Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VII (OLD) EXAMINATION – SUMMER 2019

Subject Code: 171701   **Date: 18/05/2019**
Subject Name:Control System Design
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)**	Discuss the Optimal control systems in detail with necessary equations. Brief about the procedure to find out feedback gain for the systems using it.	**07**
	(b)	List the steps to design Robust PID controlled systems.	**07**
Q.2	**(a)**	Explain the Pseudo Quantitative Feedback Theory, with suitable example	**07**
	(b)	What is dead beat response? Give the design procedure for obtaining dead beat response.	**07**

OR

	(b)	Explain the duality principle of controllability and observability, with suitable example	**07**
			07
Q.3	**(a)**	State the condition for observability. Discuss the state observer design with necessary equations and block diagram.	**07**
	(b)	With example discuss design of digital controllers using root locus in the z-plane.	**07**

OR

Q.3	**(a)**	Define state variable and state model. If a system has one input, one output and three states, find out the dimensions of the various matrices of the state model.	**07**
	(b)	Explain the compensator design with integrated full-state feedback and observer.	**07**
Q.4	**(a)**	State an Ackermann's formula. Show the Computation of State Controllability and Observability using it. What is its limitation?	**07**
	(b)	Discuss about Internal model design for step input tracking with mathematical arguments.	**07**

OR

Q.4	**(a)**	Explain the implementation of digital (PID, PD and PI) controllers with necessary steps.	**07**
	(b)	What do you mean by Eigen value and Eigen Vector? What is the role of its in State Variable Analysis?	**07**
Q.5	**(a)**	Discuss the Lead compensation technique based on frequency response (bode plot). List the necessary steps and explain with suitable example.	**07**
	(b)	Discuss importance of robust control system and sensitivity of control system.	**07**

OR

Q.5	**(a)**	State the Computer (MatLab) commands used for State variable analysis with syntax/code and its related outputs. Mention appropriate comments also.	**07**
	(b)	Explain the control of uncertain parameter in robust control system.	**07**

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