22427

12425

3 Hours / 70 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) Assume suitable data, if necessary.

Marks

1. Attempt any FIVE of the following : **5 × 2 = 10**

(a) Draw V-I characteristics of IGBT and label the different regions.

(b) Draw the symbols of (i) GTO (ii) SUS.

(c) State difference between forced commutation and natural commutation. (Any two points)

(d) State any two applications of controlled rectifiers.

(e) List two applications of choppers.

(f) Define Inverter. Classify it.

(g) List any two advantages of UPS.

2. Attempt any THREE of the following : **3 × 4 = 12**

(a) Draw V-I characteristics of SCR and define holding current and latching current.

(b) Draw block diagram of SMPS and describe its working.

(c) Explain working of step-up chopper with neat diagram.

(d) Describe the operation of single phase half wave controlled rectifier with R-L load.

3. Attempt any THREE of the following : **3 × 4 = 12**

(a) Draw the circuit of class A commutation for SCR and describe its operation.

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

(c) Compare step-up and step-down chopper with respect to following parameters :

(i) Range of output voltage

(ii) Expression of output voltage

(iii) Quadrant of operation

(iv) Applications

(d) Draw the neat circuit diagram of emergency light system and write its working.

4. Attempt any THREE of the following : **3 × 4 = 12**

(a) State turn ON methods of SCR. Explain dv/dt triggering.

(b) A single phase full wave controlled rectifier is supplied with a voltage V = 230 sin(314 t). Find average DC output voltage and current if firing angle is 45º and load resistance is 100 Ω.

(c) With a neat diagram, explain the operation of step-down chopper using MOSFET.

(d) Draw with neat circuit diagram lamp dimmer circuit using DIAC-TRIAC and explain its working.

(e) Draw the circuit of R-triggering of SCR and explain its working.

5. Attempt any TWO of the following : **2 × 6 = 12**

(a) Draw labelled constructional diagram for GTO and describe its working with V-I characteristics.

(b) Draw and explain SCR triggering using UJT with the help of pulse transformer. List its advantages.

(c) Explain the operation of 3-phase half wave controlled rectifier with R-load with circuit diagram. Draw its input and output voltage waveforms.

6. Attempt any TWO of the following : **2 × 6 = 12**

(a) Describe the working of Series Inverter with neat diagram and state its two applications.

(b) Describe the working principle of power MOSFET using constructional diagram. Draw the V-I characteristics of Power MOSFET.

(c) Suggest a suitable power device having 1st and 3rd quadrant symmetrical characteristics and describe its operation with modes.