Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME – SEMESTER I (OLD) – • EXAMINATION – SUMMER 2016

Subject Code: 710702N **Date:17/05/2016**

Subject Name: Advanced Power Electronics

Time:02:30 pm to 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)**	Discuss static and dynamic characteristics of power MOSFET and IGBT.	**07**
	(b)	Compare buck and boost regulators. Explain working of boost regulator with necessary circuit and waveforms.	**07**
Q.2	**(a)**	Explain the functions of dc-dc converter. Explain the working of Buck regulators with the help of circuit diagram and various waveforms.	**07**
	(b)	What is the need of isolation in driver circuit? Discuss the basic two ways of isolating gate signal.	**07**
		OR	
	(b)	Distinguish between SCR, GTO and Power BJT.	**07**
Q.3	**(a)**	State the advantages of Switched –Mode DC power supplies. With neat diagrams and waveforms, analyze operation of Fly-back converters.	**07**
	(b)	Write short note on SMPS design criterion.	**07**
		OR	
Q.3	**(a)**	Compare voltage source inverter and current source inverter.	**07**
	(b)	Discuss (i) harmonic reduction by PWM to eliminate a pair of harmonics and (ii) harmonic reduction by transformer connection methods.	**07**
Q.4	**(a)**	Derive the expression for the r.m.s. output voltage of a 3-phase, 3-wire star connected AC controller with resistive load. Also draw the necessary circuit and waveforms for firing angle of 60^0.	**07**
	(b)	Explain the basic principle of operation of a cycloconverter with a neat circuit diagram. Derive the equation of the fundamental r.m.s. value of per phase output voltage of low frequency for an m-pulse cycloconverter.	**07**
		OR	
Q.4	**(a)**	Explain operation 3-phase full wave controllers with resistive loads.	**07**
	(b)	Discuss circulating current operation of 3-phase cyclo-converter.	**07**
Q.5	**(a)**	What is the difference in design of power transformer and high frequency transformer?	**07**
	(b)	State the main requirements and advantages of a good current transformer. Also state different types of magnetic core materials.	**07**
		OR	
Q.5	**(a)**	Discuss C'uk converter with suitable diagram and waveforms.	**07**
	(b)	Compare 120^0 and180^0 of firing schemes in a 3-phase inverter. Discuss any one in details with the help of necessary diagram and waveforms.	**07**

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