Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – WINTER 2015

Subject Code: 172401 **Date:12/12/2015**

Subject Name: Power Electronics Systems Modelling

Time: 10:30am to 1:00pm **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 modeling? Explain its importance and draw the block diagram of Power Electronics System with reference to modeling.	**08**
	(b)	What is the requirement of normalization? Explain normalization w.r.t. Frequency.	**06**
Q.2	(a)	Explain: Controllability, Observability and normalized model.	**07**
	(b)	State inductor volt-second balance principle and explain its use in buck converter.	**07**
		OR	
	(b)	State capacitor charge balance principle and explain its use in buck converter.	**07**
Q.3	(a)	Discuss the objectives of AC modeling and the concept of non-linearity introduced due to switching.	**07**
	(b)	Explain the graphical construction of series impedances using a series R-C network.	**07**
		OR	
Q.3	(a)	List and explain the major steps of engineering design process.What do you mean by small signal approximation? Explain with appropriate example.	**07**
	(b)	List and explain the different types of modeling methods with a suitable example.	**07**
Q.4	(a)	Develop the state space model of a boost converter with necessary equations and figures.	**07**
	(b)	Explain the difference between ideal and physical models of AC transformer using neat diagrams.	**07**
		OR	
Q. 4	(a)	Develop the model of inverter with transformer along with necessary figures and equations.	**07**
	(b)	Develop the state space model of a buck converter with necessary equations and figures.	**07**
Q.5	(a)	Explain the state space model of DC motor.	**07**
	(b)	Explain Canonical Circuit Model based on physical arguments giving its importance.	**07**
		OR	
Q.5	(a)	What is circuit averaging? Discuss the steps of circuit averaging.	**07**
	(b)	Explain the state space model of a full bridge inverter with RL load.	**07**

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