

**GUJARAT TECHNOLOGICAL UNIVERSITY**

**BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020**

**Subject Code:2150903**

**Date:29/01/2021**

**Subject Name:Power Electronics – I**

**Time:10:30 AM TO 12:30 PM**

**Total Marks: 56**

**Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
<b>Q.1</b>	(a) Compare SCR with IGBTs.	<b>03</b>
	(b) Draw input voltage, output voltage and output current waveform of half wave diode rectifier with RL load.	<b>04</b>
	(c) Develop two transistor analogy model of SCR. Explain working principle of SCR from it.	<b>07</b>
<b>Q.2</b>	(a) Explain construction of TRIACs.	<b>03</b>
	(b) How SCRs can be used as bidirectional switch?	<b>04</b>
	(c) Explain series and parallel operation of SCRs and problem associated with them.	<b>07</b>
<b>Q.3</b>	(a) Explain the requirement of gate drive.	<b>03</b>
	(b) Explain the term latching current and holding current of SCR. Compare them.	<b>04</b>
	(c) Discuss RC triggering circuit. Explain its limitations.	<b>07</b>
<b>Q.4</b>	(a) Explain principle of natural commutation.	<b>03</b>
	(b) Explain effect of gate current on V-I characteristics of SCR.	<b>04</b>
	(c) With the necessary circuit diagram and waveforms explain the operation of UJT triggering circuit.	<b>07</b>
<b>Q.5</b>	(a) Explain snubber circuit and its applications.	<b>03</b>
	(b) Explain applications of pulse transformer and optocouplers.	<b>04</b>
	(c) Sketch circuit diagram and waveform of 3-phase full wave fully controlled converter. Analyse its performance with RL load.	<b>07</b>
<b>Q.6</b>	(a) Explain requirement of $di/dt$ and $dv/dt$ protection of SCR.	<b>03</b>
	(b) Discuss need of freewheeling diode.	<b>04</b>
	(c) Sketch circuit diagram and waveform of 1-phase full wave bridge converter. Analyse its performance with RLE load.	<b>07</b>
<b>Q.7</b>	(a) Compare voltage commutated, current commutated and load commutated chopper.	<b>03</b>
	(b) Explain four quadrant operation of DC drives.	<b>04</b>
	(c) Explain operation of 3-phase separately excited DC drive controlled by semi converter.	<b>07</b>
<b>Q.8</b>	(a) Explain working principle of boost converter.	<b>03</b>
	(b) Explain four quadrant operation of chopper.	<b>04</b>
	(c) Explain the concept of regenerative braking. Explain chopper controlled DC drive with regenerative braking.	<b>07</b>

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