Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- Vth SEMESTER–EXAMINATION – MAY/JUNE - 2012

Subject code: 150903 **Date: 04/06/2012**

Subject Name: Power Electronics - I

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)**	Explain the various methods for turn-on of thyristors.	**07**
	(b)	Explain class B commutation of SCR with neat waveforms and state its merits and demerits.	**07**
Q.2	**(a)**	Describe the working of SCRs connected in parallel. Also explain the problems arising in parallel operation of SCRs and their remedies.	**07**
	(b)	Draw and explain the V-I characteristics of UJT. Define peak point and valley point clearly.	**07**
		OR	
	(b)	Ten thyristors are used in a string to withstand a dc voltage of 10kV. The maximum leakage current and recovery charge difference of thyristors is 10mA and 75μC respectively. The value of R for steady-state equalizing circuit is 40kΩ and value of capacitance C of dynamic equalizing circuit is 0.1μF. Find the (i) steady state and (ii) transient derating factor.	**07**
Q.3	**(a)**	Explain the working of SCR firing circuit using UJT Relaxation Oscillator.	**07**
	(b)	Write a short note on TRIAC and explain its characteristics.	**07**
		OR	
Q.3	**(a)**	Describe the construction, working and characteristics of IGBT.	**07**
	(b)	What is a snubber circuit? How are the elements of the snubber circuit calculated?	**07**
Q.4	**(a)**	Explain the operation of 1-Φ fully controlled converter with RL load and derive the expression for average voltage and current.	**07**
	(b)	Discuss the effect of source inductance on fully controlled converter.	**07**
		OR	
Q.4	**(a)**	Explain the operation of dual converter circuit.	**07**
	(b)	A 1-Φ full wave converter is operated at 230V, 50Hz for a resistive load of 12Ω. If the average output voltage is 25% of maximum possible average output voltage, find (i) delay angle (ii) average and rms output currents (iii) average and rms thyristors currents.	**07**
Q.5	**(a)**	Describe the working of Morgan's chopper.	**07**
	(b)	Write a short note on buck-boost converter.	**07**
		OR	
Q.5	**(a)**	Explain how a step-up chopper may be used in regenerative braking of dc motors.	**07**
	(b)	Explain 1-Φ dual converter drive for dc motor.	**07**

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