

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-V (NEW) EXAMINATION – WINTER 2022****Subject Code:3151106****Date:06-01-2023****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.
4. Simple and non-programmable scientific calculators are allowed

		MARKS
Q.1	(a) Draw and Explain V-I characteristics of DIAC briefly.	03
	(b) List and Describe Turn ON methods for SCR.	04
	(c) Discuss regenerative latching action in thyristor using two transistor analogy also derive equation for anode current.	07
Q.2	(a) Define SCR commutation. Explain the self commutation in brief.	03
	(b) Make the comparison between Power MOSFET and IGBT.	04
	(c) Explain the operation of single phase fully controlled bridge converter with resistive and inductive load with associated waveforms.	07
	OR	
	(c) Derive input supply power factor, displacement factor and harmonic factor for single phase full wave-controlled rectifier using its input current Fourier series analysis.	07
Q.3	(a) Explain UJT as a relaxation oscillator.	03
	(b) Draw the circuit diagram and explain the operation of step down chopper with the help of waveforms.	04
	(c) Explain the different control strategies for chopper.	07
	OR	
Q.3	(a) Explain Step up Chopper briefly.	03
	(b) Differentiate between constant frequency and variable frequency operation of chopper.	04
	(c) A step up chopper has input voltage of 220V and output voltage of 660V. If the nonconducting time of thyristor chopper is 100 μ sec, compute the pulse width of output voltage. In case pulse width is halved for constant frequency operation, find the new output voltage.	07
Q.4	(a) Design and explain the operation of current source inverter.	03
	(b) Explain block diagram of SMPS.	04
	(c) With help of neat circuit diagram and waveforms, explain the operation of PWM inverter with resistive load.	07
	OR	
Q.4	(a) Compare voltage and current source inverter.	03
	(b) Enlist the applications of Inverter.	04
	(c) With the help of circuit diagram and waveforms, explain the working of single phase full bridge inverter.	07
Q.5	(a) Compare online and offline UPS.	03
	(b) Explain speed control of AC motor.	04

- (c) Draw and explain the structure of power MOSFET. Also explain principle of operation and V-I characteristics of power MOSFET. **07**

OR

- Q.5** (a) Enlist advantages of AC drives. **03**
(b) Discuss EMI protection in brief. **04**
(c) Explain the construction and working of flyback converter type switched mode DC power supply. **07**
