Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME SEMESTER – I (OLD) EXAMINATION – SUMMER 2017

Subject Code: 710702N **Date:09/05/2017**

Subject Name: Advanced Power Electronics

Time:02:30 P.M. to 05:00 P.M. **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)**	Describe the necessity of Isolation of gate and Base drives and explain how they are implemented using the pulse transformer and Opto Isolator with necessary circuit diagrams.	**07**
	(b)	Develop the steady-state and switching characteristics of (i) Power BJT and (ii) SCR.	**07**
Q.2	**(a)**	Explain the working of dc-dc converter. Explain the working of Buck regulators with the help of circuit diagram and various waveforms.	**07**
	(b)	A 230 V, 1 kW resistive load is connected to a half bridge rectifier. Input voltage of the rectifier is 230 V ac. Find the values of (a) output dc power (b) Output ac power (c) Output Gross power.	**07**
		OR	
	(b)	Write short note on SMPS design criterion.	**07**
Q.3	**(a)**	Discuss circulating current operation of 3-phase cyclo-converter.	**07**
	(b)	Explain difference in inverter and cyclo-converter circuit.	**07**
		OR	
Q.3	**(a)**	Define step-up and step-down cycloconverter. Discuss 3-phase to 3- phase bridge type cycloconverter with necessary diagram.	**07**
	(b)	Explain operation of current source inverter with neat diagram. Differentiate it from voltage source inverter.	**07**
Q.4	**(a)**	A single phase AC voltage regulator is supplied by single phase ac 230 Volts, 50 Hz supply. A resistive load of 10 ohms is connected at the output of ac voltage regulator. Find rms value of output voltage and current and input power factor if firing angle α is 60^0 .	**07**
	(b)	Discuss 3-phase bidirectional delta-connected AC controller with necessary circuit and waveforms for the delay angle of 120^0.	**07**
		OR	
Q.4	**(a)**	What is the difference in design of power transformer and high frequency transformer?	**07**
	(b)	Discuss steps illustrating design of inductor.	**07**
Q.5	**(a)**	Discuss various harmonics reduction techniques in the Inverter output with necessary sketches.	**07**
	(b)	Explain single quadrant, two quadrant and bidirectional operation of switches.	**07**
		OR	
Q.5	**(a)**	Explain the various protection circuits against dv/dt, di/dt and overvoltage in the driver circuit of power devices.	**07**
	(b)	Distinguish between SCR, GTO, Power MOSFET and IGBT.	**07**

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