Enrollment No: _____ Exam Seat No:_____

C.U.SHAH UNIVERSITY

Summer Examination-2016

Subject Name : Basic Process Control

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

Semester : 6 Date : 11/05/2016 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) Impulse response of system can also be term as _____. 01
A.Transfer function B.impulse function C.unit function D.none of these

b) To eliminate effect of disturbance on controlled variable, before it affects controlled variable _____ scheme is used 01
A. Feed back B. Split range C. Cascade control D. Feed forward

c) A negative gain margin expressed in decibels means a/an _____ system. 01
A.Critically damped B.Unstable C.None of these D. Stable

d) The maximum gain of the proportional controller at which the sustained Oscillations occur is called _____ 01
A. Ultimate constant B. Ultimate gain
C. Ultimate time constant D. None of these

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 are measured and held in a ratio to each other. 01
A. Cascade B. Feed forward C. Split-range D. None of these

h) The inner loop of cascade control is _____ than that of outer loop 01
A. Slower B. Faster C. Equal D. None of these

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) What are the key factor that engineers has to consider, so that plants can be maintained reliably and safely near desired values? 01
A. Process Design B. Measurements C. Control Structure D. All the above

k) A _____ variables are adjusted dynamically to keep the controlled variables at their set-points. 01

A. Load B. Disturbance C. Manipulated D.None of these

l) If the controller output decreases with increase in controlled variable then it is called _____. 01

A. reverse action B. direct action C. proportinal D. none of these

m) _____is the elapsed time between the instant a deviation (error) occurs and when the corrective action first occurs 01

A. Dead time B. Disturbance C. Time constant D.None of these

n) The span, in which no change occur in the controller output of ON-OFF controller that is term as_____. 01

A. Neutral Zone B. Dead zone C. Lag D. Delay

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

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

a) Explain P+I+D controller algorithm. Justify the importance of each mode in PID controller 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-3 **Attempt all questions** **(14)**

a) Derive the transfer function of the two non-interacting series tank. 07

b) Implement the Proportional Integral (PI) control mode using operational amplifiers circuits 07

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

a) What is the meaning of controller tuning? Give the procedure for obtaining PID controller parameters for the system G(s) = 1/s(s+1)(s+5) with Ziegler Nichols method (close loop method). 07

b) Prepare a feedback control algorithm using plain proportional control on level system 07

Q-5 **Attempt all questions** **(14)**

a) A 5-m diameter cylindrical tank is emptied by a constant outflow of 1 m^3/min. A two position controller is used to open and close a fill valve with an open flow of 2 m^3/min. for level control, the neutral zone is 1 m and the set point is 12m (1) Calculate the cycling period (2) Plot the level versus time 07

b) What is a Cascade Control? Explain with suitable example. 07

Q-6 **Attempt all questions** **(14)**

a) Explain the feedforward control algorithm and its tuning. 07

b) Measurements conducted on a servomechanism show the system response to be 07
c(t) = 0.3e-60t + 1.5e-10t when subjected to a step input.
1) Obtain the expression for the closed loop transfer function
2) Determine The undamped natural frequency and damping ratio Of the system
3) Plot the poles and zeros of the system

4) Define the system on the basis of damping ratio.

Q-7	**Attempt all questions**		**(14)**
a)	What are the steps to make linear model for nonlinear physical system? Explain in detail		07
b)	Explain two alternatives of ratio control with respective application.		07
Q-8	**Attempt all questions**		**(14)**
a)	Discuss Ziegler Nichols open loop method for controller tuning		07
b)	Explain Mathematical modeling procedure with an example		07