Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VIII (New) EXAMINATION – WINTER 2019

Subject Code: 2181705 **Date: 29/11/2019**

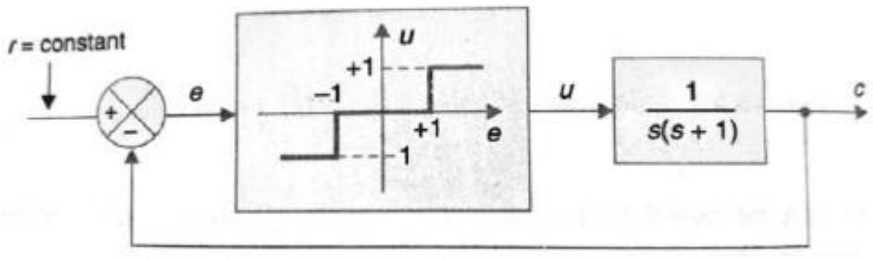
Subject Name: Advance Control Theory

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.**

			MARKS
Q.1	**(a)**	Describe Discretization of continuous time system.	**03**
	(b)	Draw and explain the block diagram of linear time-invariant discrete time control system in state space.	**04**
	(c)	What is nonlinear system? Classify various types of nonlinearities	**07**
Q.2	**(a)**	Explain the describing function analysis method.	**03**
	(b)	Explain phase plane method & construction of phase trajectories.	**04**
	(c)	Define local stability, asymptotically stable, asymptotically stable at large and limit cycles for nonlinear system	**07**
		OR	
	(c)	Consider the system described by Y(k)-0.6y(k-1)-0.81y(k-2)+0.67y(k-3)-0.12y(k-4)=x(k) Where x(k) is the input and y(k) is the output of the system. Determine the stability of the system.	**07**
Q.3	**(a)**	Write a short note on fuzzification.	**03**
	(b)	Comment on membership function and its types.	**04**
	(c)	Explain in details applications of fuzzy logic to control systems.	**07**
		OR	
Q.3	**(a)**	Brief about stability in the z-domain.	**03**
	(b)	How the PID controller can be implemented with a digital system?	**04**
	(c)	Define singular point. Explain in detail	**07**
Q.4	**(a)**	Derive describing function for a relay with dead zone.	**03**
	(b)	Explain relative gain array for multivariable system.	**04**
	(c)	Obtain the phase trajectory for the system shown below having relay with dead zone non linearity. Compare and comment with respect to the phase trajectory obtained with dead zone nonlinearity absent in the same system.	**07**



OR

Q.4	**(a)**	What is the relationship between s and z domain?	**03**
	(b)	Comment on state feedback design for discrete time system.	**04**
	(c)	Obtain discrete time state and output equations when the sampling period T=1 of the following continuous time system G(s)=1/s(s+2)	**07**
Q.5	**(a)**	Comment on interaction and decoupling for multi variable systems.	**03**

	(b)	Comment on stability of nonlinear system and limit cycles.	**04**
	(c)	What is two degrees of freedom control? Explain the method to achieve it.	**07**

OR

Q.5	**(a)**	Explain how multivariable system can be represented in state space.	**03**
	(b)	What is multivariable system? Draw and explain the block diagram of multivariable system with example.	**04**
	(c)	Explain decoupling of multivariable system and its stability.	**07**

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