

*Instrumentation & Control*

**College of Engineering, Pune**  
**Third Year – Instrumentation & Control**  
**SUB: IE-312 Process Loop Components**  
**END Semester Exam**

Term-II  
Academic Year: 2012- 13

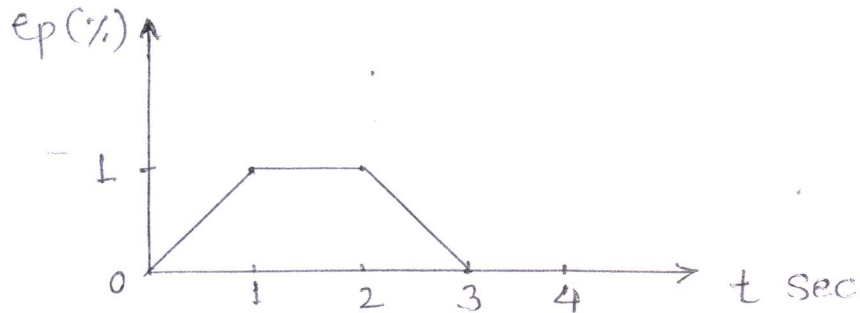
Timing: 3.0 hrs  
Max. Marks: 50

Instructions:

1. All questions are compulsory
  2. Assume suitable data
  3. Draw neat diagrams wherever necessary
  4. Use of non programmable calculators are allowed
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		<b>Marks</b>
Q. 1	A. Define following terms: i. Process load ii. Measurement lag iii. Transportation lag iv. Control lag v. Manipulating Variable	5
	B. A new printing station will add a logo to parts as they travel along an assembly line. When a part arrives a 'part' sensor will detect it. After this the 'clamp' output is turned on for 10 seconds to hold the part during the operation. For the first 2 seconds the part is being held a 'spray' output will be turned on to apply the ink. For the last 8 seconds a 'heat' output will be turned on to cure the ink. After this the part is released and allowed to continue along the line. Write the ladder logic for this process.	5
Q. 2	A. For level measurement in a closed tank DPT is used with remote seal system with a fill fluid having a density of $935\text{kg/m}^3$ and a process level measurement of 0 to 10 m of sea water (density = $1025\text{kg/m}^3$ ). The transmitter elevation is of 5m. Complete five-point calibration of DPT for given application.	5
	B. What is a need of standardization of signals? Write standard signals used in industry. Explain two wire transmitter, live zero, span and zero adjustment terms associated with transmitter.	5
Q. 3	A. What do you mean by controller tuning criteria? Explain ultimate controller tuning method with neat diagram. Write limitations of the same.	5

- B. Error shown in graph is applied to proportional integral derivative controller with  $K_p = 4$ ,  $K_I = 0.7s^{-1}$ ,  $K_D = 0.5s$ , and  $P_i(0) = 15\%$ . Draw a graph of the resulting controller output. 5



- Q. 4 A. What are control valve characteristics? Explain dead band, range ability, and valve gain associated with control valve. 5
- B. List out control valve accessories. Explain any five control valve accessories with neat diagram. 5
- Q. 5 A. Gives classification of hazardous area. Describe type of protection method used in hazardous location. 5
- B. Write short note on IEC61508 safety standard 5
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