Enrolment No /Seat No.: _____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– 3 (NEW) • EXAMINATION – WINTER - 2024

Subject Code:3730713 **Date: 20 Nov 2024**

Subject Name:Dynamics Of Linear Systems

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)**	What are the advantages of state space representation over classical approach?	**07**
	(b)	Obtain state space representation of an armature controlled dc servomotor.	**07**
Q.2	**(a)**	Explain duality between controllability and observability.	**07**
	(b)	Discuss properties of state transition matrix.	**07**
		OR	
	(b)	Derive equation to obtain transfer function/transfer matrix from the state space representation.	**07**
Q.3	**(a)**	With an example explain Ackerman's formula and its application in linear dynamic system.	**07**
	(b)	Explain technique to achieve controllability with state variable feedback.	**07**
		OR	
Q.3	**(a)**	Write a technical note on state observer.	**07**
	(b)	Explain stability of continuous time linear system.	**07**
Q.4	**(a)**	Define Lyapunov stability. Explain Lyapunov theorems for stability.	**07**
	(b)	Explain design of a state regulator.	**07**
		OR	
Q.4	**(a)**	Explain properties of Lyapunov function.	**07**
	(b)	Describe any one technique to solve state equations in discrete time systems.	**07**
Q.5	**(a)**	Explain how controllability can be analyzed in discrete time systems.	**07**
	(b)	Give transformation of a transfer function to canonical state variable model.	**07**
		OR	
Q.5	**(a)**	How can the state feedback of a linear discrete time system be utilized to improve system response?	**07**
	(b)	Write a note on Asymptotic observer.	**07**

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