Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-I Remedial Examination April 2010

Subject code: 710702 **Subject Name: Advanced Power Electronics**

Date: 07 / 04 / 2010 **Time: 12.00 noon – 02.30 pm**

Total Marks: 60

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	What are the necessary conditions for the successful switching (turn on) and commutation of an SCR, and explain relative comparison of MOSFET and SCR.	**06**
	(b)	What is switching mode regulator? List the basic types of switching mode regulators. Explain in brief Buck-Boost Regulators with necessary circuit diagram and waveforms.	**06**
Q.2	**(a)**	Explain the principle of operation of three phase bridge inverter with 180˚ conduction mode with necessary circuit diagram and waveforms and give a comparison of 120˚and 180˚conduction schemes.	**06**
	(b)	Describe the on-off and phase angle control techniques for AC Voltage controllers.	**06**
		OR	
	(b)	The three phase bidirectional delta connected A.C.Voltage controller has a resistive load of R=10Ω. The line to line voltage is Vs=208 V (rms), 60 Hz, and the delay angle is $\alpha = 2\Pi / 3$. Determine (a) the rms output voltage Vo, (b) the expression for instantaneous currents ia, iab, ica,	**06**
Q.3	**(a)**	What is PWM Inverter principle? List the different pulse width modulation techniques used for inverters? Compare Bipolar and Unipolar switching schemes of Sinusoidal PWM inverter with necessary waveforms and harmonic spectrums.	**06**
	(b)	Write a brief note on space vector modulation for Inverter	**06**
		OR	
Q.3	**(a)**	Describe in brief design of current transformer.	**06**
	(b)	Explain the operation of forward converter and illustrate with inductor current, transformer primary, switch current and switch voltage waveforms.	**06**
Q.4	**(a)**	Explain the uses of pulse transformer and optocouplers for thyristor firing circuits with necessary sketches.	**06**
	(b)	Explain the use of PUT-programmable uni junction transistor for thyristor driver circuit.	**06**
		OR	
Q.4	**(a)**	Discuss the operation of cuck converter.	**06**
	(b)	Describe 3 phase cycloconverter with necessary circuit diagram.	**06**
Q.5	**(a)**	Describe current source inverter with necessary waveforms.	**06**
	(b)	Explain operation of full bridge converter topology of switching converter.	**06**
		OR	
Q.5	**(a)**	What is cyclconverter? Explain the principle of operation of cycloconverters and discuss the effect of source and load inductances on cycloconverter.	**06**
	(b)	Describe IGBT with necessary static and dynamic characteristics.	**06**

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