

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-V • EXAMINATION – SUMMER • 2014

Subject Code: 150903**Date: 19-06-2014****Subject Name: Power Electronics-I****Time: 10.30 am - 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) Derive the expression for average output voltage, RMS output voltage for single phase half wave rectifier assuming purely resistive load. Draw necessary waveform. **07**
(b) Discuss the working principle of Jones chopper. **07**
- Q.2** (a) Explain steady state V-I characteristics of power BJT. Also discuss the second breakdown phenomenon in brief. **07**
(b) Draw & explain dynamic turn-on characteristics of SCR. **07**
- OR**
- (b) Discuss the operation of buck-boost converter. **07**
- Q.3** (a) Explain two transistor analogy of an SCR. **07**
(b) What are the methods of DC motor speed control? Explain single phase semi-converter DC motor drive. **07**
- OR**
- Q.3** (a) Explain RC firing circuit for SCR. Draw output voltage waveform for firing angle equal to 90° . **07**
(b) What do you mean by commutation of SCR? Explain any one method in brief. **07**
- Q.4** (a) With neat diagram & waveform explain UJT oscillator triggering. **07**
(b) Write a short note on voltage rating of SCR. **07**
- OR**
- Q.4** (a) A relaxation oscillator using a UJT is to be designed for triggering an SCR. The UJT has the following data
 $I_p = 0.6\text{mA}$, $V_p = 18\text{V}$, $V_v = 1\text{V}$, $R_{bb} = 5\text{K}\Omega$, $\eta = 0.72$, $C = 0.04\mu\text{F}$, firing frequency is 2KHz, normal leakage current with emitter open is 4.2mA.
Compute the values of R, R1 & R2. **07**
(b) Write a short note on protection of SCR. **07**
- Q.5** (a) What are the control strategies for chopper? Explain in brief. **07**
(b) Explain the operation of dual converter circuit. **07**
- OR**
- Q.5** (a) Explain regenerative braking control in DC machines using chopper circuit. **07**
(b) Explain the working of MOSFET. **07**
