

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER-V • EXAMINATION – WINTER • 2014

Subject Code: 150903**Date: 03-12-2014****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) With the help of neat diagram explain the working and characteristics of IGBT. List advantages and disadvantages of IGBT over Power BJT. **07**
- (b) What do you mean by commutation of SCR? What are the different classes of forced commutation method? Explain any one method in detail. **07**
- Q.2** (a) Draw and explain static characteristics of Triac. Differentiate between SCR and Triac. **07**
- (b) Explain the various turn-on methods of SCR. **07**
- OR**
- (b) List out the different protection provided to SCR. Explain Crowbar circuit for SCR. **07**
- Q.3** (a) What is the necessity of connecting SCRs in series? What are the problems associated with series connections of SCRs? How are they eliminated? **07**
- (b) Describe the working of single phase fully controlled bridge converter with RL load. Sketch the waveforms of 1) Load current 2) Load voltage 3) Thyristor current 4) Thyristor voltage for $\alpha = 60^\circ$. Hence derive the expression of average output voltage. **07**
- OR**
- Q.3** (a) With the help of neat circuit diagram explain R-C full wave triggering circuit for SCR. Also draw the related voltage waveforms. **07**
- (b) Explain the operation of three phase half wave controlled converter with RL load. Sketch the associated waveforms for $\alpha = 45^\circ$. **07**
- Q.4** (a) Explain with a neat circuit diagram the basic principle of a dual converter. Give the comparison between circulating current mode and non-circulating current mode. **07**
- (b) Discuss the various techniques of improving the power factor in phase controlled converters. Explain PWM techniques in detail with necessary sketch and waveforms. **07**
- OR**
- Q.4** (a) Explain the control strategies for chopper in detail. **07**
- (b) With the help of circuit diagram explain the type D chopper. **07**
- Q.5** (a) What are the different methods of braking of D.C motor? Explain regenerative braking scheme with schematic diagram. **07**
- (b) Explain single phase semi converter DC motor drive. **07**
- OR**
- Q.5** (a) What is the principle of phase lock loop control of d.c drives? List the advantages of phase lock loop control of d.c drives. **07**
- (b) Explain 1- ϕ dual converter drive for d.c motor. **07**
