Subject Code: 2712908

Subject Name: Power Converter-I

Date: 01/01/2016

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER-I(New course) • EXAMINATION - WINTER- 2015

Time: 2:30 pm to 5:00 pm Instructions: Total N			Iarks: 70	
1. 2.	Attemp Make s	ot all questions. Suitable assumptions wherever necessary. So to the right indicate full marks.		
Q.1	(a)	Compare Power BJT with Thyristor for various aspects in tabular form.	07	
	(b)	Sketch symbol and equivalent circuit of an IGBT. Describe its switching characteristic.	07	
Q.2	(a)	What is cycloconverter? With waveforms, explain the operation of 3-Ø cycloconverter.	07	
	(b)	Explain 3- \emptyset , phase controlled rectifier with inductive load using necessary waveforms for $\alpha = 45^{\circ}$.	07	
	(b)	Describe in detail the operation of dual converter without circulating current.	07	
Q.3	(a)	With waveforms, explain the operation of a 1-Ø to 1-Ø cycloconverter. State applications of cyclo-converter.	07	
	(b)	Discuss operation of a 1-Ø ac regulator with RL load when $\alpha \le$ load phase angle Ø.	07	
Q.3	(a)	Analyse performance of the circuit shown in Fig.1	07	
		Fig. 1		
	(b)	Describe operation of multi-stage sequence control of ac voltage regulator with suitable power diagram.	07	
Q.4	(a) (b)	Discuss working of Boost converter with neat sketches. A chopper circuit is operating on time-ratio control principle at a frequency of 2kHz on a 220V dc supply. If the load voltage is 170V, compute the conduction and blocking period of thyristor in each cycle. OR	07 07	
Q.4 Q.4		Describe operation of a Sepic converter. State its advantages. Discuss Cuk converter operation with equivalent circuit for both switch - on and switch-off conditions.	07 07	

- Q.5 (a) A single phase bridge inverter delivers power to a series connected RLC load with R= 2 Ω and wL = 10Ω . The periodic time T = 0.1 msec . What value of C should the load have in order to obtain load commutation for the SCRs? The Thyristor turn-off time is 10 μ sec. Take circuit turn-off time as 1.5 t_q . Consider load current contains only fundamental components.
 - (b) State various types of PWM techniques & describe any one of 07 them in detail.

OR

- Q.5 (a) Describe the operation of a three phase bridge inverter for 180° 07 conduction for star connected resistive load.
 - (b) Describe input side voltage control technique for inverter using 07 controlled rectifier.
