Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI(NEW) EXAMINATION – WINTER 2022

Subject Code:3160104 Date:14-12-2022

Subject Name:Basic control theory

Time:02:30 PM TO 05:00 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 the difference the open loop and control loop control system	03
	(b)	Speed control of DC motor is an example of open loop control system. Justify the statement	04
	(c)	Define transfer function. Derive the transfer function for RLC series circuit.	07
Q.2	(a)	Explain the difference between block diagram method and signal flow graph.	03
	(b)	Explain series, parallel and feedback rule in block diagram reduction method.	04
	(c)	Explain Masons gain formulae in detail.	07
		OR	
	(c)	Explain signal flow graph using example.	07
Q.3	(a)	Explain various types of input signal in control system	03
	(b)	Explain steady state error in detail.	04
	(c)	Derive the mathematical form for step response of first order system	07
		OR	
Q.3	(a)	Define second order system stability based on the values of ζ.	03
	(b)	Explain Routh Hurwitz criteria.	04
	(c)	Explain steps for designing the root locus	07
Q.4	(a)	Explain state space analysis	03
	(b)	Explain the function of proportional controller in detail.	04
	(c)	Explain the steps for designing the Bode plot	07
		OR	
Q.4	(a)	Explain Integral controller	03
	(b)	Explain Nyquist plot	04
	(c)	Explain time response analysis for the second order system.	07
Q.5	(a)	Explain the difference between man-made system and natural systems	03
	(b)	Explain F to V analogy	04
	(c)	Drive e_{ss} for first, second and third order system with step, ramp and parabolic input signals	07
		OR	
Q.5	(a)	Explain spring, mass and damper system in detail.	03
	(b)	Explain F to I analogy.	04
	(c)	Explain PID controller	07