Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER–IV EXAMINATION – SUMMER 2016

Subject Code:X40902 **Date:30/05/2016**

Subject Name:Power Electronics-I

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)**	Describe construction and working of a SCR. Analyze it's performance using two transistor analogy. Derive it's expression for it's anode current in terms of current gain 'β' and leakage Current ICo	**7**
	(b)	Explain the working of UJT relaxation oscillator circuit. Derive the expression for frequency of triggering and firing angle delay in terms of eta, charging resistance etc.	**7**
Q.2	**(a)**	List Forced Turnoff methods for SCR and Explain how an auxiliary SCR and a capacitor can be used to turn-off conducting SCR? Draw Necessary waveforms.	**7**
	(b)	What is snubber circuit? Why is it needed? Draw such circuit for a SCR and give guidelines for selecting it's components.	**7**
		OR	
	(b)	Draw the circuit of a single phase fully controlled converter with R-L load. Derive necessary equations and sketch output waveforms.	**7**
Q.3	**(a)**	List and explain various turn on methods for SCR.	**7**
	(b)	List various gate triggering methods and describe the uses of freewheeling diode in converters circuit.	**7**
		OR	
Q.3	**(a)**	Compare MOSFET with SCR in terms of basic structure, V-I characteristics, ratings, control principle, applications etc.	**7**
	(b)	State the control strategies adopted to control the output voltage in chopper. Explain 'Step-up Chopper'.	**7**
Q.4	**(a)**	Describe basic characteristics of Separately excited DC machine & explain its various operating modes.	**7**
	(b)	Describe in brief DC to DC converter based drives various principles like (i) Regenerative Break Control (ii) Rheostatic Break Control	**7**
		OR	
Q.4	**(a)**	Describe various power factor improvement techniques with controlled rectifier.	**7**
	(b)	Classify various chopper circuits based on principle of operation, circuit configuration etc.	**7**
Q.5	**(a)**	What is switch mode regulators & classify them. Explain Buck regulator with necessary circuit diagram & waveforms.	**7**
	(b)	Describe Pulse Transformer & opto-isolators with their applications	**7**
		OR	
Q.5	**(a)**	Explain the concept of 'Dual Converter'. Using circuit diagram, briefly explain the working of any one type of dual converter.	**7**
	(b)	Describe TRIAC four mode operation with necessary waveforms.	**7**

****