

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2014**

**Subject code: 712902N****Date: 17-06-2014****Subject Name: Power Processing Circuits****Time: 02:30 pm - 05:00 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) What is safe operating area? Discuss SOA for bipolar junction transistor. **07**  
 (b) Write a brief note on effect of source inductance on AC-DC converter. **07**
- Q.2** (a) Explain working of single phase full bridge controlled converter with R-L load. Draw necessary waveforms. **07**  
 (b) A single phase full wave AC to AC controller has an input voltage of 150 V supplying an energy to resistive load of  $R_L=8$  ohm. The firing angle of thyristors is 60. Find (1) average output voltage over half cycle. (2) RMS output voltage. (3) Power output. **07**
- OR**
- (b) A half controlled bridge converter is supplied with single phase 240V, 50 Hz source, feeds a load with ripple free current. The load resistance is  $R_L=10$  ohm. Find (1) average load voltage (2) RMS input current for a firing angle  $=60$ . **07**
- Q.3** (a) Explain three phase half wave controlled AC-DC converter circuit with waveforms. **07**  
 (b) Discuss working operation of 1 phase to 1 phase cyclo-converter circuit with appropriate waveforms. **07**
- OR**
- Q.3** (a) Explain construction and working principle of IGBT with its static characteristics. **07**  
 (b) Discuss the driver circuit for Bipolar Junction transistor. **07**
- Q.4** (a) Write a brief note on ring connected cyclo-converter circuit. **07**  
 (b) Explain operation of dual converter with circulating mode. Draw appropriate waveforms. **07**
- OR**
- Q.4** (a) Explain the operation of full bridge DC-DC converter with neat diagram and waveforms. **07**  
 (b) Discuss, how lower order selected harmonics can be eliminated in output of I phase inverter circuit. **07**
- Q.5** (a) Explain the operation of integral cycle control of AC-AC converter with neat diagram and waveforms. **07**  
 (b) Discuss working operation of buck-boost DC-DC converter circuit with appropriate waveforms. **07**
- OR**
- Q.5** (a) Explain sinusoidal pulsed width modulation technique for inverter. **07**  
 (b) Explain working of three phase inverter circuit with 120 conduction mode. Draw line voltage and phase voltage waveform. **07**

\*\*\*\*\*