Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – WINTER 2018

Subject Code: 2170906 **Date: 15/11/2018**

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)**	Compare buck, boost and buck-boost converter with reference to technical parameters.	**03**
	(b)	Write the advantages of resonance converter as compared to PWM 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)**	Define duty cycle and write its importance.	**03**
	(b)	Differentiate between continuous mode of conduction and discontinuous mode of conduction.	**04**
	(c)	Justify the name of converter as zero voltage switching converter with necessary diagram and waveform.	**07**
		OR	
	(c)	Illustrate how the harmonic current are canceled by phase shifting transformer in 12 pulse rectifier.	**07**
Q.3	**(a)**	Compare the three topologies of multilevel inverter.	**03**
	(b)	Compare HVAC and HVDC transmission line.	**04**
	(c)	The buck-boost regulator has an input voltage = 12 V, duty cycle = 0.25, switching frequency = 25 kHz, inductor = 150 μH, filter capacitor = 220 μF and average load current = 1.25 A. Determine (a) Average output voltage (b) Peak to peak output voltage ripple (c) Peak to peak ripple current (d) Peak current of switch (e) Critical value of L and C.	**07**
		OR	
Q.3	**(a)**	Introduce the multi pulse converter.	**03**
	(b)	Draw circuit diagram of 9 level asymmetric cascaded H bridge multilevel inverter and mention the switching states to generate 0 level.	**04**
	(c)	The class E resonance inverter operates at resonance and has Vs = 12 V, R= 10 Ω, fs = 25 kHz and Q = 7. Determine optimum value of L, C, Ce and Le.	**07**
Q.4	**(a)**	Draw block diagram of HVDC transmission system. Mention equipment required for HVDC system.	**03**
	(b)	Justify: ZVS is better than ZCS.	**04**
	(c)	Explain in detail about rectifier and inverter control characteristic of HVDC converter.	**07**
		OR	
Q.4	**(a)**	State the need of reactive power compensation.	**03**
	(b)	Draw and explain bipolar HVDC power transmission system based on 12 pulse converters for each pole.	**04**
	(c)	Discuss the operation of thyristor switched capacitor.	**07**
Q.5	**(a)**	Compare SVC and STATCOM.	**03**

	(b)	Classify carrier based PWM technique for multilevel inverter. Discuss any one in detail.	**04**
	(c)	Explain in brief about FACTS.	**07**

OR

Q.5	**(a)**	Explain star/delta phase shifting transformer with phasor diagram.	**03**
	(b)	Write the advantages and limitations of SSSC.	**04**
	(c)	Explain how multilevel inverter is used as reactive power compensator with necessary vector diagram.	**07**

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