

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

1. (a) Attempt any **SIX** of the following: [12]
(i) Draw the symbol of : (1) SCS (2) SBS
(ii) State any two advantages of poly-phase rectifier.
(iii) What is the need of inverter?
(iv) List two features of IGBT.
(v) List two applications of chopper.
(vi) Define holding current (I_H) and Latching current (I_L) of SCR.
(vii) Give classification of Inverter.
(viii) Define rectification. State any two devices used for rectification.
- (b) Attempt any **TWO** of the following: [8]
(i) Explain how DC voltage is controlled in single phase half wave controlled rectifier with resistive load.
(ii) Define inverter and give classification of inverter.
(iii) Draw and explain the block diagram of SMPS.
2. Attempt any **FOUR** of the following: [16]
(a) Draw symbol of TRIAC. TRIAC can be operated in how many modes? Which mode is most sensitive?
(b) Draw V-I characteristics of UJT and describe its different operating region.
(c) Describe working of single phase centre tapped full wave controlled Rectifier with Resistive load.
(d) Draw block diagram of UPS. Explain each block in detail.
(e) What are different Turn ON methods of SCR? Explain dv/dt triggering.
(f) Draw the circuit diagram of Resistance triggering. Explain the working with necessary waveforms.
3. Attempt any **FOUR** of the following: [16]
(a) Compare power BJT, power MOSFET and IGBT (any four points).
(b) Describe the effect of free wheeling diode in controlled rectifiers.
(c) State the types of power MOSFETS. Explain the working of any one type with a constructional diagram.
(d) Draw the circuit diagram and waveforms of 3-phase half wave controlled rectifier.
(e) Draw the circuit diagram of emergency lighting system using SCR and describe its working.
(f) Compare step up and step down chopper. (any four points)

4. Attempt any **FOUR** of the following: [16]
- (a) Draw the series resonant commutation circuit for SCR and describe its working.
 - (b) What is poly-phase rectifier? State its need.
 - (c) Define the following terms w.r.t. inverters :
 - (i) Harmonic factor of n^{th} harmonic
 - (ii) Total harmonic distortion
 - (iii) Distortion factor
 - (iv) Lowest order harmonics
 - (d) What is SMPS? State types of SMPS. Sketch block diagram of SMPS and label it will.
 - (e) What is commutation? Explain class C commutation with neat diagram.
 - (f) Describe working of emergency lighting system with neat circuit diagram.
5. Attempt any **FOUR** of the following: [16]
- (a) Draw the neat circuit diagram of class B chopper and draw its input and output voltage waveforms.
 - (b) Using UJT relaxation oscillator, how SCR can be fired?
 - (c) Draw circuit diagram of low power DC flasher. List any two applications.
 - (d) With necessary waveforms explain the turn-off mechanism of SCR.
 - (e) Draw the construction of GTO & explain the working principle.
 - (f) Explain RC triggering circuit with neat circuit diagram & waveforms.
6. Attempt any **FOUR** of the following: [16]
- (a) A single phase full wave controlled rectifier is supplied with $V = 230 \sin (314 t)$, find average output DC voltage and current of firing angle is 45° and load resistance is 100Ω .
 - (b) Draw circuit diagram of 2-Quadrant chopper and explain its working.
 - (c) State one application each for
 - (i) SCR
 - (ii) PUT
 - (iii) TRIAC and
 - (iv) GTO
 - (d) State any two features of power MOSFET. Which makes it suitable for medium power applications?
 - (e) Explain operation of Electronic timer using SCR. Give any two applications.
 - (f) Describe working of fully controlled bridge rectifier with RL load.

