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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII • EXAMINATION - WINTER 2013

Total Marks: 70

04

Subject Code: 171002	Date: 05-12-2013
Subject Name: Power Electronics	

Instructions:

1. Attempt all questions.

Time: 10:30 TO 01:00

- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- **Q.1** Power diodes. 2) The reverse recovery time of diode is 4 micro-second and the rate of fall of 03 the diode current is 20A/ micro-second. Determine (i) the storage charge Q_{RR} and (ii) the peak reverse current I_{RR} .

(a) 1) Explain in brief about reverse recovery characteristics of

- **(b)** Explain the construction and characteristics of IGBT. **07**
- **Q.2** (a) For a single phase half converter with purely resistive load and delay angle 07 $\pi/2$, determine (i) the rectification efficiency, (ii) the form factor (FF), (iii) the ripple factor (RF), (iv) the TUF, and (v) the PIV of thyristor.
 - (b) Explain the two transistor analogy of a thyristor and derive an expression for 07 the anode current I_A using this analogy.

OR

- **(b)** Explain in brief about the operation of three series-connected thyristors. 07 Derive an expression for the worst case steady state voltage across first thyristor T_1 .
- **07** Q.3(a) Explain dv/dt protection circuits of thyristor in detail.
 - (b) Explain with circuit diagram, single phase full converters with inductive 07 Load.

OR

- (a) Describe the working of a single phase dual converters with inductive load 07 Q.3 with circuit diagram and waveforms.
 - **(b)** Explain with circuit diagram, principal of step-down chopper. 07
- (a) Describe the working of three phase half wave converters with circuit 07 **Q.4** diagram and waveforms.
 - **(b)** Write Short note on first quadrant (Type –A) chopper. 07

OR

- 0.4 (a) List and explain performance parameters of inverters. 07
- (b) Define and discuss switching mode regulators. Explain Boost regulator with **Q.4** 07 circuit diagram and waveforms.
- Q.5 (a) Describe the working of a single phase half bridge inverter with **07** diagram and waveforms.
 - **(b)** Write Short note on Uninterruptible Power Supply. 07

OR

- (a) Describe the working of a three phase bridge inverter for 180° conduction 07 Q.5 with circuit diagram and waveforms.
 - **07 (b)** Write Short note on Switched mode Power Supply.
