Enrolment No.\_\_\_\_\_

## **GUJARAT TECHNOLOGICAL UNIVERSITY**

BE - SEMESTER-VII (OLD) - EXAMINATION – SUMMER 2017 Subject Code: 172401 Date: 06/05/2017 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.

(a) (b)	Explain DC transformer model with necessary equations and figures. What is feedback control? Explain the closed loop of controlled rectifier with necessary circuit diagram.	07 07
(a) (b)	Develop State-space model of the Buck-Boost converter. Discuss different types of modeling methods with their merit and demerits. <b>OR</b>	07 07
<b>(b)</b>	Why is AC modeling required? Discuss non-linearity in electrical system. Explain perturbation and linearization w.r.t. power electronics.	07
(a) (b)	List the major steps of engineering design process. Explain each in brief. Explain SISO and MIMO model of the control system with block diagram.	07 07
(a) (b)	Explain the difference between ideal and physical models of AC transformer. And draw neat diagrams. Explain Controllability and Observability of the system with suitable example	07 07
(a) (b)	Write a short note on state space averaging method for DC-DC converter. Write a brief note on small signal modeling of buck converter.	07 07
(a) (b)	Explain the working of the CUK converter with neat circuit diagram and necessary waveforms. Draw and explain the modeling of PWM inverter.	07 07
(a) (b)	Explain the state space model of a full bridge inverter. Derive the transfer function for armature controlled DC Motor and develop block diagram for the same.	07 07
(a)	<b>OR</b> State inductor voltage-second balance principle and explain its use in buck	07
(b)	converter. Explain working of open loop control with feedforward for an up/down convertor with necessary circuit and waveform.	07
	<ul> <li>(a)</li> <li>(b)</li> <li>(c)</li> </ul>	<ul> <li>(a) Explain DC transformer model with necessary equations and figures.</li> <li>(b) What is feedback control? Explain the closed loop of controlled rectifier with necessary circuit diagram.</li> <li>(a) Develop State-space model of the Buck-Boost converter.</li> <li>(b) Discuss different types of modeling methods with their merit and demerits. OR</li> <li>(b) Why is AC modeling required? Discuss non-linearity in electrical system. Explain perturbation and linearization w.r.t. power electronics.</li> <li>(a) List the major steps of engineering design process. Explain each in brief.</li> <li>(b) Explain SISO and MIMO model of the control system with block diagram. OR</li> <li>(a) Explain the difference between ideal and physical models of AC transformer. And draw neat diagrams.</li> <li>(b) Explain Controllability and Observability of the system with suitable example.</li> <li>(a) Write a short note on state space averaging method for DC-DC converter.</li> <li>(b) Write a brief note on small signal modeling of buck converter. OR</li> <li>(a) Explain the working of the CUK converter with neat circuit diagram and necessary waveforms.</li> <li>(b) Draw and explain the modeling of PWM inverter.</li> <li>(a) Explain the state space model of a full bridge inverter.</li> <li>(b) Derive the transfer function for armature controlled DC Motor and develop block diagram for the same. OR</li> <li>(a) State inductor voltage-second balance principle and explain its use in buck converter.</li> <li>(b) Explain working of open loop control with feedforward for an up/down convertor with necessary circuit and waveform.</li> </ul>

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