Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-VII Examination-Nov/Dec.-2011

Subject code: 171002 **Date: 22/11/2011**

Subject Name: Power Electronics

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)**	Give classification of thyristor family. Draw and explain SCR in detail. Also draw and explain SCR V-I characteristics with required terms.	**07**
	(b)	What is GTO ? Draw and Explain GTO structures . Also explain GTO Turn off mechanism with desired equation and figures.	**07**
Q.2	**(a)**	List all SCR triggering circuits and explain any two of them in detail using circuit diagram, Waveforms and equations.	**07**
	(b)	Draw and explain construction of power BJT. Also explain I-V characteristics of power BJT. How power BJT are differed then normal BJT.	**07**
		OR	
	(b)	Draw and explain the structure of power MOSFET. Also explain principle of operation and I-V characteristics of power MOSFET	**07**
Q.3	**(a)**	Draw and Explain Full wave controlled rectifier with the inductive load using required waveforms and equations. Also explain use and function of free wheeling diode with the inductive load.	**07**
	(b)	An SCR with latching current of 100 mA is connected with series resistance of 10 Ω and inductance of 1H. DC source voltage is 207 V. calculate minimum gate pulse width to turn ON SCR.	**07**
		OR	
Q.3	**(a)**	Draw and explain Three Phase Half wave controlled rectifier with required waveforms and equations	**07**
	(b)	A 3 Phase bridge circuit is supplied by 200 V .Assume continuous load current. Determine mean load voltage at firing angle 0^0 ,45^0 ,90^0 Neglect all devices drops .If commutating diode is placed across the load then what will be the mean load voltage at $\infty = 120^0$.	**07**
Q.4	**(a)**	Classify the chopper. List all types of Chopper and explain any two of them.	**07**
	(b)	In a step UP chopper applied voltage is 200V and O/P voltage is 600V . If conducting time of thyristor is 200µSec Compute (a) Chopper frequency (b) Find O/P voltage for when pulse width is half for constant frequency of operation.	**07**
		OR	

Q.4	**(a)**	Draw and explain Full bridge invertors. Also give comparison of Half bridge and Full bridge Inverter	**07**
	(b)	A 3 Phase bridge inverter operating in a 180^0 mode with a wye connected resistive load . If supply voltage is 230 V Find the rms phase voltage.	**07**
Q.5	**(a)**	What is UPS / Why we need that ? Draw and explain Online UPS system with their operation and features	**07**
	(b)	List types of Heating mechanism available and explain any one of them in detail.	**07**

OR

Q.5	**(a)**	What is SMPS ? Give classification of SMPS. Also explain any one of the SMPS.	**07**
	(b)	Draw the circuit diagram of a Battery charging Regulator and Explain them in detail.	**07**

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