

GUJARAT TECHNOLOGICAL UNIVERSITY**PDDC - SEMESTER-VII • EXAMINATION – WINTER 2013****Subject Code: X 71102****Date: 05-12-2013****Subject Name: Power Electronics****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 schematic and circuit, explain two transistor analogy of an SCR. **07**

(b) Discuss various turn on methods of thyristor. **07**

Q.2 (a) Distinguish between natural and forced commutation of SCR. Discuss any two forced commutation techniques. **07**

(b) Discuss the different modes of operation of thyristor with the help of V-I characteristic. **07**

OR

(b) Explain the operation of IGBT with the help of neat structural diagram and equivalent circuit. **07**

Q.3 (a) Explain the operation of three phase half wave converter with inductive load and also sketch the associated waveforms. **07**

(b) If the single-phase half-wave convertor with resistive load has a purely resistive load of R and delay angle is $\alpha = \pi/2$, determine (a) the rectification efficiency, (b) the form factor FF (c) the ripple factor RF , and (d) the peak inverse voltage PIV of thyristor. **07**

OR

Q.3 (a) Draw and explain single phase full converter with inductive load using required waveforms and equations. **07**

(b) Explain dv/dt and di/dt protection for thyristor. **07**

Q.4 (a) Explain the principle of operation of step-up chopper. Sketch the current and voltage waveform. Also discuss the modes of operation with equivalent circuit. **07**

(b) Describe switched mode power supply with necessary diagrams in detail. **07**

OR

Q.4 (a) Show chopper classification. Explain Class B and Class C chopper with necessary diagram. **07**

(b) Explain the working principle of Buck regulator with the help of circuit diagram and waveforms. Draw equivalent circuit for different modes of operation. **07**

Q.5 (a) Draw and explain the operation of 180° conduction mode of three phase inverter. **07**

(b) List types of Heating mechanism available and explain any one in detail. **07**

OR

Q.5 (a) Explain the principle of working of single phase full bridge inverter with the help of circuit and waveforms. If this inverter has a resistive load of $R = 2.4\Omega$ and the dc input voltage is $V_s = 48V$. Determine the rms output voltage at the fundamental frequency and the output power. **07**

(b) Why we need UPS? Draw and explain online UPS system with their operation and features. **07**
