Total No. of Questions : 12]

SEAT No. :

[Total No. of Pages : 4

P3141

B.E. (Semester - II)
ELECTRONICS ENGINEERING
Process Automation
(2008 Pattern)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer books.***
2) ***Answer any three questions from each section.***
3) ***Neat diagrams must be drawn wherever necessary.***
4) ***Figures to the right side indicate full marks.***
5) ***Use of Calculator is allowed.***
6) ***Assume suitable data if necessary.***

SECTION - I

Q1) a) Explain with suitable example following process characteristics : **[9]**

i) Process Equation

ii) Process Load

iii) Process lag

iv) Self Regulation

b) A sensor outputs a range of 20.0 to 250mV as a variable varies over its range. Develop signal conditioning so that this becomes 0 to 5V. The circuit must have very high input impedance. **[9]**

P.T.O.

OR

Q2) a) Explain with suitable example process control block diagram. **[9]**

b) Temperature is to be measured in the range of 250 ° C to 450 ° C with an accuracy of ±2 °C. The sensor is a resistance that varies linearly from 280Ω to 1060Ω for this temperature range. Power dissipated in the sensor must be kept below 5 mW. Develop analog signal conditioning that provides a voltage varying linearly from –5 to +5 V for this temperature range. The load is a high impedance recorder. **[9]**

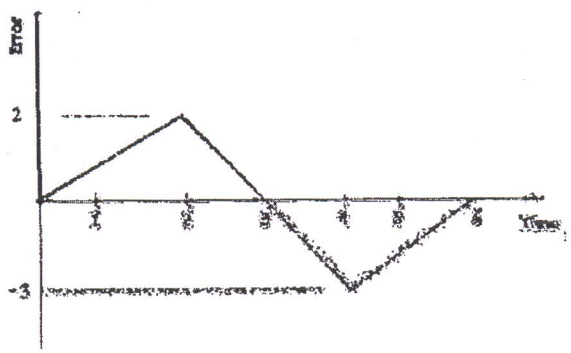
Q3) a) Explain the following discontinuous controller modes. **[8]**

i) Two position

ii) Three position

iii) Floating control action.

b) A PID controller has $K_p = 2$, $K_I = 2.2\ S^{-1}$, $K_D = 2\ S$ and $P_I(0) = 40\ \%$. Plot the controller output for the error input shown in figure. **[8]**



OR

Q4) a) Explain Ziegler Nichols method of process loop tuning. **[8]**

b) A proportional derivative controller has a 0.4 to 2.0 V input measurement range, a 0 to 5V output, Kp = 5%/% and Kd = 0.08 % per (%/min). The period of the fastest expected signal change is 1.5 sec. Implement this controller with an op-amp circuit. **[8]**

Q5) a) Explain different types of control valve noise. **[8]**

b) Draw control valve characteristics and explain the terms linear, equal percentage and quick opening. **[8]**

OR

Q6) a) Explain the terms flashing and cavitation with respect to control valves. **[8]**

b) Write a short note on selection criteria of control valves. **[8]**

SECTION - II

Q7) a) Explain combined feedback and feed forward control scheme for a heat exchanger. **[9]**

b) Define the term adaptive control. Why are adaptive controllers needed? Explain with suitable example gain scheduling adaptive control. **[9]**

OR

Q8) a) Explain with suitable example ratio control scheme. **[9]**

b) Explain with block diagram the concept of Internal Model Control (IMC) for a first order with dead time process. **[9]**

Q9) a) Explain any one control scheme for a distillation column. **[8]**

b) Draw and explain P & I diagram for three element control of drum level in a boiler. **[8]**

OR

Q10) a) Draw & explain the P & I diagram for cascade control of multiple effect evaporator. **[8]**

b) Explain with neat diagram components of a Robotic system. **[8]**

Q11) a) Explain: Alarm Annunciator **[8]**

b) Write short note on SCADA. **[8]**

OR

Q12) a) Explain with block diagram Distributed Control System. **[8]**

b) What is the necessity of a Square Root Extractor? Explain the working of a square root extractor. **[8]**

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