREE

9 Marks

- a) State different types of inverters and state their applications.
- b) State any two merits and demerits of load commutated chopper.
- c) Draw the battery charger circuit using SCR.
- d) State any two advantages of DC drive systems and state its applications.

Q2. Attempt any TWO

8 Marks

- a) Compare voltage source inverter (VSI) and current source inverter (CSI) on the basis of- Input voltage and input current, Effect of misfiring, freewheeling diode and Commutation circuit.
- b) Describe the working principle of class-A chopper.
- c) Describe the automatic street lighting circuit using SCR.

Q3. Attempt any TWO

8 Marks

- a) Describe the LC filter used to improve the output waveform of inverter.
- b) Describe the operation of step-up chopper with neat sketch.
- c) Compare induction heating and dielectric heating on the basis of: - Material, Rate of heating, Frequency and Applications.