Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code: 172401 **Date: 29/11/2018**

Subject Name: Power Electronics Systems Modelling

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 requirement of normalization? Explain normalization w.r.t. frequency.	**07**
	(b)	Explain the working of the buck converter with neat circuit diagram and necessary waveforms. Draw the graph for DC conversion ratio M(D) versus duty cycle.	**07**
Q.2	**(a)**	What is mathematical modeling? Draw and explain the block diagram of Power Electronics System with reference to modeling.	**07**
	(b)	State and explain inductor voltage-second balance principle.	**07**
		OR	
	(b)	State and explain capacitor charge balance principle.	**07**
Q.3	**(a)**	Derive the state-space model of a Boost converter.	**07**
	(b)	Explain the difference between ideal and physical models of AC transformer.	**07**
		OR	
Q.3	**(a)**	Derive the state-space model of a Buck-Boost converter.	**07**
	(b)	Explain DC transformer model with necessary equations and figures.	**07**
Q.4	**(a)**	Develop the model of a DC motor.	**07**
	(b)	Explain: Controllability, Observability and normalized model.	**07**
		OR	
Q.4	**(a)**	List and explain the major steps of engineering design process.	**07**
	(b)	What do you mean by small signal approximation? Explain with appropriate example.	**07**
Q.5	**(a)**	Explain the modelling of PWM inverter.	**07**
	(b)	Discuss the objectives of AC modeling and the concept of non-linearity introduced due to switching.	**07**
		OR	
Q.5	**(a)**	Explain the state space model of a full bridge inverter.	**07**
	(b)	What is feed forward control? Explain the basic working concept and its requirement in a control loop.	**07**

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