21222

3 Hours / 70 Marks   Seat No.

15 minutes extra for each hour

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 :**   **(5 × 2 = 10)**

(a)   State two applications of power MOSFET.

(b)   Draw the symbol of PUT and GTO.

(c)   Define commutation and state its types.

(d)   Define inverter and state its types.

(e)   Draw the block diagram of UPS.

(f)   State two advantages of gate triggering.

(g)   Define firing angle and conduction angle.

2.   **Attempt any THREE :**   **(3 × 4 = 12)**

(a)   Draw the constructional details of IGBT and mark the layers.

(b)   Describe the operation of a battery charger with neat diagram.

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

(d)   Draw and explain complementary commutation circuit.

3. **Attempt any THREE :** **(3 × 4 = 12)**

(a) Draw the circuit diagram of 1 ϕ H.W.C. Rectifier with 'R' load. Explain the working with wave forms.

(b) Draw and explain the operation of a triggering circuit to control the firing angle 0° - 180°.

(c) Draw and explain the operation of a light dimmer circuit using TRIAC & DIAC.

(d) Suggest a suitable inverter to produce square wave output. Draw its neat circuit diagram.

4. **Attempt any THREE :** **(3 × 4 = 12)**

(a) Draw and explain two transistor analogy of SCR.

(b) A single phase full wave controlled rectifier is supplied with a voltage V=100 sin(314 t), $\alpha = 30°$ and load resistance is 50 Ω. Find the average output DC voltage and load current.

(c) Describe the effect of free wheeling diode with respect to single phase center tapped fully controlled rectifier with RL load.

(d) Draw and explain the operation of a temperature control circuit using SCR.

(e) Draw the constructional detail of GTO. Explain its working principle.

5. **Attempt any TWO :** **(2 × 6 = 12)**

(a) Draw the constructional details of TRIAC. State its mode of operation and explain its V-I characteristics.

(b) Explain the operation of three phase half wave controlled rectifier with circuit diagram. Draw i/p – o/p wave forms.

(c) Explain the operation of series inverter with neat circuit diagram. Draw the waveforms.

6. **Attempt any TWO :** **(2 × 6 = 12)**

    (a)   (i)   Define chopper. State its classification.

         (ii)   Compare step-down and step-up chopper [any four points].

    (b)   Describe the operation of synchronized UJT triggering circuit with circuit diagram.

    (c)   (i)   Draw neat labelled diagram of V-I characteristics of SCR.

         (ii)   Explain the effect of gate current on turn on voltage of SCR.

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