Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 2712908 **Date: 07-01-2015**

Subject Name: Power Converters - I

Time: 02:30 pm - 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)**	Describe construction and working principle of MOS Controlled Thyristor (MCT) switch.	**07**
	(b)	Explain need of snubber circuit for silicon control rectifier with illustration.	**07**
Q.2	**(a)**	Discuss single phase to single phase Cyclo-Converter with neat diagram. Explain, how variation in voltage and frequency is obtained?	**07**
	(b)	A single phase fully controlled bridge converter is fed from 230V AC, 50 Hz. The converter is supplying energy to highly inductive load having load resistance of 20 ohm. For firing angle of 30,←calculate (i) Average output voltage (ii) Average output current (iii) RMS input current.	**07**
		OR	
	(b)	A DC-DC buck converter is supplied from 100V dc, feeding energy to the resistive load of R_L=10 ohm. The switch is operated with frequency of 10 kHz. For 40% duty cycle, calculate (i) output voltage (ii) output current (iii) output power (iv) input current. (assume all components of converter are loss less)	**07**
Q.3	**(a)**	Explain Integral cycle control for AC-AC controller with appropriate waveform.	**07**
	(b)	Discuss design considerations for Boost type DC-DC converter circuit.	**07**
		OR	
Q.3	**(a)**	Explain Phase angle control of AC-AC controller with R-L type load. Discuss the effect of load inductance on AC-AC controller.	**07**
	(b)	Discuss single phase fully controlled AC-DC converter with appropriate waveforms.	**07**
Q.4	**(a)**	Explain Buck converter circuit for DC-DC conversion. Discuss the effect of inductance on converter operation.	**07**
	(b)	Discuss single phase semi-controlled AC-DC converter with neat diagram and relevant waveforms.	**07**
		OR	
Q.4	**(a)**	Explain Buck-boost converter circuit. How output voltage is boosted?	**07**
	(b)	Discuss basic single phase inverter circuit with different type of load.	**07**
Q.5	**(a)**	Describe working operation of three phase inverter circuit with 150 ←degree conduction mode.	**07**
	(b)	Discuss voltage control technique for output voltage of the inverter.	**07**
		OR	
Q.5	**(a)**	Explain 180 ←degree conduction mode operation of three phase inverter circuit for delta connected load.	**07**
	(b)	Discuss Parallel capacitor inverter circuit with appropriate waveforms.	**07**

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