

King AbdulAziz University

College of Engineering , Chemical Engineering Dept.

Fall 2004 HW#10 Ch.E 442

(Design & Computer Application)

1. The table below shows the experimental process reaction curve of an open-loop system with a PI controller. Using these values:
 - a- Approximate the open-loop response with that of a first-order system plus dead time .
 - b- Select the controller parameters using Cohen-Coon technique.

Time (minutes)	Manipulated input	Measurement of output
-2	100	200
-1	100	200
0	150	200.1
0.2	150	201.1
0.4	150	204.0
0.6	150	227.0
0.8	150	251.0
1.0	150	280.0
1.2	150	302.5
1.4	150	318.0
1.6	150	329.5
1.8	150	336.0
2.0	150	339.0
2.2	150	340.5
2.4	150	341.0

2. Problem IV.54 in the text book (Chemical Process control by G. Stephanopoulos).

3. The table below shows the amplitude ratio and phase lag values of an unknown system at various frequencies.
 - a- Determine the order of the unknown system.
 - b- Compute the values of the system parameters
 - c- Compute the value of the dead time if the system possesses dead time.

Frequency (Cycles/min.)	AR	ϕ (degrees)
.01	10	-0.63
.05	9.99	-6.30
.1	9.99	-3.15
1.0	9.95	-63.01
3.0	9.58	-188.6
5.0	8.94	-313.0
7.0	8.19	-436.1
9.0	7.43	-557.7
10.0	7.04	-618.0
12.0	6.40	-737.7
15.0	5.55	-915.8
20.0	4.47	-1209.4