GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2161007   **Date:18/05/2019**
Subject Name:Digital Control
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 sampling theorem and explain sample and hold operation.	**03**
	(b)	Define Z transform. Also derive Z transform for $f(t) = e^{-at}$	**04**
	(c)	Draw and explain basic block diagram of Digital Control System	**07**
Q.2	**(a)**	Explain the Final value theorem.	**03**
	(b)	Explain the Pulse Transfer Function of Closed Loop System.	**04**
	(c)	Explain the Pulse Transfer Function of Digital PID Controller.	**07**
		OR	
	(c)	Explain the realization methods for digital controllers.	**07**
Q.3	**(a)**	Explain Jury stability criterion.	**03**
	(b)	Explain bilinear transformations.	**04**
	(c)	Explain the Stability Analysis of Closed Loop System in Z-plane	**07**
		OR	
Q.3	**(a)**	Explain similarity transformations.	**03**
	(b)	List the necessary and sufficient condition for state observation	**04**
	(c)	Explain state-space representations of Discrete-Time system.	**07**
Q.4	**(a)**	Define following terms (1) State (2) State vector (3) State variables	**03**
	(b)	Write a short note on concept of controllability.	**04**
	(c)	Explain discretization of continuous – time state space equations.	**07**
		OR	
Q.4	**(a)**	Write short note on Lead lag compensators	**03**
	(b)	List general rules to construct root locus.	**04**
	(c)	Write a brief note on root locus diagram of digital control system.	**07**
Q.5	**(a)**	Explain stability improvement by state feedback.	**03**
	(b)	Discuss necessary and sufficient condition for state Observation.	**04**
	(c)	Explain Quadratic Optimal Control Problem.	**07**
		OR	
Q.5	**(a)**	Explain the State Equation with necessary figure.	**03**
	(b)	Explain the necessary and sufficient conditions for design of state feedback controller through pole placement.	**04**
	(c)	Explain Optimal Regulator System based on a Quadratic Performance Index.	**07**

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