Seat No.: _____ Enrolment No._____

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

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