22232

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.

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

Marks

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

   (a)   Draw labelled symbol of LASCR and SBS.

   (b)   State two applications of TRIAC.

   (c)   List two types of gate trigger circuits.

   (d)   State the relation between firing angle and conduction angle with waveform.

   (e)   List two applications of inverter.

   (f)   Define converter and state its types.

   (g)   Draw the block diagram of on line UPS.

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

   (a)   Draw neat labelled diagram of V-I characteristics of SCR. Define holding current and latching current.

   (b)   Draw and explain the block diagram of SMPS.

(c) Explain with a neat circuit diagram, the operation of series inverter.

(d) Explain with circuit diagram and waveform the operation of single phase centre tapped full wave controlled rectifier with R load.

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

(a) Explain with circuit diagram the operation of a suitable over current protection circuit for high power transistor.

(b) Describe the effect of freewheeling diode with respect to single phase half wave controlled rectifier with RL load.

(c) Name a suitable chopper to decrease the output voltage and also explain its operation with neat circuit diagram.

(d) Explain with circuit diagram the operation of emergency lighting system.

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

(a) Describe the working of class C commutation with neat circuit diagram and waveforms.

(b) A single phase fully controlled rectifier is supplied with voltage V=300 sin 314 t. If firing angle $\alpha = 60°$, Find

   (i) average output DC voltage

   (ii) load current for load resistance 500Ω.

(c) Draw circuit diagram of step up chopper. State its output voltage expression and draw its input output waveforms.

(d) Explain with circuit diagram the operation of a suitable circuit to charge a battery.

(e) List different Turn ON methods of SCR and explain any one in detail.

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

(a) Draw labelled constructional diagram for DIAC and describe its operating principle with V-I characteristics.

(b) Describe the operation of PUT as relaxation oscillator.

(c) Draw the circuit diagram of three phase half wave controlled rectifier. Explain the working of it with input output waveforms.

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

(a) Explain with a neat circuit diagram the operation of parallel inverter.

(b) Draw labelled constructional diagram of SCR. Explain its operating principle with two transistor analogy.

(c) (i) Suggest a suitable power device which combines benefits of a power MOSFET and a BJT. Also draw its V-I characteristics.

(ii) Suggest a suitable power device which can be turned OFF by applying negative pulse to its gate terminal. Also draw its labelled constructional diagram.

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