D 50563 (Pages : 2) Name.....

Reg. No.....

# SEVENTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION NOVEMBER 2013

## AI 09 701—PROCESS CONTROL INSTRUMENTATION

Time : Three Hours Maximum : 70 Marks

### Part A

*Answer* **all** *questions.*

1. Define degrees of freedom.
2. Draw the feed forward control of a heat exchanger.
3. List out the drawbacks of cascade control.
4. What are decouplers ?
5. What are the general rules for installation of a PLC ?

(5 × 2 = 10 marks)

### Part B

*Answer any* **four** *questions.*

1. Draw the time response of a second order under damped system when subjected to unit step input and define peak overshoot and settling time.
2. Explain the principle of a pneumatic actuator.
3. List out the merits and drawbacks of feedback control.
4. Give two examples of adaptive control and inferential control schemes.
5. List out the relationship between time domain and frequency domain.
6. What are factors to be considered in the selection of PLC's ?

(4 × 5 = 20 marks)

### Part C

*Answer* **all** *questions.*

Module I

1. (a) Explain in detail about various types of relays. (10 marks)

*Or*

(b) (i) Derive time response of a first order system to unit step input. (6 marks)

(ii) State principle characteristics of a first order process. (4 marks)

Turn over

Module II

2. (a) Explain split range control with a suitable example. (10 marks)

*Or*

(b) (i) Explain the characteristics of a control valve. (6 marks)

(ii) Write short notes on cavitation. (4 marks)

Module III

3. (a) Explain the interaction among control loops of a flash drum and distillation column. (10 marks)

*Or*

(b) (i) What are the steps that constitute to basis for experimental identification of process ? (6 marks)

(ii) What is meant by offline and online process identification ? (4 marks)

Module IV

4. (a) Explain in detail about timers and counters of a PLC. (10 marks)

*Or*

(b) (i) What is a ladder diagram ? What are its symbols ? (4 marks)

(ii) Design a PID controller on a PLC. (6 marks)

(4 × 10 = 40 marks)