Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V EXAMINATION – SUMMER 2025

Subject Code:3151106 Date:15-05-2025

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
Q.1	**(a)**	Explain briefly the concept of power electronics.	**03**
	(b)	Define and compare holding and latching currents of SCR.	**04**
	(c)	What is commutation? With help of circuit and wave form explain self commutation by an LC circuit.	**07**
Q.2	**(a)**	Compare simple rectifier and controlled rectifier.	**03**
	(b)	With help of neat diagram and associated waveform, explain the operation of half wave RC triggering circuit.	**04**
	(c)	A complementary commutation circuits operate from DC supply of 120 V and use $R_1 = R_2 = 10\ \Omega$, commutating capacitor C = 10 μF. Calculate circuit turn off time and peak thyristor current.	**07**
		OR	
	(c)	A single phase full converter is supplied from 230 V, 50 Hz supply. The load current is continuous and ripples free. If the average current is 150 A and source inductance is 0.1 mH determine the overlap angle at (i) $\alpha = 10^0$ (ii) $\alpha = 30^0$ (iii) $\alpha = 60^0$	**07**
Q.3	**(a)**	Write the classification of DC Chopper.	**03**
	(b)	With help of circuit diagram explain the working of class E chopper.	**04**
	(c)	Explain the various voltage control methods of single phase inverter.	**07**
		OR	
Q.3	**(a)**	Enumerate the merits and demerits of load commutated chopper.	**03**
	(b)	With help of circuit diagram explain the working of Jones chopper.	**04**
	(c)	With help of neat circuit diagram and waveforms, explain the operation of single phase voltage source inverter.	**07**
Q.4	**(a)**	Explain the power integrated circuits.	**03**
	(b)	Compare DIAC and TRIAC.	**04**
	(c)	Which are the conditions to make SCR on? Explain the full wave RC triggering circuit in detail.	**07**
		OR	
Q.4	**(a)**	Explain the effect of freewheeling diode.	**03**
	(b)	What are advantages of IGBT? Explain the basic structure of IGBT.	**04**
	(c)	With help of neat circuit diagram and associated waveform explain the operation of single phase full wave controlled rectifier with resistive and inductive load.	**07**
Q.5	**(a)**	Explain the discontinuous mode of isolated fly back SMPS.	**03**
	(b)	Explain MOS controlled thyristor.	**04**

	(c)	With help of block diagram explain the operation of on line uninterrupted power supply. Write the detail specifications of on line UPS.	**07**

OR

Q.5	**(a)**	What is meant by EMI and EMC?	**03**
	(b)	Explain the capacity and efficiency of batteries used in UPS.	**04**
	(c)	Explain the construction, working and applications of separately excited DC motor drive.	**07**

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