Total No. of Questions : 12]

SEAT No. :

P1409

[Total No. of Pages :3

[4759] - 122
B.E. (Electronics)
PROCESS AUTOMATION
(2008 Pattern) (Semester - II)

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

Instructions to the candidates:

1) ***Answers to the two sections should be written in separate answer - books.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Assume suitable data, if necessary.***

SECTION - I

Q1) a) Explain process control principles with- **[8]**

i) Human Aided Control

ii) Automatic Control

b) Explain the following control system evaluation criteria. **[8]**

i) Minimum area

ii) Quarter amplitude

OR

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

b) Explain with suitable example following process characteristics: **[8]**

i) Process Equation

ii) Process Load

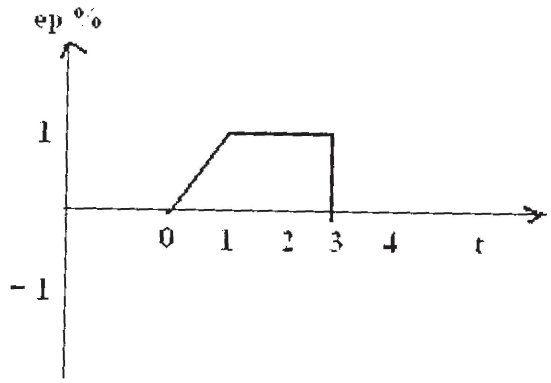
iii) Process lag

iv) Self Regulation

Q3) a) State the equation for a proportional integral controller. Explain a OP-AMP based 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) Explain open loop transient response method of process loop tuning. **[8]**

b) A proportional derivative controller has a 0.4 to 2.0V 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. **[10]**

Q5) a) Explain the following sources of valve noise **[8]**

i) Mechanical Vibration

ii) Hydrodynamic noise

iii) Aerodynamic noise

b) Compare pneumatic, hydraulic and electronic systems from the process control perspective. **[8]**

OR

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

b) Define valve sizing coefficient (Cv) and state its formula? State important selection criterion of a control valve. **[8]**

SECTION- II

Q7) a) 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 air:fuel ratio control scheme for improving combustion efficiency in a steam boiler. **[8]**

b) Explain with block diagram the concept of Model Predictive Control. **[8]**

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

b) Draw and explain P & I diagram for surge control in a air compressor. **[10]**

OR

Q10) a) Draw & explain the P & I diagram for cascade control of multiple effect evaporator. **[10]**

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

Q11) Explain with neat diagram following auxiliary process control components **[16]**

a) Control Panels

b) Strip Chart recorder

OR

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

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

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