### Enrolment No.

## **GUJARAT TECHNOLOGICAL UNIVERSITY** PDDC - SEMESTER-VII • EXAMINATION – WINTER • 2014

Subject Code: X71102

## Date: 01-12-2014

**Total Marks: 70** 

# **Subject Name: Power Electronics**

## Time: 10:30 am - 01:00 pm

### Instructions:

Q.5

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- Q.1 (a) Explain working principle of SCR with its characteristics and two transistor 07 model.
  - (b) What is GTO? Draw and Explain GTO structure. Also explain GTO Turn off 07 mechanism with desired equation and figures.
- Q.2 (a) Draw and explain the structure of power MOSFET. Also explain principle of 07 operation and I-V characteristics of power MOSFET.
  - (b) Briefly explain the series operation of thyristors with necessary equations. 07 OR
  - (b) What are the different methods for turning off an SCR? Explain all methods in 07 detail.
- Q.3 (a) Describe the operation of single phase full dual converter with the help of 07 voltage and current waveform.
  - (b) For a single phase half converter with purely resistive load and delay angle  $\pi/2$ , 07 determine (i) the rectification efficiency, (ii) the form factor (FF), (iii) the ripple factor (RF), (iv) the TUF, and (v) the PIV of thyristor.

### OR

- Q.3 (a) Draw the circuit arrangements for the single phase full converter with resistive 07 load. Derive expression for the average output voltage and RMS output voltage. Sketch the voltage and current waveforms.
  - (b) Classify the chopper. List all type of chopper and explain any two in detail. 07
- Q.4 (a) Discuss the principle of operation of DC-DC step down chopper with suitable 07 waveform.
  - (b) Describe three phase bridge inverter with 180° mode of conduction. 07

### OR

- Q.4 (a) Describe the working of a  $1\phi$  full bridge inverter with relevant circuit and 07 waveforms.
  - (b) With the help of neat circuit diagrams and associated waveforms, discuss the 07 operation of Buck regulators.
- Q.5 (a) List types of Heating mechanism available and explain any one of them in 07 detail.
  - (b) Describe Switched Mode Power Supply with necessary diagram in detail. 07

OR

(a) Describe Uninterruptible power supply with necessary diagrams in detail.
(b) Write a note on battery charger.
07

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