Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – SUMMER • 2014

Subject Code: 150903 **Date: 19-06-2014**

Subject Name: Power Electronics-I

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)**	Derive the expression for average output voltage, RMS output voltage for single phase half wave rectifier assuming purely resistive load. Draw necessary waveform.	**07**
	(b)	Discuss the working principle of Jones chopper.	**07**
Q.2	**(a)**	Explain steady state V-I characteristics of power BJT. Also discuss the second breakdown phenomenon in brief.	**07**
	(b)	Draw & explain dynamic turn-on characteristics of SCR.	**07**
		OR	
	(b)	Discuss the operation of buck-boost converter.	**07**
Q.3	**(a)**	Explain two transistor analogy of an SCR.	**07**
	(b)	What are the methods of DC motor speed control? Explain single phase semi-converter DC motor drive.	**07**
		OR	
Q.3	**(a)**	Explain RC firing circuit for SCR. Draw output voltage waveform for firing angle equal to 90°.	**07**
	(b)	What do you mean by commutation of SCR? Explain any one method in brief.	**07**
Q.4	**(a)**	With neat diagram & waveform explain UJT oscillator triggering.	**07**
	(b)	Write a short note on voltage rating of SCR.	**07**
		OR	
Q.4	**(a)**	A relaxation oscillator using a UJT is to be designed for triggering an SCR. The UJT has the following data I_p =0.6mA, V_p=18V, V_v=1V, R_{bb}=5KΩ, η=0.72, C=0.04μF, firing frequency is 2KHz, normal leakage current with emitter open is 4.2mA. Compute the values of R, R1 & R2.	**07**
	(b)	Write a short note on protection of SCR.	**07**
Q.5	**(a)**	What are the control strategies for chopper? Explain in brief.	**07**
	(b)	Explain the operation of dual converter circuit.	**07**
		OR	
Q.5	**(a)**	Explain regenerative braking control in DC machines using chopper circuit.	**07**
	(b)	Explain the working of MOSFET.	**07**

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