

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2023****Subject Code:3172007****Date:08-12-2023****Subject Name: Modern Control 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.
4. Simple and non-programmable scientific calculators are allowed.

		Marks
Q.1	(a) Explain the Need and Requirements of Modern control systems.	03
	(b) Compare time domain and frequency domain analysis of the control system.	04
	(c) Explain the design of the phase lead compensator with suitable example.	07
Q.2	(a) What is the application of state space analysis in the control system?	03
	(b) Differentiate Phase-Lead, Phase-Lag, and Phase-Lead-Lag compensation techniques.	04
	(c) Explain the procedure to verify the Controllability and observability of the system using a suitable example.	07
	OR	
	(c) With suitable example Explain state space representation of electrical system.	07
Q.3	(a) What is the application of describing function for stability analysis?	03
	(b) Explain Standard nonlinearities in control systems.	04
	(c) Explain Describing the function analysis of nonlinear control systems.	07
	OR	
Q.3	(a) What is the application of phase plane analysis for stability analysis?	03
	(b) Explain State-Transition Matrix.	04
	(c) Enlist and explain Lyapunov stability theorems.	07
Q.4	(a) What are the applications of a discrete-time system?	03
	(b) Explain Stability analysis in z-plane.	04
	(c) Explain Derivation of z-transform of standard functions.	07
	OR	
Q.4	(a) What is the application of the initial value theorem and final value theorem?	03
	(b) What is the difference between P, PI and PID controller?	04
	(c) Analyze Inverse z-transform using infinite series and partial fraction methods.	07
Q.5	(a) Draw Block Diagram of an Adaptive Control System.	03
	(b) What are the applications of embedded control systems?	04
	(c) Write short note on neural control systems.	07
	OR	
Q.5	(a) Draw Block Diagram of a Reinforcement Learning Control	03
	(b) What are the measures of performance of control system?	04
	(c) Write short note on fuzzy control systems.	07