Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME SEMESTER – I (OLD) EXAMINATION – SUMMER 2017

Subject Code: 714501N **Date: 08/05/2017**

Subject Name: Power Electronics – I

Time: 02:30 P.M. to 05:00 P.M. **Total Marks: 70**

Instructions:

1. **Attempt all the questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Notations and symbols used have usual technical meaning.**

Q.1	**(a)**	Explain principle of operation of IGBT.	**07**
	(b)	Explain Class-D commutation of SCR.	**07**
Q.2	**(a)**	Explain the operation of 3-phase bridge inverter with Y-connected resistive load in 180° conduction mode with neat circuit diagram and waveforms.	**07**
	(b)	Explain any one harmonic elimination technique with respect to 1-phase inverter.	**07**
		OR	
	(b)	Draw only the basic structure of a TRIAC. Enlist all the possible triggering modes of TRIAC. Explain any one triggering mode.	**07**
Q.3	**(a)**	Explain unipolar switching scheme of a 1-phase sinusoidal PWM inverter with neat circuit diagram and waveforms.	**07**
	(b)	Explain center-tapped 1-phase to 1-phase cycloconverter with neat circuit diagram and waveforms.	**07**
		OR	
Q.3	**(a)**	Explain UJT as a triggering circuit for SCR with necessary waveforms.	**07**
	(b)	Explain the need of Heat-sink. Explain its selection process.	**07**
Q.4	**(a)**	Explain the "latching" phenomenon of SCR using its two-transistor equivalent model. Also derive the equation for the anode current.	**07**
	(b)	Explain dual converter with circulating current control mode.	**07**
		OR	
Q.4	**(a)**	Explain the operation of a 12-pulse converter with neat circuit diagram and waveforms.	**07**
	(b)	Explain the operation of push-pull converter with neat circuit diagram and necessary waveforms.	**07**
Q.5	**(a)**	Draw only the basic structure, symbol and V-I characteristic of a GTO. Explain Turn ON and Turn OFF mechanism of GTO with neat diagrams.	**07**
	(b)	Explain the operation of forward converter with neat circuit diagram and necessary waveforms.	**07**
		OR	
Q.5	**(a)**	Explain the principle of operation of integral cycle control type 1-phase AC voltage controller with neat diagram and waveforms. Also derive the expression for the RMS output voltage in terms of duty cycle.	**07**
	(b)	Explain the operation of boost converter with necessary waveforms.	**07**

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