

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER– IV (New) EXAMINATION – WINTER 2019****Subject Code: 2142003****Date: 12/12/2019****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.

		MARKS
Q.1	(a) Differentiate between open loop and close loop system.	03
	(b) Define and explain the following terms related to the transfer function of a system. Poles, Zeros, Characteristic equation, order.	04
	(c) Explain open loop and closed loop control system with suitable example & gives its advantages and disadvantages.	07
Q.2	(a) Explain the mathematical model of thermometer.	03
	(b) Discuss translational element.	04
	(c) Derive the transfer function of simple liquid level system with interaction.	07
OR		
	(c) Explain the analysis of gear train with inertia and friction.	07
Q.3	(a) Explain various standard inputs used in the control system analysis.	03
	(b) Explain the critical rules.	04
	(c) What is force voltage analogous system? Which are the analogues quantities according to this method?	07
OR		
Q.3	(a) Derive the expression for Peak overshoot.	03
	(b) Define the following terms related to SFG. Non-touching loops, Dummy node, Loop gain, self-loop	04
	(c) Rules of Block Diagram Reduction.	07
Q.4	(a) Explain the following terms: Delay time, Rise time, Peak time.	03
	(b) Define and Explain the following terms. State variable, State vector, State trajectory, State space.	04
	(c) Derive the expression for unit step response of underdamped second order system.	07
OR		
Q.4	(a) Explain static error co-efficient method to obtain steady state error.	03
	(b) Define the following terms. Stable systems, Unstable system, Critically stable system, Conditionally stable system.	04
	(c) List all the rules to construct a root locus and explain.	07
Q.5	(a) What is polar plot? Explain.	03
	(b) Explain: G.M., P.M., ω_{gc} , ω_{pc} .	04
	(c) List all the steps to sketch the Bode plot.	07
OR		
Q.5	(a) Explain Routh's stability criterion with example.	03
	(b) What is corner frequency? Explain.	04
	(c) How to determine gain margin and phase margin from the Polar plot and Nyquist plot?	07
