T.E ETRX VI (Rev)
Power Electronics

Con. 3021-11. **(REVISED COURSE)** **RK-2616**

(3 Hours) **[Total Marks : 100**

N.B.: (1) Question No. **1** is **compulsory**.
(2) Attempt any **four** questions from remaining **six** questions.
(3) Assume **suitable** data if **required.**

1. Answer the following :—
   (a) What is half waving effect explain with waveforms. 5
   (b) Write SOA rating of Power Mosfet. 5
   (c) Compare SCR and IGBT 5
   (d) Define $\frac{di}{dt}$ and $\frac{dv}{dt}$ rating what happens when these ratings are exceeded. 5

2. (a) Explain the full wave ac control using Triac and Diac. Draw waveforms. 10
   (b) Draw construction of IGBT. Explain the same along with latch up in IGBT. 10

3. (a) Explain the operation of complementary commutation ckt. Draw the waveform across any one SCR and capacitor. 10
   (b) A relaxation OSC using UJT is to be designed for SCR. 10
   $\eta = 0{\cdot}71$ Ip = 0·6 MA Vp = 16V Vv = 1V
   Iv = 2·6 MA $R_{BB} = 5{\cdot}5\ K\Omega$ Normal leakage current with emitter open 4·2 MA.
   The firing frequency. is 2 kHz C = 0·04 μF

4. (a) What is the problem with series connection of SCR, explain in detail and suggest protection ckt. 10
   (b) Explain with the ckt diagram zero voltage switch. 10

5. (a) Define various performance parameters single phase bridge rectifier with RL load and derive the same. 10

   (b) Draw and explain 3 phase fully controlled rectifier with R load, draw various waveforms when $\alpha = 60°$ 10

6. (a) If half wave controlled rectifier has purely resistive load of R and delay angle $\alpha = \pi/3$, determine :— 10

   (i) Rectification efficiency
   (ii) FF
   (iii) RF
   (iv) TUF
   (v) PIV of SCR.

   (b) Draw complete protection ckt. for SCR. Explain in detail. 10

7. Write short notes on :— 20

   (a) Soft Start Ckt
   (b) SOA Rating of Power Transistor
   (c) Inverse Cosine Control Triggering Ckt
   (d) Gate Characteristics of SCR.