17444

15162

3 Hours / 100 Marks Seat No. | | | | | | | | |

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) Use of Non-programmable Electronic Pocket Calculator is permissible.

Marks

1. (A) Attempt any SIX : **2 × 6 = 12**

(a) Name any two triggering devices used for SCR.

(b) List two features of IGBT.

(c) Define (i) Latching current and (ii) Holding current.

(d) List two applications of chopper.

(e) Define commutation. What is the meaning of natural commutation ?

(f) State the concept of chopper.

(g) Define firing angle and conduction angle.

(h) State any two applications of UPS.

(B) Attempt any TWO : **4 × 2 = 08**

(a) Compare controlled and uncontrolled rectifier (any four points).

(b) Define inverter and give classification of inverter.

(c) Draw the labelled circuit diagram of Electronic Timer using SCR.

2. Attempt any FOUR : **4 × 4 = 16**

(a) Draw the circuit diagram and input and output voltage waveforms of 3ϕ half wave rectifier with resistive load.

(b) Draw the circuit diagram of step-up chopper and state its operating principle.

P.T.O.

(c) State the working of temperature controller circuit using SCR with neat diagram.

(d) State the advantages and applications of GTO.

(e) Describe the working of Class-B commutation with neat circuit diagram.

(f) State different performance parameters of inverter and describe any two in details.

3. Attempt any FOUR : **4 × 4 = 16**

(a) Draw V-I characteristics of DIAC. Is DIAC equally sensitive in both the directions ? Give two applications of DIAC.

(b) Draw and explain single phase half wave controlled rectifier circuit with RL load.

(c) Draw the two transistor model of SCR and explain it.

(d) Compare power BJT, power MOSFET and IGBT (any four points).

(e) Describe the effect of free wheeling diode in controlled rectifiers.

(f) Draw the single phase full wave bridge type controlled rectifier. Draw the waveforms of input voltage, load voltage and voltage across SCR.

4. Attempt any FOUR : **4 × 4 = 16**

(a) 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.

(b) What is SMPS ? State types of SMPS. Sketch block diagram of SMPS and label it will.

(c) Describe LASCR. Give its industrial applications.

(d) List various forced commutation methods. Explain self commutation by resonating load.

(e) With neat sketch, explain SCR based battery charger circuit. Which component avoid overcharging ?

(f) State different advantages of MOSFET inverter.

5. Attempt any FOUR : **4 × 4 = 16**

(a) Draw the neat circuit diagram of emergency lighting system using SCR and describe its working.

(b) Draw V-I characteristics of PUT and describe the role of its operating regions.

(c) What is the poly phase rectifier ? State its need.

(d) Describe the operation of pulse transformer used in triggering circuits.

(e) Draw labelled layer diagram of N-Channel IGBT. Draw its V-I characteristics.

(f) Differentiate between single phase controlled half wave rectifier and single phase controlled full wave rectifier.

6. Attempt any FOUR : **4 × 4 = 16**

(a) Sketch circuit diagram of low power DC flasher and state how flashing occurs.

(b) A single phase half wave rectifier is used to supply power to load impedance 10 Ω from 230 V, 50 Hz A.C. supply at firing angle 30°. Calculate average load voltage.

(c) Compare natural and forced commutation.

(d) State one application each for

(i) SCR

(ii) PUT

(iii) TRIAC and

(iv) GTO

(e) Explain dv/dt turn on method of an SCR.

(f) State any two features of power MOSFET. Which makes it suitable for medium power applications ?

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