

**B.E DEGREE EXAMINATIONS: APRIL/MAY 2014**

(Regulation 2009)

Fifth Semester

**ELECTRONICS AND INSTRUMENTATION ENGINEERING**

EIE106: Process Control

**Time: Three Hours**

**Maximum Marks: 100**

**Answer all the Questions:-**

**PART A (10 x 1 = 10 Marks)**

- A set of fundamental dependent quantities whose value will describe the natural state of a given system is called as \_\_\_\_\_.  
 a) State equations                      b) Static variable  
 c) Dynamic variable                      d) State variable
- Whenever an input variable of a system changes, there is a time interval which may be long or short during which no effect is observed on the output of the system and this is called as \_\_\_\_\_.  
 a) Distance velocity lag                      b) Transfer lag  
 c) Non-Minimum phase response                      d) Exponential Transfer lag.
- In analog electronic controller for the derivative mode, the derivative gain  $G_D$  is given by \_\_\_\_\_.  
 a)  $R/C$                                       b)  $1/RC$   
 c)  $RC$                                       d)  $C/R$
- The term Reset Control refers to \_\_\_\_\_.  
 a) Integral Control                      b) Derivative Control  
 c) Proportional Control                      d) Evaluation Criteria
- The most common type of final control element in chemical process, the control valve is used to \_\_\_\_\_.  
 a) Block the flow of fluids.                      b) Regulate the flow of fluids  
 c) Stop the flow of fluids.                      d) Un regulate the flow of fluid
- The term  $C_V$  used in control valve sizing is called as \_\_\_\_\_.  
 a) Specific gravity of fluid.                      b) Flow co-efficient (or) factor associated with capacity of valve.  
 c)  $K_V$  factor                                      d) Flow Rate
- In Ziegler-Nichols method of tuning controller parameter, the ultimate period of sustained oscillation " $P_U$ " is given by \_\_\_\_\_.  
 a)  $\frac{2\pi}{\omega_{co}}$                                       b)  $2\pi\omega_{co}$   
 c)  $\frac{\omega_{co}}{2\pi}$                                       d)  $\pi\omega_{co}$
- ITAE suppress Errors that \_\_\_\_\_.

- a) persist for long duration                      b) persist for short duration
- c) Square of the error                      d) ISE
- Spit range control configuration has \_\_\_\_\_.  
 a) One manipulated variable and more than one measurement.                      b) One measurement and more than one manipulated variable.  
 c) More than one measurement and manipulated variable.                      d) More than two disturbances.
- The term P&ID diagram stands for \_\_\_\_\_.  
 a) Process & Instrumentation diagram                      b) Piping & Instrumentation diagram  
 c) Process flow diagram                      d) Loop Flow Diagram

**PART B (10 x 2 = 20 Marks)**

- Distinguish between Continuous Process and Batch Process.
- Define self regulation with an example.
- Write the limitation of ON/OFF control mode.
- Why derivative control is not recommended alone for any process?
- Define the flow coefficient of a control valve.
- Write about any two factors involved in the selection of a control valve.
- What is ISE and when to go for it?
- Write short note on  $1/4$  decay method of controller tuning.
- List the different types of selective control systems.
- Write short note on Model Predictive Control

**PART C (5 x 14 = 70 Marks)**

- a) (i) What is the need for mathematical modeling for process control? (4)  
 (ii) Obtain the mathematical model for first order Liquid Level Process? (10)  
**(OR)**  
 b) (i) Explain the term degree of freedom of a Process? (4)  
 (ii) Obtain the transfer function  $\frac{h_2(s)}{q_1(s)}$  for the interacting tank system? (10)
- a) Discuss in detail about the Characteristics of Proportional, Integral & Derivative control modes with necessary diagrams.  
**(OR)**  
 b) Derive the transfer function of an electronic PID Controller with necessary diagrams.

23. a) With neat sketch explain the Characteristics of different types of Control Valve

**(OR)**

b) Describe in detail about the Control Valve Positioner with neat diagram.

24. a) Explain the various steps involved in tuning the controller by process reaction curve method with necessary diagrams.

**(OR)**

b) Discuss the various steps involved in tuning the controller by Continuous cycling method with necessary diagrams.

25. a) (i) Explain the cascade control scheme with a neat sketch. (7)

(ii) Illustrate a typical application which needs cascade control scheme. (7)

**(OR)**

b) (i) Explain feed forward control with an example (7)

(ii) Describe any one adaptive control scheme with necessary Diagram. (7)

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