

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- Vth SEMESTER-EXAMINATION – MAY/JUNE - 2012****Subject code: 150903****Date: 04/06/2012****Subject Name: Power Electronics - I****Time: 02:30 pm – 05:00 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 various methods for turn-on of thyristors. **07**
(b) Explain class B commutation of SCR with neat waveforms and state its merits and demerits. **07**

- Q.2** (a) Describe the working of SCRs connected in parallel. Also explain the problems arising in parallel operation of SCRs and their remedies. **07**
(b) Draw and explain the V-I characteristics of UJT. Define peak point and valley point clearly. **07**

OR

- (b) Ten thyristors are used in a string to withstand a dc voltage of 10kV. The maximum leakage current and recovery charge difference of thyristors is 10mA and 75 μ C respectively. The value of R for steady-state equalizing circuit is 40k Ω and value of capacitance C of dynamic equalizing circuit is 0.1 μ F. Find the (i) steady state and (ii) transient derating factor. **07**

- Q.3** (a) Explain the working of SCR firing circuit using UJT Relaxation Oscillator. **07**
(b) Write a short note on TRIAC and explain its characteristics. **07**

OR

- Q.3** (a) Describe the construction, working and characteristics of IGBT. **07**
(b) What is a snubber circuit? How are the elements of the snubber circuit calculated? **07**

- Q.4** (a) Explain the operation of 1- Φ fully controlled converter with RL load and derive the expression for average voltage and current. **07**
(b) Discuss the effect of source inductance on fully controlled converter. **07**

OR

- Q.4** (a) Explain the operation of dual converter circuit. **07**
(b) A 1- Φ full wave converter is operated at 230V, 50Hz for a resistive load of 12 Ω . If the average output voltage is 25% of maximum possible average output voltage, find (i) delay angle (ii) average and rms output currents (iii) average and rms thyristors currents. **07**

- Q.5** (a) Describe the working of Morgan's chopper. **07**
(b) Write a short note on buck-boost converter. **07**

OR

- Q.5** (a) Explain how a step-up chopper may be used in regenerative braking of dc motors. **07**
(b) Explain 1- Φ dual converter drive for dc motor. **07**
