Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2016

Subject Code:172401 Date:16/05/2016

Subject Name:Power Electronics Systems Modelling

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.**

Q.1	(a)	Draw and explain the block diagram of Power Electronics System with reference to modeling.	**07**
	(b)	Explain in brief normalized model.	**07**
Q.2	(a)	State and explain inductor volt second balance principle.	**07**
	(b)	Draw PWM model with necessary waveforms.	**07**
		OR	
	(b)	Explain the manipulation of buck converter model into canonical form.	**07**
Q.3	(a)	Find out the steady state output voltage for a buck chopper using small-ripple approximation. Draw necessary diagrams & waveforms.	**07**
	(b)	Discuss the concept of nonlinearity and the importance of perturbation & linearization with respect to power electronics.	**07**
		OR	
Q.3	(a)	Derive the equation for voltage conversion ratio M(D) for a boost converter and draw it's graph.	**07**
	(b)	List the major steps of engineering design process. Explain each in brief.	**07**
Q.4	(a)	Explain the concepts of Controllability and Observability.	**07**
	(b)	Define the following: Model, Controllability, Observability, MIMO, Normalization, Impulse Response, Linearization	**07**
		OR	
Q. 4	(a)	Develop the model of a DC motor.	**07**
	(b)	Explain the close loop speed control of DC motor using power electronics converter.	**07**
Q.5	(a)	Explain the state space model of a buck converter.	**07**
	(b)	Draw and explain the ideal and physical models of AC transformer.	**07**
		OR	
Q.5	(a)	Develop the state space model of a boost converter along with necessary figures.	**07**
	(b)	Explain the modelling of PWM inverter.	**07**

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