

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER- IV EXAMINATION – SUMMER 2026****Subject Code:3142407****Date:06-06-2026****Subject Name: Control Theory****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) Define control system and discuss importance of it.	03
	(b) Explain open loop control system and give any four examples of the same.	04
	(c) Give the comparison between open loop and closed loop control system.	07
Q.2	(a) Explain transfer function.	03
	(b) Write short note on mathematical modelling of electrical Systems.	04
	(c) Explain force to voltage analogy with proper notation.	07
	OR	
	(c) Explain force to current analogy with proper notation.	07
Q.3	(a) List out advantages of state variable analysis.	03
	(b) Explain standard test signal.	04
	(c) Explain the various rules for construction of root locus.	07
	OR	
Q.3	(a) Explain first order system.	03
	(b) Explain transformation of mathematical model.	04
	(c) Define and explain following terms with respect to frequency response (I) Gain Margin (II) Phase Margin (III) Gain cross-over frequency	07
Q.4	(a) Explain linearization.	03
	(b) Explain concept of Integral controls and their Effects on System Performance.	04
	(c) A second order control system is subjected to unit step input. Draw response curves for underdamped, overdamped and critically damped system.	07
	OR	
Q.4	(a) Write short note on Routh's Stability Criterion.	03
	(b) Explain concept of derivative controls and their Effects on System Performance.	04
	(c) Discuss Nyquist's stability criterion.	07
Q.5	(a) Explain PID controller.	03
	(b) Explain lead Compensation.	04
	(c) Write note on steady state error and error constants.	07
	OR	
Q.5	(a) Write Ziegler-Nichols Rules for Tuning PID Controllers.	03
	(b) Explain lag Compensation.	04
	(c) Explain Two-Degrees-of-Freedom Control.	07
