

3/6/2013

T. E (ETRX) Sem VI (Rev)

1st Half-13-Mina - (d)-40

Con. 10073-13.

# Power Electronics

GS-1357

(3 Hours)

[ Total Marks : 100

- N. B. :** (1) Question No. 1 is compulsory.  
(2) Solve any **four** questions out of **remaining** questions.  
(3) Assume **suitable** data wherever **required**.

1. Attempt following questions :— 20
- (a) What are the minimum requirements to turn on the SCR ?
  - (b) Explain two transistor analogy of SCR.
  - (c) What are the characteristics of ideal power semi-conductor devices ?
  - (d) Explain four-modes of working of TRIAC.
  - (e) Compare the power BJT, MOSFET and IGBT.
2. (a) What is the meaning of commutation of SCR ? Explain any two methods in detail. 10  
(b) Explain the role of UJT as a relaxation oscillator. Draw the appropriate wave forms. 10
3. (a) Explain the single phase full wave fully controlled rectifier for inductive load. 10  
(b) Explain the series connection of SCR. What are the problem associated with this connection ? 10
4. (a) Explain the three phase controlled rectifier for resistive load. Draw the output waveform for firing angle of  $30^\circ$  and  $60^\circ$ . 10  
(b) What are the protection circuits for SCR ? Explain each circuit in brief. 10
5. (a) Explain Diac-Triac circuit for regulating the intensity of Light. (Light-dimmer circuit). 10  
(b) If the half-wave controlled rectifier has a purely load of R and the delay angle is  $\alpha = \frac{\pi}{3}$ . 10
- Determine :—**
- (i) Rectification efficiency
  - (ii) Form Factor
  - (iii) Ripple Factor.
6. (a) Derive the performance factors namely ; Input Displacement factor, Input Power Factor, DC Voltage, Voltage ratio, Input current distortion factor, Input Harmonic factor and voltage ripple factor for fully-controlled single phase rectifier (Bridge type) with R-L load. 10  
(b) Explain the construction, working principle, V-I characteristics and applications of DIAC. 10
7. Write short notes on (any **three**) :— 20
- (a) Power MOSFET
  - (b) IGBT
  - (c) GTO SCR
  - (d) Cooling methods of SCR.