

Total No. of Questions : 10]

SEAT No. :

P3626

[Total No. of Pages : 3

**[4959] - 1113**  
**B.E. (Electronics)**  
**PROCESS AUTOMATION**  
**(2012 Course) (Semester - II)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

**Instructions to the candidates:-**

- 1) *Answer Q. No. 1 or Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No.6, Q. No. 7 or Q. No. 8, and Q. No. 9 or Q. No. 10.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume suitable data if necessary.*

**Q1) a)** Draw the following P&ID symbols. **[5]**

- i) Stand alone Instrument
  - ii) Shared Display or control
  - iii) Computer Function
  - iv) Programmable Logic Controller(PLC)
  - v) Orifice Plate
- b) Explain Ziegler Nichol's tuning procedure. State the formulae for three mode Ziegler Nichol's settings. **[5]**

OR

**Q2) a)** State the equation for a Proportional Derivative (P+D) controller. Draw a circuit diagram for a Proportional Derivative (P+D) mode controller. **[5]**

- b) Draw a neat sketch of control valve characteristics and explain the following terms. **[5]**
- i) Quick Opening
  - ii) Linear
  - iii) Equal Percentage

**P.T.O.**

- Q3) a)** Explain the following measures of control system quality. [4]
- i) Quarter Amplitude Criterion
  - ii) Minimum Area Criterion.
- b) A temperature control system inputs the controlled variable as a range from 0 to 4V. The output is a heater requiring 0 to 8V. A PID controller is to be used with  $K_p = 2.4 \% / \%$ ,  $K_i = 9\% / (\% - \text{min})$ ,  $K_d = 0.7 \% / (\% / \text{min})$ . The period of the fastest expected change is estimated to be 8 seconds. Develop the PID circuit. [6]

OR

- Q4) a)** Explain the following process characteristics. [4]
- i) Process Equation
  - ii) Process Load.
- b) A proportional derivative controller has a 0.4 to 2.0 V input measurement range, a 0 to 5V output,  $K_p = 5\% / \%$  and  $K_d = 0.08 \% \text{ per } (\% / \text{min})$ . The period of the fastest expected signal change is 1.5 sec. Implement this controller with an op-amp circuit. [6]

- Q5) a)** Explain with neat diagram architecture of a PLC? Give important specifications of a PLC. [9]
- b) Develop the physical ladder diagram for a motor with the following. NO START button, NC STOP button, thermal overload limit switch opens on high temperature, green light when running, red light for thermal overload. [8]

OR

- Q6) a)** Explain the PLC operation with respect to [9]
- i) I/O scan mode
  - ii) Execution mode
  - iii) Scan time
- b) Develop physical ladder diagram for the tank system to satisfy following automation sequence. [8]
- i) Fill the tank
  - ii) Heat and stir the liquid for 30 minutes.
  - iii) Empty the tank
  - iv) Repeat from step

- Q7)** a) Explain with neat P&I diagram inferential control scheme for a distillation column. [9]  
b) Explain with block diagram the concept of Adaptive Control. [8]

OR

- Q8)** a) Write a short note on Fuzzy Logic Control. [9]  
b) Explain with block diagram the concept of Model Predictive Control. [8]

**Q9)** Write Short notes on

- a) Strip Chart recorder [8]  
b) Direct Digital Control [8]

OR

- Q10)** a) Explain with suitable block diagram architecture of a typical Distributed Control System (DCS) [8]  
b) State applications of SCADA. Explain the functions of RTU and MTU. [8]

