

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII • EXAMINATION – SUMMER • 2014****Subject Code: 171002****Date: 03-06-2014****Subject Name: Power Electronics****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) List the different members of the thyristor family and draw their characteristics and explain in brief. **07**
- (b) Explain single phase half wave rectifier with suitable circuit and waveform. **07**
- Q.2** (a) Discuss briefly the parallel operation of MOSFETs **07**
- (b) Explain the safe operating areas of an IGBT. **07**
- OR**
- (b) A three –phase fully- controlled bridge converter is connected to three-phase a.c. supply of 400 V, 50Hz and operates with a firing angle $\alpha = \pi/4$. The load current is maintained at 10A and the load voltage is 360 V. Compute: (i) Source inductance, L_s (ii) Load resistance, R (iii) Overlap angle, μ . **07**
- Q.3** (a) Explain the various techniques of improving power factor in three phase controlled converters. **07**
- (b) Explain the DC Chopper's principal of operation . **07**
- OR**
- Q.3** (a) A DC Chopper operates on 230 V dc and frequency of 400Hz; feed an R-L load. Determine the ON time of the chopper for output of 150 V. **07**
- (b) Briefly discuss the switching behavior of a GTO. **07**
- Q.4** (a) Explain single phase full bridge inverter. **07**
- (b) A single-phase half bridge inverter has a resistive load of $R = 3\Omega$ and the dc input voltage $E_{dc} = 24$ Volts. Determine: (i) IGBT ratings (ii) Total Harmonics distortion THD (iii) The distortion factor DF (iv) The Harmonics factor and DF of the lowest order harmonic. **07**
- OR**
- Q.4** (a) Discuss the pulse width modulated inverter. **07**
- (b) Explain three phase bridge inverter. **07**
- Q.5** (a) Explain the operation of UPS system **07**
- (b) Explain switched mode power supplies. **07**
- OR**
- Q.5** (a) Compare dielectric heating with induction heating **07**
- (b) Draw and explain the operation of automatic battery charger with trickle charging arrangement. **07**
