Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 712907N Date: 10/01/2013

Subject Name: Power Devices & Applications

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 out & explain Various types of Power Converters.	**06**
	(b)	Why silicon is preferred over germanium to make controlled rectifier.	**03**
	(c)	Write a detailed note on various types of losses in practical switches.	**05**
Q.2	**(a)**	1. Why schotky diodes switch off much faster than p-n junction diode? 2. A diode has a reverse recovery time of 2.5μs. If di/dt is 17.5 A/μs, find a stored charge & peak reverse current.	**07**
	(b)	Compare Various types of firing circuits.	**07**
		OR	
	(b)	Draw the structure, symbol & V-I characteristic of UJT. Also derive the equation for Periodic time T of UJT relaxation oscillator.	**07**
Q.3	**(a)**	Define commutation. Explain Class B commutation with necessary diagram & design consideration.	**07**
	(b)	What are the advantages of PUT? Design PUT-30 minute time delay circuit.	**07**
		OR	
Q.3	**(a)**	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**
	(b)	Compare SUS and SBS in tabular forms.	**07**
Q.4	**(a)**	Describe different region of operation of a thyristor with the help of V-I characteristics.	**07**
	(b)	Draw & explain types of UPS system. Also discuss applications of UPS systems.	**07**
		OR	
Q.4	**(a)**	Discuss Utility of Latching & holding current. Write a detailed note on Gate characteristics of SCR.	**07**
	(b)	Why battery charging needed? Draw & explain battery charging circuit.	**07**
Q.5	**(a)**	Write a detailed note on Light-dimmer control.	**07**
	(b)	What are the modes of operation of BJT? Show that the energy loss during turn on a power transistor is given by (VI/6) T joules where V=off state voltage, I= on state current and T is turn on time. Assume voltage & current to be linear.	**07**
		OR	
Q.5	**(a)**	Explain power circuit of ideal zero voltage switch with neat sketch.	**07**
	(b)	What are the features of IGBT? Describe construction & working characteristics of IGBT with neat sketches.	**07**

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