

GUJARAT TECHNOLOGICAL UNIVERSITY**BE SEM-VI Examination May 2011****Subject code: 161702****Subject Name: process control****Date: 17/05/2011****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) Discuss benefits, Difficulties and requirements of process control implementation. **08**

(b) Measurements conducted on a servomechanism show the system response to be **06**

$$c(t) = 0.3e^{-60t} + 1.5e^{-10t} \text{ when subjected to a step input}$$

- (i) Obtain the expression for the closed loop transfer function
- (ii) Determine The undamped natural frequency and damping ratio Of the system

Q.2 (a) Discuss the desired features of feedback control algorithm. **07**

(b) Compare P, PI and PD controller in their Transient and steady state Performance. **07**

OR

(b) Discuss the key features of control loop elements excluding process. **07**

Q.3 (a) With suitable example explain the modeling procedure of staged processes. **07**

(b) Explain floating control mode in detail. **07**

OR

Q.3 (a) With neat sketch explain cascade control scheme in detail **07**

(b) With neat sketch explain one configuration of ratio control scheme. **07**

Q.4 (a) The error is given by the following relation **08**

$$E_p = t\% \quad (0-1 \text{ sec})$$

$$E_p = 1\% \quad (1-3 \text{ sec})$$

$$E_p = [(-1/2)t + 2.5]\% \quad (3-5 \text{ sec})$$

Find the controller output for a three mode controller which an output with $K_p=3$, $K_i = 0.5 \text{ sec}^{-1}$, $K_d = 0.5 \text{ sec}$ and $P_0 = 50\%$.

(b) An integral controller is used for level control with a set point or 12 m within a range of 10 to 15 m. The controller output is 22% at set point. The constant K_i is 0.15 % per second per percent error. If the level jumps to 14m calculate the controller output after 2 seconds. **06**

OR

Q.4 (a) Explain cascade control design criteria in detail **07**

(b) Discuss the benefits and drawbacks of proportional Integral and derivative modes of control. **07**

Q.5 (a) With Necessary example Explain Split- range control scheme in detail. **07**

(b) Compare Feedback control scheme and Feed- forward control scheme **07**

OR

Q.5 (a) Explain the bode method for the analysis of the stability of control systems. **07**

(b) Discuss Ziegler Nichols closed loop method for controller tuning. **07**
