

Enrolment No./Seat No _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER- V EXAMINATION – SUMMER 2026

Subject Code:3151106

Date:25-05-2026

Subject Name:Power Electronics

Time:02:30 PM TO 05:00 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	CO (Course Outcome)	Cognitive Level (As per Revised Bloom's Taxonomy)
Q.1	(a) Explain the various Turn On methods of SCR.	03	CO-2	U
	(b) What are dv/dt and di/dt ratings of SCR? What happens if these rating exceeded? Explain	04	CO-1	U
	(c) What is commutation? Explain complementary commutation circuit.	07	CO-2	E
Q.2	(a) Explain snubber circuit.	03	CO-1	
	(b) With help of neat diagram and associated waveform, explain the operation of resistance triggering circuit	04	CO-2	A
	(c) A single phase semi converter is operated from 120 V, 60 Hz ac supply. The load resistance is $10\ \Omega$, if the average output voltage is 25% of the maximum possible average output voltage, finds: 1. Delay angle 2. Average and rms output voltage 3. Average and rms thyristor current.	07	CO-4	A
	OR			
	(c) A DC type A chopper has resistive load $20\ \Omega$ and input voltage of 220 volts. When the chopper remains on, its voltage drop is $V_{ch} = 1.5$ volts and chopping frequency is 10 kHz, if duty cycle is 80% determine: 1. Average output voltage 2. RMS output voltage 3. Chopper efficiency 4. Effective input resistance.	07	CO-5	E
Q.3	(a) What is the function of Chopper? Explain the working of step down chopper.	03	CO-5	U
	(b) With help of circuit diagram explain the working of class D chopper.	04	CO-5	A
	(c) With help of neat circuit diagram and waveforms, explain the operation of PWM full bridge inverter with resistive load.	07	CO-5	A
	OR			
Q.3	(a) Explain the multiphase choppers.	03	CO-5	A
	(b) With help of circuit diagram explain the working of class B chopper.	04	CO-5	N

	(c)	With help of neat circuit diagram and waveforms, explain the operation of single phase current source inverter.	07	CO-5	U
Q.4	(a)	Explain the structure and characteristic of TRIAC.	03	CO-1	R
	(b)	Compare SCR and IGBT.	04	CO-1	N
	(c)	What are the on conditions for SCR? Explain the RC triggering circuit in detail.	07	CO-2	U
OR					
Q.4	(a)	Explain the effect of freewheeling diode.	03	CO-1	U
	(b)	Compare static and dynamic latch up in IGBT.	04	CO-1	
	(c)	With help of neat circuit diagram and associated waveform explain the operation of single phase bridge converter for resistive load.	07	CO-4	N
Q.5	(a)	What are the advantages of SMPS over normal power supply? List out the various applications of SMPS.	03	CO-5	N
	(b)	Explain the working of fly back converter SMPS.	04	CO-5	U
	(c)	With help of block diagram explain the operation of off line uninterrupted power supply. Write the detail specifications of off line UPS.	07	CO-7	A
OR					
Q.5	(a)	Define and explain power line disturbances.	03	CO-7	N
	(b)	Explain the design and application of power conditioner.	04	CO-7	A
	(c)	Explain the construction, working and applications of permanent magnet stepper motor drive.	07	CO-6	A