Seat No.: _____ Enrolment No._____

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= 3Ω 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**

****