

**PROCESS CONTROL AND INSTRUMENTATION**  
**3K4-IER-19**

Time : 3 hrs.

M.M : 100

**Note :—**

1. Part 'A' may be attempted in first 6 pages of Answer Sheet.  
भाग 'क' के सभी उत्तर, उत्तर-पुस्तिका के प्रथम छः पृष्ठों में ही करने हैं।
2. Part 'B' in rest of the Sheets of Answer Sheet.  
भाग 'ख' के उत्तर, उत्तर-पुस्तिका के अगले शेष पृष्ठों में लिखिये।
3. Answers may be given in English or Hindi.  
प्रश्नों के उत्तर अंग्रेजी अथवा हिन्दी में दीजिये।

**PART - 'A'****1. Attempt any ten questions :**

(10x2=20)

- (a) Explain closed loop system.
- (b) Define tuning of controller? What are its types?
- (c) Sketch the input-output characteristics of a single-speed floating controller?
- (d) What are SMART Transmitters?
- (e) Draw the control valve characteristics curve?
- (f) What is Delta cell?
- (g) Define ladder diagram.
- (h) What is PLC?
- (i) What is Booster?
- (j) Explain control loop of temperature system?
- (k) Define process-lag Dead Time? What is its effect?
- (l) Draw the symbol of the following valves.  
(i) butterfly (ii) Pneumatic Control Valve.
- (m) What are type of annunciators?
- (n) What is Process reaction curve?

**2. Attempt any five Questions :**

(5x4=20)

- (a) Explain Zeller-Nichols method?
- (b) What is cascade control system? Explain using an example.

- (c) Explain two and four wire Transmitter?
- (d) Explain in detail basic control loop of flow and pressure loop system.
- (e) Explain calibration procedure of control valve.
- (f) Define and explain in detail ratio control system.
- (g) Write the working of the following
  - (i) Solenoid
  - (ii) Diaphragm
  - (iii) Sliding Gate
  - (iv) Ball valve
- (h) Can Proportional controller be used as ON-OFF? If yes, How?

### PART- B

**Attempt any three Questions :**

**(3x20=60)**

3. What is a "ON-OFF" controller? Explain its working with suitable example and also give its advantages, disadvantages and any two applications.
4. What are the major limitations of pneumatic controller? Draw a Pneumatic Proportional Controller and Explain its operation?
5. (a) How PLC is programmed? Explain this by an example.  
(b) Briefly explain the Block Diagram of a PLC?
6. Explain the following
  - (i) P & I Diagram
  - (ii) Intrinsic safety
7. (a) Write the working of Electronic controller (P,PI,PID)?  
(b) Explain interlocking system in Boiler.
8. (a) Differentiate between closed loop and open loop system.  
(b) What is process Resistance and process capacitance? Explain the operation of a single capacity Level loop?
9. (a) Explain in detail how we can control top and bottom product composition in a distillation column?  
(b) What is meant by cavitation & flashing in control valves?