Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: X 71102 **Date: 27/12/2012**

Subject Name: Power Electronics

Time: 10.30 am - 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)**	Explain the principle of operation of SCR with its basic structure and V-I characteristics.	**07**
	(b)	Classify commutation techniques. Discuss class-C commutation circuit for an SCR.	**07**
Q.2	**(a)**	Explain the phase control of SCR using UJT with necessary waveforms.	**07**
	(b)	Compare SCR and TRIAC with respect to their construction, characteristics and triggering methods.	**07**
		OR	
	(b)	Draw and explain the structure of power MOSFET. Also explain working principle and V-I characteristics of power MOSFET.	**07**
Q.3	**(a)**	Explain single phase full controlled rectifier with resistive load in detail.	**07**
	(b)	List all methods of controlling the speed of a DC motor. With the aid of circuit diagram, explain the speed regulation of DC motor by armature voltage control.	**07**
		OR	
Q.3	**(a)**	Draw the circuit diagram of 3 phase half wave rectifier and explain its working with necessary waveforms. Derive expression for dc output voltage, load current, PIV.	**07**
	(b)	What is the average power across the resistive load of a single phase half wave controlled rectifier circuit if a voltage of 120 volts (rms), 50 Hz is applied to the SCR which fires at an angle $\pi/4$ in every positive half cycle of the applied voltage. The value of load resistance is 100Ω.	**07**
Q.4	**(a)**	Classify the chopper. List all type of chopper and explain any two in detail.	**07**
	(b)	Explain single phase bridge inverter with necessary waveforms.	**07**
		OR	
Q.4	**(a)**	Describe three phase bridge inverter with 180º mode of conduction.	**07**
	(b)	A step up chopper has input voltage of 200V and output voltage of 600 volts. If the non conducting time of thyristor chopper is 100µsec, compute: (i) pulse width of output voltage (ii) For constant frequency operation, find the output voltage if the pulse width is halved.	**07**
Q.5	**(a)**	Describe Switched Mode Power Supply with necessary diagram in detail.	**07**
	(b)	What is the need of UPS? Discuss offline UPS system with their operation and features.	**07**
		OR	
Q.5	**(a)**	Write short note on Dielectric heating.	**07**
	(b)	Explain Battery charger with necessary diagrams.	**07**

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