Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – SUMMER • 2015

Subject Code: 172401 **Date:01/05/2015**

Subject Name: Power Electronics Systems Modelling

Time: 02.30pm-05.00pm **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Notations have usual meaning.**

Q.1	**(a)**	Explain SISO and MIMO model of the control system with block diagram.	**07**
	(b)	What is feedback control? Explain the closed loop of controlled rectifier with necessary circuit diagram.	**07**
Q.2	**(a)**	State capacitor charge balance principle and explain its use in buck converter.	**07**
	(b)	Explain the working of the buck-boost converter with neat circuit diagram and necessary waveforms. Explain the graph for DC conversion ratio $M(D)$ with duty cycle.	**07**
		OR	
	(b)	Obtain transfer function of separately exited DC shunt motor operated with armature voltage control.	**07**
Q.3	**(a)**	Develop State-space model of the Buck-Boost converter.	**07**
	(b)	Explain Controllability and Observability of the system with suitable example.	**07**
		OR	
Q.3	**(a)**	Explain the normalization of model with respect to frequency by suitable example.	**07**
	(b)	Write a brief note on small signal modeling of buck converter.	**07**
Q.4	**(a)**	Discuss about non-linearity in DC-DC converters.	**07**
	(b)	Obtain state space model of parallel R-L-C circuit.	**07**
		OR	
Q.4	**(a)**	Write a short note on state space averaging method for DC-DC converter.	**07**
	(b)	Explain DC transformer model of DC-DC converter with suitable example.	**07**
Q.5	**(a)**	What do you mean by small signal approximation? Explain with appropriate example.	**07**
	(b)	Draw and explain the modeling of PWM inverter.	**07**
		OR	
Q.5	**(a)**	What is canonical circuit model? Explain the development of canonical circuit model based on physical arguments.	**07**
	(b)	Discuss the single zero response with respect to Bode plot with illustration.	**07**

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