

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-VII (NEW) EXAMINATION – WINTER 2020****Subject Code:2172007****Date:28/01/2021****Subject Name:Modern Control Systems****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

		MARKS
Q.1	(a) Using suitable block diagram, explain ON-OFF control systems.	03
	(b) Explain PID control in details.	04
	(c) Explain pole placement design using state feedback.	07
Q.2	(a) List any three properties of z-Transform.	03
	(b) Explain relationship between z-domain and s-domain	04
	(c) List various characteristics of feedback control systems and explain any two of them using block diagram and mathematical equations.	07
Q.3	(a) Explain need for reshaping of root locus plot.	03
	(b) How locations of closed-loop pole decide the transient response of the system? Explain using suitable examples.	04
	(c) Explain various guidelines for sketching a root locus plot from given transfer function.	07
Q.4	(a) Define (i) centroid (ii) asymptotes (iii) dominant pole	03
	(b) Explain angle of departure in root locus technique.	04
	(c) What is lag compensator? What are the effects of lag compensator? Explain design steps for design of lag compensator using root locus technique.	07
Q.5	(a) Explain phase margin and gain margin.	03
	(b) Give differences between phase lead and phase lag compensation	04
	(c) Explain method to draw bode plot from given transfer function.	07
Q.6	(a) With suitable diagrams define (i) Phase crossover frequency (ii) Gain crossover frequency	03
	(b) Explain Decade and Octave.	04
	(c) Explain design procedure for cascade lag compensator using bode-plot.	07
Q.7	(a) Define (1) state (2) state variable (3) state vector	03
	(b) Explain derivation of transfer function from state model.	04
	(c) Obtain state space model for RLC series circuit in which input is V_{dc} and output voltage across capacitor.	07
Q.8	(a) List the advantages of state space approach of analyzing the control systems.	03
	(b) Explain the term Controllability and Observability.	04
	(c) Explain Taylor series expansion for computing the state transition matrix.	07
