**Seat No.: _____** **Enrolment No._____**

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE - SEMESTER–V (NEW) - EXAMINATION – SUMMER 2016**

**Subject Code:2151705** **Date:09/05/2016**

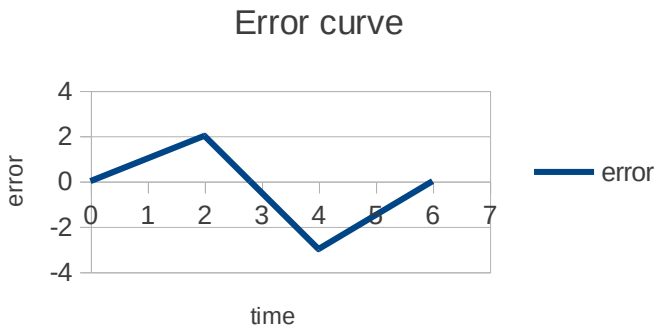
**Subject Name:Process Control Systems**

**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.**

**Q.1** **(a)** A PI controller has kp=2, ki=2.2 sec-1, and pi(0)=40%. Plot the output for an error given by curve given below. Draw a curve for controller output with scale. **07**




**(b)** Analyse the dynamic response of parallel system. Give industrial example of a system giving inverse response. **07**

**Q.2** **(a)** Explain two position controller with example. Explain the need of neutral zone. **07**

**(b)** Describe various system modeling techniques. Explain process Reaction Curve method for modeling. **07**

**OR**

**(b)** Derive the modeling of liquid level with nonlinear resistance element using first principle method of modeling. **07**

**Q.3** **(a)** For a unity feedback system, process transfer function is given by G(s)=1/s(s+1)(s+5). The controller is of PID mode. Calculate the optimal values of controller parameter based on ultimate cycle method of tuning. **07**

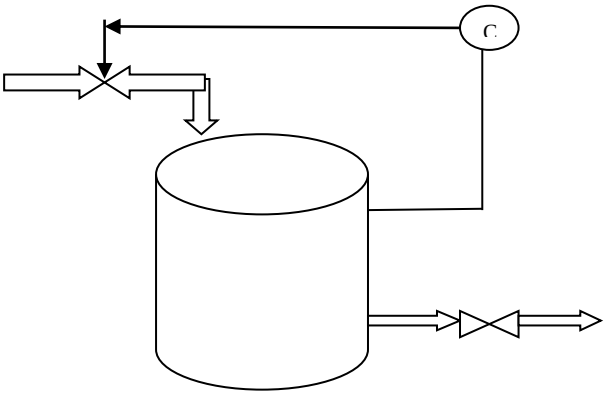
**(b)** What is Integral Windup? Draw the scheme of anti wind up strategy. **07**

**OR**

**Q.3** **(a)** List the various desired features of a feedback control algorithm. And explain how PID control algorithm possess most of the desired features. **07**

**(b)** Calculate the offset and stabilization time for level control systemshown in fig, in which outflow u is through a pump. **07**

Outflow u=2 m3/sec
U=0.1 m3/sec step increase in outflow
kp=2 m3/sec/m (Proportinal controller)
Area of tank=10 m2




**Q.4** **(a)** Draw the flow chart of PID control algorithm when implemented in digital computer. Explain Position and velocity algorithm. **07**

**(b)** Draw the block diagram of cascade controller. and write features of cascade controller. **07**

**OR**

**Q.4** **(a)** Explain shrinking and swelling phenomena in boiler drum and show three element control of boiler drum level. **07**

**(b)** Give comparision between feedforward and feedback control schemes with their advantages and disadvantages. **07**

**Q.5** **(a)** Draw and Explain various configurations of ratio control schemes. **07**

**(b)** Explain the processes with Dead time and self regulation features. **07**

**OR**

**Q.5** **(a)** What are the features of split range control? Explain the split range control for reactor pressure control. **07**

**(b)** Derive the transfer function of noninteracting two tank sysem connected with linear resistance element. Also Draw step response of one tank, two tank and three tanks connected in series and comment on the responses. **07**

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