**23242**

**3 Hours / 70 Marks**   Seat No.

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***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 :**   **10**

(a)   Draw the symbol of power transistor and IGBT.

(b)   State the applications of IGBT (any two).

(c)   Draw the symbol of PUT and DIAC.

(d)   Give the types of gate triggering.

(e)   Define :

(i)   Conduction angle

(ii)   Firing angle

(f)   State the need of UPS.

(g)   Define transfer time and back up time of UPS.

2. **Attempt any THREE of the following :** 12

   (a) Describe with neat sketch the constructional details of IGBT.

   (b) Interpret the V-I characteristics of UJT with sketch.

   (c) Explain with sketch the operation of class C commutation.

   (d) Explain with circuit diagram of single phase mid-point controlled rectifier with R-load.

3. **Attempt any THREE of the following :** 12

   (a) Draw a neat labelling V-I characteristics of SCR and explain the region.

   (b) Explain the operation of UJT relaxation oscillator circuit with diagram.

   (c) Draw a neat diagram of 1 $\phi$ half wave controlled rectifier with RL load. Give its operation.

   (d) Draw the circuit diagram of battery charger using SCR and explain its working.

4. **Attempt any THREE of the following :** 12

   (a) Give comparison of SCR & TRIAC.

   (b) Explain the operation of R triggering circuit with a diagram.

   (c) Explain with circuit diagram the operation of single phase full bridge controlled rectifier with R load.

   (d) Explain speed control of the motor by using TRIAC with the help of circuit diagram.

   (e) Explain working of AC circuit breaker using SCR with circuit diagram.

5. **Attempt any TWO of the following :** 12

   (a) Draw symbols and V-I characteristics of the following devices :

      (i) LASCR

      (ii) DIAC

      (iii) PUT

      (iv) SCS

      (v) TRIAC

      (vi) UJT

   (b) For a class D commutation, answer the following :

      (i) Explain the operation with a circuit diagram.

      (ii) Interpret with waveforms.

   (c) Explain the modes of operations in TRIAC with quadrant diagram.

6. **Attempt any TWO of the following :** 12

   (a) 1 $\phi$ half controlled rectifier supplied with voltage V = 300 sin 314 t, and load resistance is 100 $\Omega$ find :

      (i) Average output DC voltage

      (ii) Load current (for $\alpha = 60°$ and $\alpha = 100°$)

   (b) Draw full bridge and half bridge configuration with common cathode.

   (c) Explain the operation of SMPS with a neat block diagram.

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