

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-VII(OLD) • EXAMINATION – WINTER 2016

Subject Code: 171002**Date: 21/11/2016****Subject Name: Power Electronics****Time: 10:30 AM to 01:00 PM****Total Marks: 70****Instructions:**

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Sketch switching characteristics of Thyristor during its turn ON and turn OFF processes. Discuss briefly the nature of these curves. **07**
- (b) Explain R and RC half wave trigger circuits for SCR with suitable waveform. **07**
- Q.2** (a) Discuss the two transistor model of a Thyristor. Derive an expression for the anode current and henceforth discuss the turn ON mechanism of a Thyristor. **07**
- (b) Explain the turn ON process of TRIAC in all four modes. **07**
- OR**
- (b) Derive an expression for the resistance used for static voltage equalization for a series connected string. **07**
- Q.3** (a) What is chopper? Describe the working of Type C chopper. **07**
- (b) What is commutation? What are the different methods of commutation? Explain with relevant waveforms class D commutation. **07**
- OR**
- Q.3** (a) For step down chopper, DC source voltage = 230V, load resistance is 10Ω. Take a voltage drop of 2V across chopper when it is ON. For a duty cycle of 0.4, calculate (1) Average output voltage, (2) RMS output voltage and (3) chopper efficiency. **07**
- (b) Explain the operation of GTO with relevant diagram. **07**
- Q.4** (a) Describe the working of single phase half Bridge inverter. What is its main drawback? Explain how this drawback is overcome? **07**
- (b) Compare SCR, power MOSFET and IGBT. **07**
- OR**
- Q.4** (a) Describe the operation of single phase half wave converter using SCR for RL load and RL load with freewheeling diode. **07**
- (b) What is inverter? List few industrial applications of inverters. Explain basic series inverter. **07**
- Q.5** (a) What are the causes of overvoltage and overcurrent? Describe the method used for overvoltage protection of SCR. **07**
- (b) Draw and explain circuit of 3 phase semiconverter with RL load with freewheeling diode for $\alpha = 90^\circ$. **07**
- OR**
- Q.5** (a) What is meant by step down chopper? Describe the working of Type A chopper. **07**
- (b) Draw and explain circuit of 3 phase semiconverter with RL load with freewheeling diode for $\alpha = 60^\circ$. **07**
