Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – I • EXAMINATION – WINTER 2012

Subject code: 710303N **Date: 12-01-2013**

Subject Name: PID Controller

Time: 02.30 pm – 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.**

Q.1 **(a)** What do you mean by parameter estimation of a process? Explain three parameters model in details. **06**

(b) Find out transfer function of a FOPDT (first order plus dead time) system having step response parameters as time constant = 4 sec., steady state gain = 4, time delay = 0.5 sec., settling time = 8 sec., Also find out PID controller parameters for this model using Zeigler Nichols tuning formula. **08**

Q.2 **(a)** What do you mean by autotuning of PID controller? Explain bumpless transfer between manual and automatic mode. **08**

(b) Write short note on neural network control. **06**

OR

(b) Explain PI control of a system with oscillatory mode. **06**

Q.3 **(a)** Explain 1) Robustness to parameter uncertainty **04**
2) Attenuation of load disturbances.

(b) Describe practical set up for relay feedback experiment in details with block diagram. For Open loop transfer function given below, **10**

$$G(s) = \frac{1}{s\,(s+1)}$$

a relay feedback experiment gives sustained oscillations at ultimate frequency ω =5 rad/sec and ultimate gain = 4.2.

Find out PID Controller parameters using Z-N Tuning Rule .

OR

Q.3 **(a)** What is a meaning of dominant pole. Explain the method of determination of dominant pole from frequency response. **08**

(b) Explain 1) Robustness to parameter uncertainty **06**
2) Attenuation of load disturbances.

Q.4 **(a)** Give the discrete equivalence of proportional, derivative and integral action for digital PID Controller. **06**

(b) When cascade control scheme is used?. Write short note one Motor control using cascade loops. **08**

OR

Q.4 **(a)** Write short note on prefiltering step in digital PID controller implementation. How to select bandwidth of prefilter?. **06**

(b) Explain integral wind up phenomenon in detail and write short note on incremental algorithms for anti wind up. **08**

Q.5	**(a)**	Write short note on Haalman method of tuning of PID Controller.	**06**
	(b)	What is a use of model of a physical process? Write short note on Internal Model Control.	**08**

OR

Q.5	**(a)**	What do you mean by adaptive controller?.Draw and explain block diagram of an indirect adaptive controller.	**08**
	(b)	Write short note on relay based autotuner.	**06**

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