GUJARAT TECHNOLOGICAL UNIVERSITY BE - SEMESTER-VII • EXAMINATION – SUMMER • 2015

Date: 08/05/2015

Subject Code:171002 Subject Name: Power Electronics Time:02.30pm-05.00pm Instructions:

Total Marks: 70

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Describe the Holding current and Latching current as applicable to an SCR with the 07 help of its characteristics
 - (b) Draw the V-I characteristics of DIAC and TRIAC. Also explain its working. 07
- Q.2 (a) With the help of neat diagram explain the two transistor analogy of an SCR.O7 Also discuss the triggering conditions of SCR
 - (b) With the help of neat and structural diagram and suitable waveforms, explain 07 the operation of Insulated-Gate BJT (IGBT)

OR

- (b) Draw and explain the structure of power MOSFET. Also explain principle of 07 operation and V-I characteristics of power MOSFET.
- Q.3 (a) Explain the operation of single phase half controlled bridge converter with 07 resistive load & inductive load with associated waveforms.
 - (b) What is GTO? Draw and explain GTO structure, give merits and demerits of GTO as compare to a conventional SCR

OR

- Q.3 (a) Explain the operation of three-phase, half wave controlled bridge converter 07 with resistive load. Also sketch associated waveforms.
 - (b) A single phase semiconverter is operated from 120 V, 50 Hz ac supply. The load resistance is 10 Ω . If the average output voltage is 25% of the maximum possible average output voltage, determine:
 - (i) Firing angle (ii) rms and average output current
 - (iii) average thyristor current

OR

- Q.4 (a) Classify the choppers and draw the schematic of step down and step up 07 choppers and derive an expression for the output voltage in terms of duty cycle for step up and step down.
 - (b) A dc chopper circuit connected to a 100V d.c. source supplies an inductive load having 40 mH in series with the resistance of 5 Ω . A freewheeling diode is placed across the load. The load current varies between the limits of 10 A and 12 A. Determine the time ratio of the chopper.

OR

- Q.4 (a) Write Short note on first quadrant (Type –A) chopper.
 - (b) Explain three-phase bridge Inverter for 1200 conduction with waveform. 07

07

Q.5	(a)	Classify the Inverters and also explain the principle operation of Full-bridge	07
		Inverter.	
	(b)	Explain why a PWM inverter is superior to a square-wave Inverter.	07

(b) Explain why a PWM inverter is superior to a square-wave Inverter.

OR

- (a) Give the classifications of SMPS. Also explain any one of the SMPS. Q.5 07
 - (b) Draw and explain Uninterruptable power supply and explain battery charging 07 Regulator
