

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-Vth Examination December 2010

Subject code: 152401

Subject Name: Power Electronics Devices & Instruments

Date: 13 /12 /2010

Time: 03.00 pm - 05.30 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Notations/symbols used have usual meanings.

- Q.1** (a) Draw symbols and V-I characteristics of (i) DIAC (ii) Power diode (iii) Power BJT (iv) TRIAC (v) IGBT (vi) Power MOSFET (vii) MCT. **07**
- (b) Derive an expression for frequency of UJT relaxation oscillator. **07**
- Q.2** (a) Draw detailed V-I characteristics of Thyristor and explain it. **07**
- (b) Draw the block diagram of power electronic system and explain functionality of each block in detail. **07**
- OR**
- (b) Explain (i) fast recovery diode and (ii) Schottky diode. **07**
- Q.3** (a) Describe Thyristor turn-off mechanism in detail. **07**
- (b) Discuss di/dt and dv/dt problems for Thyristor and its remedies. **07**
- OR**
- Q.3** (a) Define commutation. Explain the Class C commutation of Thyristor. **07**
- (b) Latching current for an SCR inserted between a dc voltage source of 200V and the load is 100mA. Calculate the minimum width of gate pulse current required to turn-on this SCR in case the load consists of (i) $L = 0.2H$ (ii) $R = 20\ \Omega$ in series with $L = 0.2H$ and (iii) $R = 20\ \Omega$ in series with $L = 2H$. Comments on the result obtain. **07**
- Q.4** (a) Explain the structure of enhancement type Power MOSFET. **07**
- (b) Discuss switching characteristics of Power BJT. **07**
- OR**
- Q.4** (a) Explain construction and working of IGBT. **07**
- (b) Enlist various types of driving circuits used for Power MOSFET. Describe any one from the same. **07**
- Q.5** (a) Explain cooling requirements for the power devices. **07**
- (b) Explain working principle of GTO. Also, state its various applications. **07**
- OR**
- Q.5** (a) Discuss the requirements of heat-sink for the power devices. **07**
- (b) Write short note on:- Power Integrated Circuits. **07**
