Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013

Subject code: 712907N **Date: 06-06-2013**

Subject Name: Power Devices and Applications

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)**	Draw the block diagram of Power Electronics System and explain the role of each component in details.	**07**
	(b)	List out and explain various types of power converters.	**07**
Q.2	**(a)**	Draw schematic diagram and symbol of IGBT. Explain in detail operation of IGBT.	**07**
	(b)	1. Why schotky diodes switch off much faster than p-n junction diode? 2. A diode has a reverse recovery time of 2.5 µs if di/dt is 17.5 A/µs, find a stored charge and peak reverse current.	**07**
		OR	
	(b)	What is the disadvantage of Power Transistor? Explain step down converter with necessary waveforms.	**07**
Q.3	**(a)**	Draw and explain Power circuit, symbol and waveforms of PUT. What are the advantages of PUT over UJT?	**07**
	(b)	Compare various types of firing circuits in tabular forms.	**07**
		OR	
Q.3	**(a)**	Compare SUS and SBS in tabular forms.	**07**
	(b)	Draw the Power circuit, V-I characteristic and waveforms for UJT as a relaxation oscillator. Also derive the equation for frequency of UJT relaxation oscillator.	**07**
Q.4	**(a)**	Define Commutation. Enlist and explain TURN-ON methods of SCR.	**07**
	(b)	Draw and explain two transistor model of SCR. Also explain regenerative action of thyristor by taking Ŭ1+ Ŭ2 Ó1 as a reference.	**07**
		OR	
Q.4	**(a)**	Draw an over voltage protection circuit using thyristor and discuss itôs working.	**07**
	(b)	What is the requirement of a snubber circuit? In an ac circuit using a thyristor having a dv/dt rating of 20 V/ µs, the source inductance is 0.5 mH. The RMS value of supply voltage is 230V. If the damping factor is 0.75, find out the value of R and C of the snubber circuit.	**07**
Q.5	**(a)**	Draw and explain block diagram of UPS systems. Also list out the applications of UPS systems.	**07**
	(b)	Enlist applications of thyristor. Explain light-dimmer control.	**07**
		OR	
Q.5	**(a)**	Why battery charging is needed? Draw and explain battery charging circuit.	**07**
	(b)	Explain Power circuit of ideal zero voltage switch with neat sketch.	**07**

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