

Enrollment No./Seat No.:

GUJARAT TECHNOLOGICAL UNIVERSITY
Bachelor of Engineering - SEMESTER - IV,V EXAMINATION - WINTER 2025

Subject Code: 2151908

Date: 02-12-2025

Subject Name: Control Engineering

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) Draw a general block diagram of an automatic control system	03
(b) What are the merits of frequency response?	04
(c) What are the signal flow graphs? Define node, transmittance, branch, source node, sink node, path, loop and loop gain with necessary diagrams.	07
Q.2 (a) Explain Poles and Zeros of a Transfer function.	03
(b) Define Resonant Peak, Resonant Frequency and Gain crossover frequency for frequency response specification.	04
(c) Explain the State space analysis and its advantages.	07
OR	
(c) Write general method steps for drawing root locus with suitable example.	07
Q.3 (a) Define hydraulic system. State the major components of hydraulic system.	03
(b) What is a Block diagram? Represent a control system by a block diagram.	04
(c) Write down examples of an Open-loop control system and a Closed-loop control system. State their differences.	07
OR	
(a) State Translational mechanical and Rotational mechanical systems with suitable sketches.	03
(b) Explain Hurwitz stability criterion.	04
(c) Explain the concept of state, state variables and state model.	07
Q.4 (a) Explain two position controllers.	03
(b) Define the following terms (1) Disturbances (2) Control system	04
(c) Explain transient response specification of a second order system.	07
OR	
(a) Write down Properties of Signal flow Graph.	03

- (b) Summarize advantages and disadvantages of hydraulic control system. 04
- (c) Explain analysis of first order system and unit step response of first order system. 07
- Q.5** (a) Enlist the sources of hydraulic power. 03
- (b) Explain linear control system. State the principle of superposition. 04
- (c) Explain Unit ramp response and Unit impulse response of first order system. 07

OR

- (a) Obtain state-space model for spring-mass-damper system. 03
- (b) Define: (1) Command input (2) System (3) Feedback element (4) Control. 04
- (c) Discuss the hydraulic PI controller with neat sketch and necessary transfer function. 07
