Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VI (NEW).EXAMINATION – WINTER 2016

Subject Code: 2161006 **Date: 25/10/2016**

Subject Name: Power Electronics Devices and Circuits

Time: 10:30 AM to 01:00 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 two transistor model of a Thyristor. Derive an expression for the anode current and henceforth discuss the turn ON mechanism of a Thyristor.	**07**
	(b)	Derive an expression for the resistance used for static voltage equalization for a series connected string.	**07**
Q.2	**(a)**	Describe with suitable waveforms the operation of single phase fully controlled bridge converter with RL load.	**07**
	(b)	Explain the turn ON process of TRIAC in all four modes.	**07**
		OR	
	(b)	Explain R and RC half wave trigger circuits for SCR with suitable waveform.	**07**
Q.3	**(a)**	What is meant by step down chopper? Describe the working of Type A chopper.	**07**
	(b)	Describe the operating principle of single phase to single phase step up cycloconverter with bridge type configuration.	**07**
		OR	
Q.3	**(a)**	A step up chopper has input voltage of 220V and output voltage of 660V. If the conducting time of Thyristor chopper is 100 microsecond, compute the pulse width of output voltage. In case output voltage pulse width is halved for constant frequency operation, find the average value of new output voltage.	**07**
	(b)	Describe three phase to single phase cycloconverter with relevant circuit arrangements.	**07**
Q.4	**(a)**	What is inverter? List few industrial applications of inverters. Explain basic series inverter.	**07**
	(b)	Explain the principle of working of induction heating with proper block diagram. Also list its advantages and disadvantages.	**07**
		OR	
Q.4	**(a)**	Explain sinusoidal pulse modulation as used in PWM inverters.	**07**
	(b)	Draw the circuit of battery charging control and explain its working.	**07**
Q.5	**(a)**	Describe single phase half wave converter feeding a separately excited DC motor with appropriate waveforms.	**07**
	(b)	What is commutation failure? Explain with relevant waveforms class C type commutation.	**07**
		OR	
Q.5	**(a)**	Compare various speed control techniques for AC motor drives.	**07**
	(b)	Draw and explain circuit of 3 phase semiconverter with RL load with freewheeling diode for $\alpha = 90°$.	**07**

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