

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VI (NEW) EXAMINATION – WINTER 2020****Subject Code:2161006****Date:27/01/2021****Subject Name:Power Electronics Devices and Circuits****Time:02:00 PM TO 04:00 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) Why Germanium is not used in fabrication of thyristors.	03
	(b) Sketch static I-V characteristics of a thyristor. Label the various voltages, current and the operating modes on this sketch.	04
	(c) Draw and explain two transistor analogy of SCR, and derive equation for anode current $I_a = \frac{\alpha_2 I_g + I_{CBO1} + I_{CBO2}}{1 - (\alpha_1 + \alpha_2)}$.	07
Q.2	(a) Explain working principle of phase controlled rectifiers.	03
	(b) Explain one quadrant converter.	04
	(c) Explain working of single-phase half-wave circuit with RL, and RL with freewheeling diode type load with necessary waveforms.	07
Q.3	(a) What do you mean by chopper? List out its applications.	03
	(b) What is time ratio control in chopper? Explain the use of TRC for controlling the output of chopper.	04
	(c) List out types of chopper circuits and explain any one of them in detail.	07
Q.4	(a) List a few industrial applications of inverter.	03
	(b) Draw the voltage waveforms for 120 degree mode six-step 3-phase voltage source inverter.	04
	(c) Explain the working principle of a single-phase half-bridge inverter with the help of the circuit and waveforms for both resistive and inductive loads.	07
Q.5	(a) List out the applications of Cycloconverter.	03
	(b) Draw the schematic diagram of three-phase to single-phase Cycloconverter and basic circuit configuration with IG reactor.	04
	(c) Draw the circuit diagram and explain the working principle of Mid-point type single-phase to single-phase Cycloconverter.	07
Q.6	(a) Discuss braking modes operation in DC Drives.	03
	(b) Discuss the concept of electric drives with neat and clean block diagram.	04
	(c) Describe single-phase half-wave converter feeding a separately excited DC motor. Illustrate your answer with waveforms and appropriate expressions.	07

- Q.7 (a) List out advantages of AC drives. **03**
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(b) List out different speed control techniques used for three-phase induction motors. **04**
(c) With necessary diagram and characteristics discuss Stator Voltage Control of IM. **07**
- Q.8 (a) Differentiate between offline and online UPS. **03**
(b) Explain working principle of dielectric heating. **04**
(c) Draw the block diagram of SMPS and explain it briefly. **07**

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