Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3170906 Date:16-05-2025

Subject Name:Advanced 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)**	Define duty cycle and write its importance.	**03**
	(b)	Explain fly back converter.	**04**
	(c)	Illustrate the push pull converter with neat circuit diagram & waveform and derive the equation of output voltage in terms of input voltage & duty cycle.	**07**
Q.2	**(a)**	Differentiate between continuous mode of conduction and Discontinuous mode of conduction .	**03**
	(b)	What is the need of Resonant Converter? Compare Series Loaded Resonant (SLR) converter with Parallel loaded resonant (PLR) Converter	**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 two transistor forward converter with circuit diagram, waveform and required equation.	**07**
Q.3	**(a)**	Give Classification of resonant converters.	**03**
	(b)	Classify carrier based PWM technique for multilevel inverter. Discuss any one in detail .	**04**
	(c)	Draw circuit diagram and output voltage phasor diagram of 12-pulse converter.	**07**
		OR	
Q.3	**(a)**	Compare the three topologies of multilevel inverter.	**03**
	(b)	What are the advantages of cascaded H bridge multi-level inverter over other two topologies?	**04**
	(c)	Explain following transformer connection with phasor diagram used in multi pulse converter. (a) Y-Z1 (b) Δ-Z1	**07**
Q.4	**(a)**	Explain star/delta phase shifting transformer with phasor diagram	**03**
	(b)	What is phase angle compensation in transmission system?	**04**

	(c)	Explain TCR with circuit diagram. Draw current and voltage waveforms for different values of α	**07**

OR

Q.4	**(a)**	Explain different types of HVDC link.	**03**
	(b)	Draw block diagram of HVDC transmission system. Mention equipment required for HVDC system.	**04**
	(c)	Explain working of Static Synchronous Series Compensator (SSSC) with neat diagrams	**07**
Q.5	**(a)**	State the need of reactive power compensation.	**03**
	(b)	Discuss the principle of series compensation and state various methods for series compensation	**04**
	(c)	Explain operating principle of Unified power flow controller (UPFC).	**07**

OR

Q.5	**(a)**	Give classification and applications of phase shifting transformer	**03**
	(b)	Discuss static characteristics of STATCOM	**04**
	(c)	Explain the working principle of TSC-TCR.	**07**

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