Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3164104 Date:10/06/2022

Subject Name:Power Electronics and Drives

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)**	"Gate trigger pulse turning on SCR, but after removing gate voltage it remain in on condition" Justify the statement.	**03**
	(b)	List the various turn on method of SCR. Explain resistance triggering method in brief.	**04**
	(c)	What is controlled rectification? With help of circuit diagram and waveforms explain the working of single phase half wave controlled rectifier with restive and inductive load.	**07**
Q.2	**(a)**	Explain the gate turn on/off method of GTO.	**03**
	(b)	What is the necessity of connecting SCRs in series? What are the problems associated with series connections of SCRs?	**04**
	(c)	A single phase half wave rectifier is used to supply power to a load of impedance 10 Ω from 230 V, 50 Hz ac supply at the firing angle 30^0. Calculate average load voltage, effective value and load current.	**07**
		OR	
	(c)	A 150 A SCR is to be used in parallel with 100 A SCR. The on state voltage drops of SCRs are 1.8 V and 2 V, respectively, calculate the series resistance that should be connected with each SCR if two SCRs have to share the total current 250 A in proportion to their ratings.	**07**
Q.3	**(a)**	What is commutation? Explain self commutation method.	**03**
	(b)	Explain the effect of freewheeling diodes in inductive load.	**04**
	(c)	With help of circuit diagram and wave forms explain the working of single phase full wave controlled rectifier with reactive load and derive the average output dc voltage and rms load voltage equations.	**07**
		OR	
Q.3	**(a)**	Compare resistance and resistance-capacitance triggering circuits of SCR.	**03**
	(b)	Explain basic structure and VI characteristics of IGBT.	**04**
	(c)	Explain two transistor analogy of SCR.	**07**
Q.4	**(a)**	What is the function of an inverter? List the various applications of an inverter.	**03**
	(b)	Compare step up and step down choppers.	**04**
	(c)	What are the applications of DC to DC converter? Explain the operation of Buck converter.	**07**
		OR	
Q.4	**(a)**	Design class-C chopper and explain its operation.	**03**
	(b)	Write short note on cycloconverter.	**04**

	(c)	With help of circuit diagram and wave form explain the working of single phase full bridge voltage source inverter.	**07**
Q.5	**(a)**	List out the various schemes for DC motor speed control and explain one of the schemes.	**03**
	(b)	Explain the single quadrant closed loop control of AC Drive.	**04**
	(c)	Explain the breaking operation of rectifier controlled separately excited DC motor.	**07**

OR

Q.5	**(a)**	Explain the basic principle of operation of induction motor with reference to its equivalent circuit.	**03**
	(b)	Write short note on DC Chopper drives.	**04**
	(c)	Explain the variable frequency control operation of AC Drives.	**07**

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