Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2021

Subject Code:2170906 Date:03/08/2021

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)**	What is the need of multi-level inverter? Give its classifications.	**03**
	(b)	What do mean by switch mode power supply? How is it differs from linear regulated power supply?	**04**
	(c)	Draw necessary waveforms and explain working of Boost converter in continuous and discontinuous conduction mode.	**07**
Q.2	**(a)**	What do you mean by hard and soft switching? How does the ZCS and ZVS principle help to achieve soft switching?	**03**
	(b)	Explain half bridge dc-dc converter with neat diagram and waveforms.	**04**
	(c)	Explain three level diode clamped type multi-level inverter. What are demerits of this topology?	**07**
		OR	
	(c)	Discuss operation of a five level flying capacitor multilevel inverter with neat circuit diagram and waveforms.	**07**
Q.3	**(a)**	List the possible combinations or configurations of the phase shifting transformers for the 18-pulse converter clearly indicating the phase shift from the respective windings/transformer.	**03**
	(b)	Calculate the total no. of switches and power supply required in case of nine level cascade H-bridge inverter connected to a single phase load? Also calculate the minimum number of switches required in case of DC power supply with unequal magnitudes.	**04**
	(c)	Which harmonics are dominant in line for a 12-pulse multi-pulse converter? Also, explain how harmonic cancellation occurs in multi-pulse converter.	**07**
		OR	
Q.3	**(a)**	Explain the role of transformer in isolated DC-DC converter.	**03**
	(b)	Draw circuit diagram and waveforms of output voltage and input line current in case of six-pulse diode rectifier connected to resistive load.	**04**
	(c)	Discuss operation of Cuk converter. Derive the relation between duty ratio and input voltage.	**07**
Q.4	**(a)**	Explain the significance of third winding in case of forward converter.	**03**
	(b)	Classify carrier-based PWM technique for multilevel inverter. Discuss any one in detail.	**04**
	(c)	Discuss operation of parallel load resonant DC to DC converter.	**07**
		OR	
Q.4	**(a)**	Draw block diagram of HVDC transmission system. Mention equipment required for HVDC system.	**03**
	(b)	Give comparison of SVC and STATCOM.	**04**

	(c)	With neat circuit diagram and waveform discuss class E resonant inverter.	**07**
Q.5	**(a)**	Define FACTS. Give classification of FACTS controllers.	**03**
	(b)	Give comparison of HVAC and HVDC transmission.	**04**
	(c)	Explain working of STATCOM with neat diagram.	**07**
		OR	
Q.5	**(a)**	Discuss importance of reactive power compensation.	**03**
	(b)	Write the advantages and limitations of SSSC.	**04**
	(c)	Explain working of FC-TCR with neat diagram and waveforms.	**07**

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