C.U.SHAH UNIVERSITY
Summer Examination-2017

Subject Name : Basic Process Control

Subject Code : 4TE06BPC1   **Branch: B.Tech (IC)**

Semester : 6   Date : 17/04/2017   Time : 02:30 To 05:30   Marks : 70

Instructions:
   (1) Use of Programmable calculator & any other electronic instrument is prohibited.
   (2) Instructions written on main answer book are strictly to be obeyed.
   (3) Draw neat diagrams and figures (if necessary) at right places.
   (4) Assume suitable data if needed.

Q-1   **Attempt the following questions:**   **(14)**

a) Which of the following controller has maximum offset?   01
    A) P   B) PD   C) PID   D) PI

b) $e^{-\theta s}$ indicate _____.   01
    A) Transportation delay   B) Incremental angle
    C) Decrement in angle   D) None of these

c) The span over which no change occur in the controller output of an ON-OFF controller   01
    is term as_____.
    A) Neutral Zone   B) Dead Zone   C) Lag   D) Delay

d) The output of D- controller is _____, if error is constant.   01
    A) Infinity   B) Maximum   C) One   D) Zero

e) Ziegler Nichols closed loop method for PID tuning is also known as_____   01
    A) Good Gain method   B) Reaction curve method
    C) Frequency response method   D) None of these

f)   The response of two tanks of same size and resistance in series is_____   01
    A) Under damped   B) Critically damped   C) Over damped   D) None of the above

g) Ratio control is a special type of_____ control where two disturbances   01
    are measured and held in a ratio to each other.
    A) Cascade   B) Feed forward   C) Split-range   D) None of these

h) A car is running at a constant speed of 50 km/h, which of the following is the feedback   01
    element for the driver?
    A) Clutch   B) Eyes   C) Needle of the speedometer   D) Steering wheel

i) Transfer function of a system is used to calculate which of the following ?   01
   A) The order of the system   B) The time constant
   C) The output for any given input   D) The steady state gain

j) The range of error to cover the 0% to 100% controller output is called as_____.   01
   A) Offset   B) Proportional band   C) Oscillation   D) None of these

k) Which of the following controllers has the least maximum deviation?   01
   A) P-controller   B) P-I-D controller   C) P-I controller   D) P-D controller

l) Which is the fastest process from the following?   01
   A) Air flow   B) Water flow   C) Air pressure   D) Water pressure

m) _____ control strategy involves one measurement and more than one   01
manipulated variables.
   A) Selective   B) Feed forward   C) Split-range   D) Ratio

n) _____ control strategy involves one manipulated variables and several   01
controlled output.
   A) Selective   B) Feed forward   C) Split-range   D) Ratio

Attempt any four questions from Q-2 to Q-8

Q-2   **Attempt all questions**   **(14)**

a) Define controlled variable and Manipulated variable. How to select controlled and   07
manipulated variable for any process loop with a suitable process loop example.

b) Define following terminology of the controller.   07
(i)   Proportional band
(ii) Dead time
(iii) Rate gain
(iv) Anti wind up
(v) Process lag
(vi) Nominal load
(vii) Controller tuning.

Q-3   **Attempt all questions**   **(14)**

a) Draw and explain process and instrumentation elements of a typical feedback loop.   07

b) A controlling variable is a motor speed that varies from 800 to 1750 rpm.   07
If the speed is controlled by a 25 to 50 v dc signal then calculate
(a) the speed produced by an input of 38 V and
(b) the speed produced as a percent of span.

Q-4   **Attempt all questions**   **(14)**

a) Explain the strategy of cascade control with suitable example.   07

b)		Prepare a feedback control algorithm using plain proportional control on level system.	07
Q-5		**Attempt all questions**	**(14)**
a)		Explain P+I+D controller algorithm. Justify the importance of each mode in PID controller.	07
b)		Write short note on Multiposition controller mode.	07
Q-6		**Attempt all questions**	**(14)**
a)		Explain the feedforward control algorithm and its tuning.	07
b)		What is a master-slave control? Explain how outlet temperature of the heat exchanger is controlled using this kinds of control	07
Q-7		**Attempt all questions**	**(14)**
a)		What are the steps to make linear model for nonlinear physical system? Explain it in details	07
b)		Explain derivative mode (D) of control in detail. Why derivative mode should not be used alone?	07
Q-8		**Attempt all questions**	**(14)**
a)		Discuss benefits, difficulties and requirements of process control implementation.	07
b)		Explain the mathematical modeling procedure with an example	07