

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- IV EXAMINATION – SUMMER 2020****Subject Code: 3140915****Date: 04/11/2020****Subject Name: Power Electronics****Time: 10:30 AM TO 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.

	Marks
Q.1 (a) Explain IGBT with its physical construction diagram and characteristics.	03
(b) Draw the SCR static V-I characteristics and explain its behavior in forward conduction, forward blocking and reverse blocking modes.	04
(c) Explain working of 1- ϕ semi converter with the help of voltage and current waveform under resistive load.	07
Q.2 (a) Compare the RC firing circuit and R firing circuit based on its circuit diagram.	03
(b) Describe the effect of high switching frequency on harmonics spectrum in single phase full bridge inverter.	04
(c) Derive the output voltage equation in case of buck and boost converter and draw the comparison.	07
OR	
(c) Draw the circuit diagram of three-phase full converter connected to RL load with continuous conduction. Draw the waveforms of output voltage, output current for firing angle equal to 60° .	07
Q.3 (a) Write application of cycloconverters.	03
(b) Write advantages and disadvantages of PWM technique to generate gate pulse.	04
(c) Draw necessary waveforms and explain working of single phase full controlled rectifier circuit with R-L load.	07
OR	
Q.3 (a) Justify the statement why SCR is not suitable for dc to ac converter for low power applications.	03
(b) Explain construction of Power MOSFET.	04
(c) Describe the working of a single phase full bridge inverter with relevant circuit and waveforms for R-L Load.	07
Q.4 (a) Derive only expression of RMS output voltage of single phase full wave AC voltage controller with R load.	03
(b) Write important features of sinusoidal pulse width modulation used in PWM inverters.	04

- (c) Explain working of 3 phase bridge inverter with star connected resistive load with 180° mode using gate signals, output phase voltage and line voltage. **07**

OR

- Q.4** (a) Describe the working of freewheeling diode in Phase controlled rectifier. **03**
(b) Write a short note on matrix converter. **04**
(c) Explain working of 3 phase bridge inverter with star connected resistive load with 120° mode using gate signals, output phase voltage and line voltage. **07**

- Q.5** (a) List the various voltage control techniques in DC-DC converters. **03**
(b) Give four points of difference between on-off control and phase angle control. **04**
(c) Explain the working principal of buck-boost converter with circuit diagram of different modes of operation. **07**

OR

- Q.5** (a) Draw the output voltage waveform of three-phase half-wave controlled rectifier with the R-load. **03**
(b) State at least two reasons to control or eliminate the harmonics in inverters. List out different techniques to eliminate harmonics in inverter. **04**
(c) Explain the parallel operation of SCR. **07**