Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(OLD) • EXAMINATION – WINTER 2016

Subject Code: 172401 **Date: 25/11/2016**

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)**	State differences between single input single output and multi input multi output system.	**07**
	(b)	Obtain transfer function of separately exited DC shunt motor operated with armature voltage control.	**07**
Q.2	**(a)**	Draw and Explain the block diagram of Power Electronics System with reference to modelling.	**07**
	(b)	Obtain mathematical model of DC motor.	**07**
		OR	
	(b)	Explain DC motor speed control.	**07**
Q.3	**(a)**	Develop State-space model of the Buck-Boost converter.	**07**
	(b)	Explain DC transformer model with necessary equations and figures	**07**
		OR	
Q.3	**(a)**	Explain Controllability and Observability of the system with suitable example.	**07**
	(b)	What is normalization? State its importance.	**07**
Q.4	**(a)**	What do you mean by small signal approximation? Explain with appropriate example.	**07**
	(b)	Obtain state space model of parallel R-L-C circuit.	**07**
		OR	
Q.4	**(a)**	Explain the difference between ideal and physical models of AC transformer. Draw neat diagrams.	**07**
Q.4	**(b)**	Explain the state space model of a full bridge inverter.	**07**
Q.5	**(a)**	Explain the modelling of PWM inverter.	**07**
	(b)	Draw and explain the modelling of PWM inverter.	**07**
Q.5	**(a)**	Find out the steady state output voltage for a buck chopper using small-ripple approximation. Draw necessary diagrams & waveforms. Also derive the equation for voltage conversion ratio M(D) and draw it's graph.	**07**
	(b)	What is Canonical Circuit Model? Explain the manipulation of buck-boost converter model into canonical form.	**07**

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