GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–IV (NEW) EXAMINATION – WINTER 2021

Subject Code:3140915   **Date:30/12/2021**

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)**	Derive output voltage equation for single phase half wave rectifier.	**03**
	(b)	Discuss SVPWM technique in brief.	**04**
	(c)	Explain working of 1-ϕ semi converter with the help of voltage and current waveform under resistive load.	**07**
Q.2	**(a)**	Compare the RC firing circuit and R firing circuit based on its circuit diagram.	**03**
	(b)	State the merits & demerits of current source inverter & voltage source inverter.	**04**
	(c)	Draw gate voltage and phase voltage waveform and explain 3 phase inverter operation for 120° conduction mode.	**07**
		OR	
	(c)	Describe the effect of high switching frequency on harmonics spectrum in single phase full bridge inverter.	**07**
Q.3	**(a)**	Justify the statement, why SCR is not suitable for dc to ac converter for low power applications?	**03**
	(b)	Classify of different techniques for voltage control of inverter. Explain anyone.	**04**
	(c)	Analysis of working of 3-ϕ half wave controlled rectifier with RL load with continuous conduction mode.	**07**
		OR	
Q.3	**(a)**	Describe the working of freewheeling diode in phase controlled rectifier.	**03**
	(b)	Distinguish between full controlled bridge converter and half controlled bridge converter.	**04**
	(c)	Draw circuit diagram and necessary waveforms of single phase fully controlled center tapped ac to dc converter with R load. Derive equation for V_{RMS}.	**07**
Q.4	**(a)**	Explain protection of SCR and its design.	**03**
	(b)	Explain Snubber circuit and its design	**04**
	(c)	Explain the parallel operation of SCR.	**07**
		OR	
Q.4	**(a)**	Draw and explain static V-I characteristics of SCR.	**03**
	(b)	Explain Matrix converter	**04**
	(c)	Write short note cycloconverters.	**07**
Q.5	**(a)**	Give four points of difference between on-off control and phase angle control.	**03**
	(b)	Explain Buck converter.	**04**
	(c)	Explain working of 3 phase bridge inverter with star connected resistive load with 180° mode using gate signals, output phase voltage and line voltage.	**07**
		OR	

Q.5 **(a)** Enlist various control techniques for output voltage control. **03**

(b) Sketch bipolar PWM **04**

(c) Explain multi-quadrant operation of DC-DC converter. **07**

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