Total No. of Questions : 12]

SEAT No. :

P3383

[Total No. of Pages : 3

[4959]-123
B.E.(Electronics)
PROCESS AUTOMATION
(2008 Course) (404208)(Semester-II)

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

Instructions to the candidates:

1) ***Answer any three questions from each section***
2) ***Answers to the two sections should be written in separate books.***
3) ***Neat diagrams must be drawn whenever necessary.***
4) ***Figures to the right indicate full marks.***

SECTION-I

Q1) a) Explain the following measures of control system quality. **[8]**

i) Over damped response

ii) Under damped response

iii) Critically damped response

iv) Quarter amplitude criteria

v) Minimum area criteria

b) A sensor outputs a voltage ranging from –2.4V to –1.1V. For interface to analog to digital converter, this needs to be 0 to 5V. Develop the required signal conditioning. **[8]**

OR

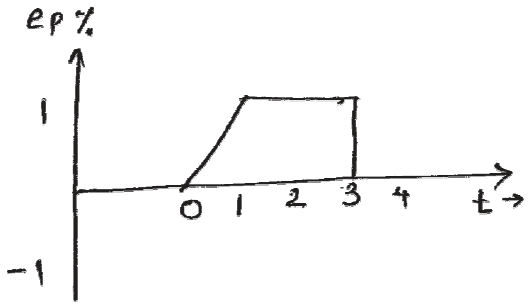
Q2) a) Explain with suitable example process control block diagram. **[8]**

b) Suppose the temperature range 20 to 120°C is linearly represented by the standard current range of 4-20 mA. What current will result from 66°C. What temperature does 6.5mA represent? **[8]**

Q3) a) Justify the statement- adding an integral action to the proportional action eliminates offset error. State the equation for a proportional intergral controller. Draw a circuit diagram for a proportional integral(PI) mode controller. **[8]**

P.T.O.

b) Given the error shown in fig. plot a graph of proportional integral controller output as a function of time. K_p=5, K_I= 1.0 s^{-1}, and $P_I(0)$ = 20%. **[10]**



OR

Q4) a) What do you mean by process loop tuning? Enlist different tuning methods and explain any one method in detail **[8]**

b) A proportional derivative controller has a 0.4 to 2.0 V input measurement range and 0 to 5V output, K_p = 5% and K_d=0.08% per(%/min). The period of the fastest expected signal change is 1.5 sec. Implement this controller with an op-amp cirucit **[10]**

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

b) An equal percentage valve has a rangeability of 32. If the maximum flow rate is 100m^3/hr find the flow at 2/3, and 4/5 open settings. **[8]**

OR

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

b) An equal percentage valve has a maximum flow of 100cm^3/s and a minimum of 4 cm^3/s. If the full travel is 3 cm, find the flow at a 2cm opening. **[8]**

SECTION-II

Q7) a) Enlist both measurable and unmeasurable disturbances in the heat exchanger process. Explain combined feedback and feed forward control scheme for a heat exchanger. **[8]**

b) Explain with block diagram the concept of a self-tuning regulator. **[8]**

OR

Q8) a) Explain with P&I diagram control scheme suitable for improving combustion efficiency in a boiler. **[8]**

b) Explain with block diagram the concept of model predictive control. **[8]**

Q9) a) Explain control scheme to control tops product composition in a distillation column **[10]**

b) Draw and explain P & I diagram for surge control in air compressor. **[8]**

OR

Q10)a) Draw and explain P&I diagrams for cascade control of multiple effect evaproator **[10]**

b) Explain with neat diagram architecture of robot controller. **[8]**

Q11) Write notes on

a) Role of alarm annunciator in ensuring plant safety **[8]**

b) Strip chart recorder **[8]**

OR

Q12) a) Explain with block diagram distributed control system. **[8]**

b) Explain with neat diagram working principle of a flow totalizer. **[8]**