Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I (New course)• REMEDIAL EXAMINATION – SUMMER 2015

Subject Code: 2710702 **Date:14/05/2015**

Subject Name: Power Electronics

Time: 10:30 am to 1:00 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)**	Discuss the static and dynamic characteristics of SCR and Power BJT.	**07**
	(b)	Explain single quadrant, two quadrant and bidirectional operation of switches. Suggest power semiconductor devices capable to realize it.	**07**
Q.2	**(a)**	Explain working of Buck regulator with necessary circuit and waveforms and obtain necessary derivations for continuous mode of conduction.	**07**
	(b)	Explain working of Full bridge DC to DC converter with necessary circuit and waveform.	**07**
		OR	
	(b)	Explain the operation of a fly back converter with its relevant analysis.	**07**
Q.3	**(a)**	Write short note on SMPS design criterion.	**07**
	(b)	Compare 120^0 and 180^0 modes of operation of 3-phase inverter. Explain 180^0 mode of operation of 3-phase inverter with waveforms.	**07**
		OR	
Q.3	**(a)**	What is PWM Inverter principle? List the different pulse width modulation techniques used for inverters? Describe Multiple Pulse Modulation technique of PWM inverter with necessary waveforms and harmonic spectrums.	**07**
	(b)	Discuss space vector pulse width modulation (SVPWM) technique in brief.	**07**
Q.4	**(a)**	Explain operation of current source inverter with neat diagram. Differentiate it from voltage source inverter.	**07**
	(b)	Explain with neat circuit diagram and waveforms the principle of operation of three phase half wave cyclo-converters with circulating current mode.	**07**
		OR	
Q.4	**(a)**	Describe the phase angle control technique for AC voltage controllers and Derive the expression for average and rms value of output voltage for single phase half wave AC voltage controller.	**07**
	(b)	Discuss 3-phase bidirectional delta-connected AC controller with necessary circuit and waveforms for the delay angle of 120^0.	**07**
Q.5	**(a)**	Describe the necessity of Isolation of gate and Base drives and explain how they are implemented using the pulse transformer and Opto Isolator.	**07**
	(b)	Discuss steps illustrating design of inductor.	**07**
		OR	
Q.5	**(a)**	What does one mean by óArea Productõ? Obtain the area-product for high frequency transformer used with forward converter.	**07**
	(b)	Explain the various protection circuits against dv/dt, di/dt and overvoltage in the driver circuit of power devices.	**07**

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