Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – SUMMER • 2013

Subject code: 1720308 **Date: 05-06-2013**

Subject Name: Process Control

Time: 10.30 am – 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.**

Q.1	**(a)**	Explain why and how ratio of some inputs are to be controlled in process?	**06**
	(b)	Explain cascade control design criterion? Design cascade control scheme for valve positioner.	**08**
Q.2	**(a)**	Explain following with respect to process characteristics : 1)Proportional element 2) Capacitance element 3) Time constant element and 4) Oscillatory element	**08**
	(b)	A PI controller has Kp=4.5 and Ki=7 (second)^-1. Find the controller output for an error given by Ep = 3*Sin(pi*t). What is the phase shift between error and controller output?	**06**
		OR	
	(b)	A proportional derivative controller has a 0.4 to 2.0 Volt input measurement range, a 0 to 5 Volt output, Kp = 4.5 %/% and Kd = 0.07 per (%/minute). The period of the fastest expected signal change is 1.5 s. Implement this controller with Op amp circuits.	**06**
Q.3	**(a)**	Explain the two time constant in series system using liquid process with necessary equations.	**08**
	(b)	Write short note on flow process.	**06**
		OR	
Q.3	**(a)**	What are the effects of disturbance on the system? Explain process disturbances in details.	**08**
	(b)	Explain the proportional, integral and derivative control actions in details.	**06**
Q.4	**(a)**	Why proportional control action should not be used alone? Give the Proportional (P) control schematic for a single capacitance liquid level process.	**08**
	(b)	Explain two position control of single capacitance system.	**06**
		OR	
Q.4	**(a)**	Give differences between feed forward control an feedback control schemes. Draw and explain feedforward dynamic model for a general process.	**08**
	(b)	A furnace has a heating rate of 50 deg per min for full valve opening and a measuring element time constant of 60 sec. The measuring element time constant can be reduced to 20 sec. Would this change be worthwhile if proportional control is used? .	**06**
Q.5	**(a)**	Write short note on storage vessel and surge vessel control in details.	**08**
	(b)	Write short note on Reboilers.	**06**
		OR	

Q.5	**(a)**	Why evaporation control is required in chemical process? Explain single effect and multi effect evaporator.	**08**
	(b)	Write short note on three element boiler control in details.	**06**

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