Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VII (New) EXAMINATION – WINTER 2019

Subject Code: 2170906 **Date: 23/11/2019**

Subject Name: Advanced 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.**

Q.1	**(a)**	With block diagram Compare Linear voltage regulator and Switch mode voltage regulator.	**03**
	(b)	Compare HVDC transmission over EHVAC transmission based on Economics of Transmission, Technical Performance & Reliability	**04**
	(c)	With neat circuit diagram & waveform explain the operation of a BOOST converter in CCM and Derive the equation of (1) Peak to Peak Inductor Current (2) Peak to Peak Capacitor Voltage (3) Critical value of inductor & Capacitor.	**07**
Q.2	**(a)**	What is the need of Resonant Converter? Compare Series Loaded Resonant (SLR) converter with Parallel loaded resonant (PLR) Converter	**03**
	(b)	Explain the operation of FORWARD Converter in Continuous Current Mode. Derive the Equation of Output Voltage.	**04**
	(c)	What do you mean by Zero Voltage Switching (ZVS). With neat circuit and waveform explain the operation of ZVS Converter	**07**
		OR	
	(c)	Explain the operation of Series loaded resonant (SLR) converter in (1) Discontinuous Current Mode ($\omega_s \leq \frac{1}{2}\omega_o$) (2) Continuous Current Mode ($\frac{1}{2}\omega_o \leq \omega_s \leq \omega_o$)	**07**
Q.3	**(a)**	Explain the concept & need of Multi Level Inverter (MLI)	**03**
	(b)	Explain the operation of Class E converter	**04**
	(c)	Explain the operation of 5-Level DCMLI. Also discuss problems associated with DCMLI and how it will overcome.	**07**
		OR	
Q.3	**(a)**	Explain Concept and requirement of Multi Pulse Converter (MPC)	**03**
	(b)	Draw the one line diagram of HVDC & Discuss the equipments of HVDC systems.	**04**
	(c)	With neat circuit diagram and waveform, Explain the operation of 5-level cascade H-bridge Inverter	**07**
Q.4	**(a)**	Classification Of FACTS devices.	**03**
	(b)	Explain the operation of SEPIC converter. Derive the Equation of Output Voltage.	**04**
	(c)	Explain the how source current Harmonic Elimination using 12 Pulse Converter	**07**
		OR	
Q.4	**(a)**	What is the need of Reactive Power Compensation?	**03**
	(b)	Explain the operation of CUK converter. Derive the Equation of Output Voltage	**04**
	(c)	Explain following transformer connection with phasor diagram used in multi pulse converter. (a) Y-Z1 (b) Δ-Z1	**07**
Q.5	**(a)**	What is FACTS? Discuss the advantages of FACTS in brief.	**03**
	(b)	Explain working principal of SSSC.	**04**
	(c)	Explain TCR with circuit diagram. Draw current and voltage waveforms for different values of α.	**07**
		OR	
Q.5	**(a)**	Comparison of SVC & STATCOM.	**03**
	(b)	Explain working principal of UPFC	**04**
	(c)	Explain the Operation of FC-TCR.	**07**

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