Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC SEMESTER VII– EXAMINATION – SUMMER 2017

Subject Code: X71102 **Date: 01/05/2017**

Subject Name: Power Electronics

Time: 02.30PM to 05.00PM **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)**	What is the difference between latching current and holding current? Explain the two transistor analogy of thyristor and derive the equation for anode current.	**07**
	(b)	Explain the full wave bridge controlled rectifier (inductive load) with necessary waveform and derive the equations for average current and rms current.	**07**
Q.2	**(a)**	Describe the construction and working of IGBT and also give the advantages of IGBT over BJT and MOSFET.	**07**
	(b)	A three-phase half-wave controlled rectifier is connected to a 230 V, 50Hz input supply with 100Ω load. If the desired average output voltage is 50% of the maximum possible average output voltage, calculate the delay angel α.	**07**
		OR	
	(b)	What is the difference between natural and force commutation? Explain class A force commutation with necessary circuit and waveforms.	**07**
Q.3	**(a)**	What do you mean by chopper? List the different chopping devices. Explain the working principal of step down chopper.	**07**
	(b)	Explain three phase 3-Φ half wave controlled rectifier (resistive load) with necessary waveform.	**07**
		OR	
Q.3	**(a)**	Explain buck-boost convertor with necessary waveforms.	**07**
	(b)	A step-down chopper is powered with source voltage of 100V.The load voltage waveform consist of rectangular pulses across a 1 KΩ resistor of duration 1 ms in one cycle of 2.5 ms. Calculate average output voltage, rms output voltage, ripple factor and output power of the given circuit.	**07**
Q.4	**(a)**	Why free-wheeling diode is required in inductive load? Explain speed control of dc motor using controlled rectifier.	**07**
	(b)	Define the term inverter. Give the principle of operation of PWM inverter with necessary waveforms and circuit.	**07**
		OR	
Q.4	**(a)**	What do you mean by performance parameters of inverter? List and explain different performance parameters of inverter.	**07**
	(b)	Describe the working of a single phase full bridge inverter with waveforms.	**07**
Q.5	**(a)**	Draw and explain the operation of 180º conduction mode of three phase inverter with necessary waveform and circuit.	**07**
	(b)	List the different heating techniques. Explain RF heating in brief.	**07**
		OR	
Q.5	**(a)**	Classify the different types of chopper. Explain Class B and Class D chopper.	**07**
	(b)	Give the difference between online and offline UPS. Explain working of UPS with detailed block diagram.	**07**

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