T.E./ SEM VI (CBSGS) INST NOV '16

PROCESS INSTRUMENTATION SYSTEM

**QP Code : 597902**

**( 3 Hours )** **[ Total Marks : 80**

**N.B.:** (1) Question **No.1** is **compulsory**.
(2) From **Q. No. 2 to Q. No. 6.** Solve any **three.**
(3) Assume suitable data wherever necessary.

1. Answer any **four** **20**
   a) Explain Auctioneering control using an Example.
   b) Why derivative control is not used alone?
   c) What is Dead time. Derive an equation for dead time.
   d) Compare Batch process and continuous process.
   e) Draw symbols for physical ladder elements for Temperature switch, pressure switch, level switch & push buttons.

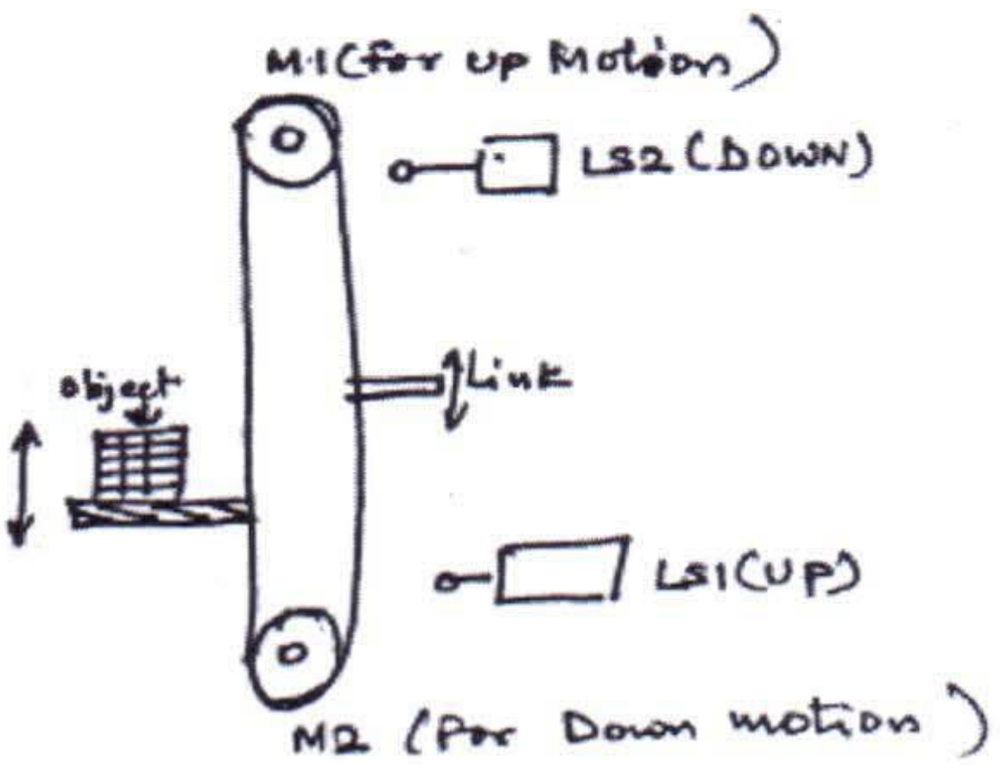
2. a) What are the objectives of Adaptive control. Explain Self Tuning Regulator. **10**
   b) Explain Ziegler-Nichols Closed loop technique for tuning of controllers. **5**
   c) In an application of Z-N method a process begins oscillation with 30% Proportional Band in an 11.5min period. Find nominal PID controller settings. **5**

3. a) Explain Electronic PID controller with neat Diagram. **10**
   b) A 5-m diameter cylindrical tank is emptied by a constant outflow of $1.0m^3$/min. An on-off controller is used to open and close a fill value with an open flow of $2.0m^3$/min. For level control, the neutral zone is 1m and the setpoint is 12m. **10**
      i) Calculate the cycling period.
      ii) Plot level versus time.

4. a) Explain Relay based TuningTechnique. What are the advantages over Cohen-Coon Technique. **10**
   b) Explain with an example What is interaction? Explain Decoupling method used in multivariable control. **10**

**[ TURN OVER**

5. a) **10**




The Elevator shown in figure above employs a platform to move objects up and down. The obejctive is when UP Button (PB3) is pushed, the platforms carries object to the up position upto LSI (Link on other Side of object touches LSI) Similarly when Down button (PB4) is pushed, the platform carries object down till LS2. M1 and M2 are separate motors used for this operation Process should start only when START Button is pressed and should stop when STOP Button is pressed.

b) Explain feed forward control in detail. Derive equation for controller in feed forward control system. Also draw feed forward control system for Stirred Tank Heater (STH) system. **10**

6. a) **10**


Assume $K_P = 5$, $K_I = 1.0s^{-1}$ and $P_I(0) = 20\%$ Plot the graph of P + I controller output as function of Time.

b) Prove that Integral Action Changes the order of closed loop system.(Consider only setpoint change problem) **10**

Assume $G_P = \frac{K_P}{\tau_p s + 1}$, $G_f = G_m = 1$, controller P + I. Gd = 0

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