GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER– VI (New) EXAMINATION – WINTER 2019

Subject Code: 2160902   **Date: 09/12/2019**

Subject Name: Power Electronics – II

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.

			MARKS
Q.1	**(a)**	Define total harmonic distortion. What is the importance of THD while designing an inverter?	**03**
	(b)	Write important features of sinusoidal pulse width modulation used in PWM inverters.	**04**
	(c)	Mention disadvantages of harmonics produced by an inverter. What are the different methods to reduce harmonic content? Explain any one harmonics reduction technique in detail.	**07**
Q.2	**(a)**	Compare VSI and CSI.	**03**
	(b)	Write advantages and disadvantages of PWM technique to generate gate pulse.	**04**
	(c)	Discuss the principle of working of a three-phase bridge inverter with an appropriate circuit diagram. Draw gate signal, phase voltage and line voltage waveforms for $120°$ conduction of SCRs with star connected resistive load.	**07**

OR

	(c)	A full bridge inverter is operated from a dc supply of 280V and in unipolar PWM mode. Determine (1) Fundamental output voltage at M=0.8 and (2) First five dominant harmonic order if M_f = 24.	**07**
Q.3	**(a)**	Derive only expression of RMS output voltage of single phase full wave AC regulators with R-load.	**03**
	(b)	Explain integral cycle control and phase control method.	**04**
	(c)	A single phase AC regulator with R-L load has input voltage 230V, 50 Hz. R=4Ω and ωL=3Ω. Calculate the control range of firing angle, maximum power and power factor.	**07**

OR

Q.3	**(a)**	Write application of Cycloconverters.	**03**
	(b)	Write advantages of AC voltage regulators using either Triac or Thyristors. Mention at least one limitation of it.	**04**
	(c)	Write importance of sequence control in AC regulators. Explain two stage sequence control AC regulators with circuit diagram and waveforms.	**07**
Q.4	**(a)**	Compare Cycloconverter with DC link converter.	**03**
	(b)	Write shortly Load-commutated cycloconverter.	**04**
	(c)	Describe single phase Cycloconverter with centre-tapped transformer configuration with neat circuit diagram and plot input and output voltage waveform for R-load and frequency of 16.66 Hz.	**07**

1

OR

Q.4	**(a)**	Explain briefly slip-power recovery scheme.	**03**
	(b)	Explain effect of non-sinusoidal waveform on performance of AC machine.	**04**
	(c)	Write short technical note on matrix converter.	**07**
Q.5	**(a)**	Compare AC drives and DC drives.	**03**
	(b)	Explain rotor resistance control of induction motor drives.	**04**
	(c)	Explain the method of controlling induction motors using Cycloconverters.	**07**

OR

Q.5	**(a)**	Why voltage to frequency ratio kept constant in Induction Motor Drives.	**03**
	(b)	Briefly explain self controlled synchronous motor drive using electronic commutator.	**04**
	(c)	List out types of synchronous motors. Explain Motoring and Regeneration region of Cylindrical rotor synchronous motor by plotting torque vs. δ	**07**

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