

Total No. of Questions : 12]

SEAT No. :

**P847**

**[4659]-106**

[Total No. of Pages : 3

**B.E. (Electronics & Telecommunication)**  
**d -PLC & INDUSTRIAL PROCESS AUTOMATION**  
**(2008 Pattern) (Elective-IV) (Semester- II)**

*Time : 3Hours]*

*[Max. Marks :100*

*Instructions to the candidates:*

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

**SECTION-I**

- Q1)** a) Explain the following: **[8]**
- i) Control system networks.
  - ii) Foundation field bus and Profi bus.
- b) Explain the process control elements with the help of process control system. **[8]**

OR

- Q2)** a) What is P&I diagrams? Explain what information it contains & its use for system engineer. **[8]**
- b) Explain the process control principle with the help of examples. **[8]**
- Q3)** a) What are signal transmission standards used in process control systems? Which signal standard is most popular? Why? **[8]**
- b) A temperature sensor has a span of 20° - 250°C. A measurement results in a value of 55°C for the temperature. Specify the error if the accuracy is **[8]**
- i)  $\pm 0.5\%$  full scale
  - ii)  $\pm 0.75\%$  of span
  - iii)  $\pm 0.8\%$  of reading.
- What is possible temperature in each case?

OR

**P.T.O.**

- Q4)** a) What is the need of transmitter? Explain two wire transmitter topology in detail? What are the drawbacks of two wire transmitters and how to eliminate them? [8]
- b) Explain the following terms concern to process measurement. [8]
- i) Repeatability
  - ii) Span and range
  - iii) Accuracy and ways to express it.
  - iv) Linearity and linearization
- Q5)** a) A PD controller has a 0.4 to 2.0 V input measurement range and 0 to 5 V output range.  $K_p = 5\% / \%$ ,  $K_D = 0.08\% / (\%/min)$ . The period of the fastest expected signal change is 1.5 sec. Implement this controller with Op-Amp. [4]
- b) What is linearization of the sensor? What are the various methods used for linearization? [6]
- c) Explain any one controller tuning method in brief. [8]

OR

- Q6)** a) Discuss and derive PID algorithm for Digital implementation. [8]
- b) State various implementation of PI controller? Explain any one in detail. Explain effect of integral action on loop response. [10]

### SECTION-II

- Q7)** a) Draw the block diagram of final control operation. Explain the operation of each block in it. [8]
- b) Explain the different signal conversion techniques related to final control operation. [8]

OR

- Q8)** a) Write a short notes on electrical actuators. [4]
- b) Draw and explain the pneumatic and hydraulic actuators. [6]
- c) A magnetic amplifier requires a 5V to 10 V input signal from a 4mA to 20mA control signal.  
Design and draw a signal conversion system. [6]

- Q9) a)** Draw and explain the block diagram of PLC. Why PLC is popular in process industry? [10]
- b) Draw diagram with appropriate sensing elements for level control process automation for pumping the water from ground tank  $T_1$  to overhead tank  $T_2$ , the following operation is required. [8]
- Pump the water in  $T_2$  only when there is low level in  $T_2$  and no low level in  $T_1$ .
  - Pumping should stop on high level of  $T_2$ .
  - $T_1$  inlet valve should close automatically on high level of  $T_1$ .
- Draw appropriate ladder diagram?

OR

- Q10)a)** Explain what is PLCs in following regards: [8]
- Elements of PLCs.
  - Operation of PLC.
  - Scan Cycle and Scan Time.
  - PLC Programming Languages.
- b) Draw ladder diagram for below logic. [6]
- $\overline{A.B} = \bar{A} + \bar{B}$
  - $\overline{A+B} = \bar{A}.\bar{B}$
- c) Write down the selection criteria of PLC. [4]
- Q11)a)** Write a short notes on: [8]
- Fuzzy logic system
  - Statistical Process Control.
- b) Explain fuzzy controller in details. [8]

OR

- Q12)a)** Explain Artificial Neural Network (ANN) controller in details. [8]
- b) Draw ladder diagram for 4:1 multiplexer. [8]

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