Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:3160104 Date:25-11-2024

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.**

Q.1	**(a)**	Define : Transfer function, Laplace transform and Linear system	**03**
	(b)	State the advantages and disadvantages of the transfer function.	**04**
	(c)	Compare open loop and closed loop control system with examples.	**07**
Q.2	**(a)**	Compare the modern control and conventional control theory	**03**
	(b)	Discuss and draw the standard state signals.	**04**
	(c)	What is the transient response analysis? Analyze the second order system.	**07**
		OR	
	(c)	Discuss the effect of damping factor on second order system performance.	**07**
Q.3	**(a)**	What is the mathematical modeling? State the methods to derive the mathematical model of the system.	**03**
	(b)	What is Routh- Hurwitz stability criterion? Justify with appropriate examples.	**04**
	(c)	What is the steady state error? Derive the equation of steady state error.	**07**
		OR	
Q.3	**(a)**	Discuss the steps for designing of bode plot	**03**
	(b)	What is the nyquist stability? Explain it.	**04**
	(c)	List the general steps to solve the problem on Root Locus.	**07**
Q.4	**(a)**	Explain Gain Margin and Phase Margin.	**03**
	(b)	Define : State, state variable, state vector and state space	**04**
	(c)	Derive the equation for conversation of state space equations to transfer function.	**07**
		OR	
Q.4	**(a)**	State the advantages of state space representation of the system	**03**
	(b)	Write state equations and draw the state space block diagram.	**04**
	(c)	Define Delay time, rise time, peak time, settling time, peak overshoot with appropriate diagram of time response specifications.	**07**
Q.5	**(a)**	Explain the ON-OFF controller	**03**
	(b)	Explain the multi position controller	**04**
	(c)	Explain PI controller in details.	**07**
		OR	
Q.5	**(a)**	Explain the continuous controller	**03**
	(b)	Describe the desire features of feedback control system	**04**
	(c)	Explain PID controller in details.	**07**

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