Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–V EXAMINATION – WINTER 2025

Subject Code:3151106 Date:19-11-2025

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)**	Design VI characteristic of SCR. Show and explain the difference between holding current and latching current.	**03**
	(b)	Make the comparison between SCR and TRIAC.	**04**
	(c)	A single phase half wave controlled rectifier is operated from a 240 V, 50 Hz. Load resistance R = 20 Ω. If the average output voltage is 25% of the maximum possible average output voltage, determine: (1) the firing angle (2) rms and average output and SCR currents.	**07**
Q.2	**(a)**	Explain the effect of freewheeling diodes in power electronics circuits.	**03**
	(b)	Explain the SCR resistance-capacitance triggering circuit.	**04**
	(c)	Explain the operation of single phase semi controlled bridge converter with resistive and inductive load. Draw the associated waveforms.	**07**
		OR	
	(c)	A dc chopper circuit connected to 100 V dc source supplies an inductive load having 50 mH in series with resistance of 5 Ω. Freewheeling diodes is placed across the load. The load current varies between the limits of 10-12 A. Determine the time ratio of the chopper.	**07**
Q.3	**(a)**	What is the function of Chopper? Explain the working of step-up chopper.	**03**
	(b)	With help of waveform explain the current limit control strategy of chopper.	**04**
	(c)	With help of neat circuit diagram and waveforms, explain the operation of PWM half bridge inverter with resistive load.	**07**
		OR	
Q.3	**(a)**	What are the applications of chopper? Explain the working of class D chopper.	**03**
	(b)	Compare the step up and step down chopper.	**04**
	(c)	With help of neat circuit diagram and waveforms, explain the operation of single phase current source inverter.	**07**
Q.4	**(a)**	What is commutation? Explain self commutation.	**03**
	(b)	Explain the snubber circuits for thyristor.	**04**
	(c)	Explain the basic structure and VI characteristic of IGBT.	**07**
		OR	
Q.4	**(a)**	What is the function of an inverter? List out various applications of an inverter.	**03**
	(b)	Explain two transistor analogy of SCR.	**04**
	(c)	Draw and explain the structure of power MOSFET. Explain principle and operation and V-I characteristics of power MOSFET.	**07**

Q.5	**(a)**	Compare Power supply and SMPS.	**03**
	(b)	Explain the working of Fly back SMPS.	**04**
	(c)	Write short note on UPS.	**07**
		OR	
Q.5	**(a)**	Compare EMI and EMC.	**03**
	(b)	Explain the working of DC chopper drive.	**04**
	(c)	Write short note on P M Stepper Motor drives.	**07**