

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-III EXAMINATION – WINTER 2025****Subject Code:3131101****Date:12-12-2025****Subject Name: 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 standard test signals.	03
(b) Compare time response and frequency response of system.	04
(c) Explain any 7 rules of block diagram reduction technique.	07
Q.2 (a) Write advantages of state space approach over classical methods.	03
(b) Discuss the effect of adding a pole to a closed loop transfer function.	04
(c) Explain Mason's Gain Formula with suitable example	07
OR	
(c) Write a short note on state space representation of a control system.	07
Q.3 (a) Explain in brief about PID controller.	03
(b) Discuss force voltage (F-V) analogous system with analogous quantity.	04
(c) Explain the steps of root locus	07
OR	
Q.3 (a) Explain in brief about PD controller.	03
(b) Discuss force current (F-I) analogous system with analogous quantity.	04
(c) Explain nature of Bode plot for i) Poles at the origin ii) Zeros at the origin.	07
Q.4 (a) Find Laplace transform of $x(t) = \cos 2t$	03
(b) Explain, how the gain and phase margin are obtained from Nyquist plots?	04
(c) Explain Phase-Lag compensator in detail.	07
OR	
Q.4 (a) Find Laplace transform of $x(t) = \sin 2t$	03
(b) Explain polar plot with suitable example.	04
(c) Explain Phase-Lead compensator in detail.	07
Q.5 (a) Define: State, State variable, State trajectory.	03
(b) Define steady state error and obtain its formula	04
(c) Discuss unit step response of first order system.	07
OR	
Q.5 (a) Define i) Gain Margin ii) Frequency response iii) Phase Margin	03
(b) Obtain equation of peak time for a second order control system when subjected to unit step input.	04
(c) Discuss impulse response of second order system.	07
