Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V(New) • EXAMINATION – WINTER 2016

Subject Code:2150504 Date:22/11/2016

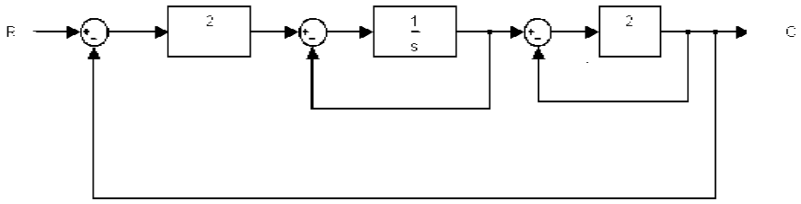
Subject Name:Insrumentation & Process Control

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Routh stability method uses _____ loop transfer function.	
	2	Conversion formula for converting amplitude ratio into decibels.	
	3	L{sinh kt u(t)}=_____	
	4	Definition of stability	
	5	If ξ is equal to unity response describe as_____	
	6	What is corner frequency?	
	7	Define: Decay ratio	
	8	Proportional gain $\propto$ _____	
	9	What is feedback control?	
	10	Write final value theorem	
	11	Write transfer function of second order system.	
	12	Define: Transfer lag	
	13	Hot wire anemometer is used for the measurement of ___	
	14	When Pitot tube is used?	
Q.2	**(a)**	Derive transforms of exponential, ramp and sine function.	**03**
	(b)	Invert the transforms: $1/(s^3-2s^2+5s)$	**04**
	(c)	Derive any one forcing function with its response considering first order system	**07**
		OR	
	(c)	Three identical tanks are operated in series in a non interacting fashion. For each tank R=1, τ = 1. If the deviation in flow rate to the first tank is an impulse function of magnitude 2, determine an expression for H(s) where H is the deviation in level in the third tank.	**07**
Q.3	**(a)**	Derive the transfer function for mixing process.	**03**
	(b)	Explain the terms used to describe under damped system.	**04**
	(c)	Assuming the flow in the manometer to be laminar and the steady state friction law for drag force in laminar flow to apply at each instant, determine a transfer function between applied pressure P_1 and the manometer reading h. it will simplify the calculations if, for inertial terms, the velocity profile is assumed to be flat. Form transfer function in standard second order form, Calculate a) steady sate gain, b) τ ,c) ξ .	**07**
		OR	
Q.3	**(a)**	Explain Servo Problem versus Regular Problem	**03**
	(b)	Describe Proportional integral control.	**04**
	(c)	For the control system shown in figure determine the transfer function C(S)/R(S).	**07**



Q.4	**(a)**	Explain third order control system.	**03**
	(b)	Derive overall transfer function and offset for P- control for set point change.	**04**
	(c)	Define Bode Diagrams and explain Bode Diagram for first order system.	**07**

OR

Q.4	**(a)**	Describe theorems of the Routh Test.	**03**
	(b)	Derive overall transfer function and offset for P- control with measurement lag.	**04**
	(c)	Explain rules for plotting root locus diagrams.	**07**

Q.5	**(a)**	Explain Pressure, Vacuum, and Head	**03**
	(b)	Explain any radiation receiving elements.	**04**
	(c)	Explain Pressure Spring Thermometer	**07**

OR

Q.5	**(a)**	What is thermal well? Why is it used?	**03**
	(b)	Explain principle and working of Venturimeter	**04**
	(c)	Describe the bubbler system for liquid level measurement with neat sketch.	**07**

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