

Unit 7 - Week 5

Course outline

How does an NPTEL online course work?

Practice Assignment

Week 1

Week 2

Week 3

Week 4

Week 5

- Lecture 14.1: Modeling Delays: Material Delay
- Lecture 14.2: Modeling Delays: Graphical Representation
- Lecture 14.3: Modeling Delays: Higher order Material Delay
- Lecture 15.1: Delays: Information Delay
- Lecture 15.2: Delays: Modeling Information Delay
- Lecture 15.3: Delays: Higher Order Information Delay
- Lecture 16.1: Second Order Systems: Romeo and Juliet Model
- Lecture 16.2: Second Order Systems: The Red and the Black, Gone with the Wind
- Lecture 16.3: Modeling Oscillations Part-I
- Download Videos
- Weekly Feedback
- Quiz : Assignment 05
- Study Material for Week 5

Week 6

Week 7

Week 8

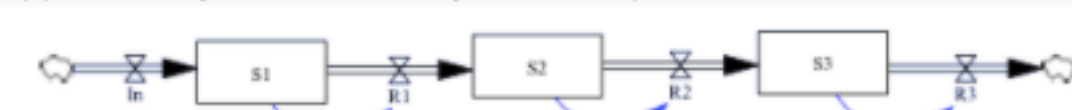
Text Transcripts

Assignment 05

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

Due on 2020-03-04, 23:59 IST.

1) Consider the below SFD where, $In=10$ units/ time, $R1=S1/5$, $R2=S2/10$, $R3=S3/5$. Suppose the system is in steady state or equilibrium state.



From the data given above answer Q1, Q2 and Q3.

At steady state, the values of stocks, $S1 =$ _____

Hint

No, the answer is incorrect.

Score: 0

Accepted Answers: (Type: Numeric) 50

1 point

2) At steady state, the values of stocks, $S2 =$ _____

Hint

No, the answer is incorrect.

Score: 0

Accepted Answers: (Type: Numeric) 100

1 point

3) At steady state, the values of stocks, $S3 =$ _____

Hint

No, the answer is incorrect.

Score: 0

Accepted Answers: (Type: Numeric) 50

1 point

4) The material delay with the least variability around the average delay time is:

- 1st order exponential delay
- 3rd order exponential delay
- 12th order exponential delay
- pipeline delay

No, the answer is incorrect.

Score: 0

Accepted Answers: pipeline delay

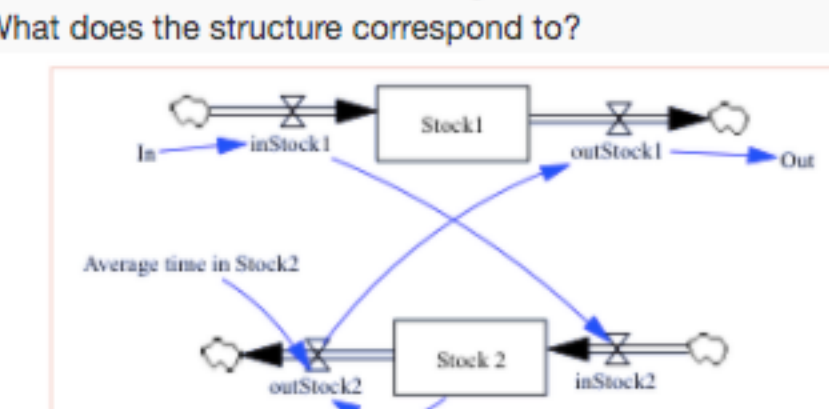
1 point

5) Consider the SFD shown on the right, in which, $inStock2 = inStock1 = In$

$Out = outStock1 = OutStock2$

$OutStock2 = Stock2 / \text{Average time in Stock 2}$

What does the structure correspond to?



- A negative feedback loop with delay
- First order material delay
- Generic structure for oscillations
- Second order material delay

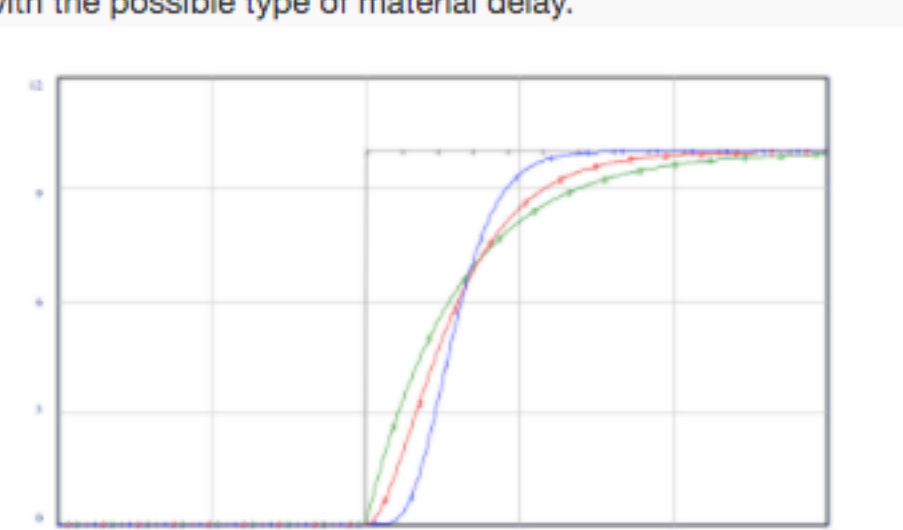
No, the answer is incorrect.

Score: 0

Accepted Answers: First order material delay

2 points

6) Consider the following output (outflow) of the material delay, in response to a step increase in input at time 10. Match the pattern shown in the graph with the possible type of material delay. 1 point



- 1-First order delay; 2-Second order delay; 3-Sixth order delay
- 1-First order delay; 3-Second order delay; 2-Sixth order delay
- 3-First order delay; 2-Second order delay; 1-Sixth order delay
- 3-First order delay; 1-Second order delay; 2-Sixth order delay

No, the answer is incorrect.

Score: 0

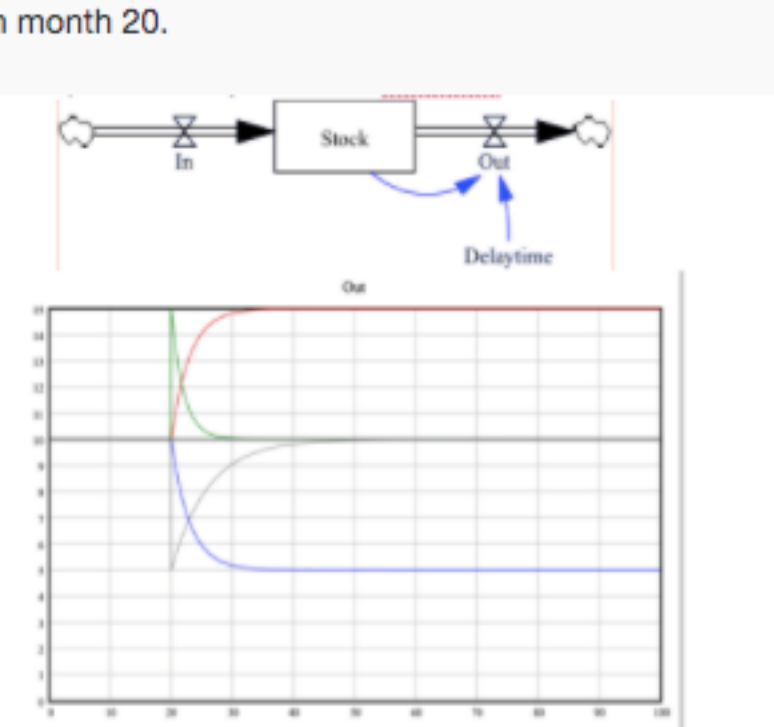
Accepted Answers: 3-First order delay; 2-Second order delay; 1-Sixth order delay

7) Consider a first-order delay as shown in the figure below, with a delay time of 3 months. Inflow is constant at 10 units/month. Initial value of Stock is 2 points 30 units.

Outflow, $Out = Stock / \text{Delaytime}$.

Suppose the Delaytime increases from 3 months to 5 months in month 20.

From the possible behaviours of the outflow Out shown in graph below, choose the correct behaviour of Out in response to a step increase in Delaytime from 3 to 5 in month 20.



- Red line
- Green line
- Grey Line
- Blue Line

No, the answer is incorrect.

Score: 0

Accepted Answers: Grey Line

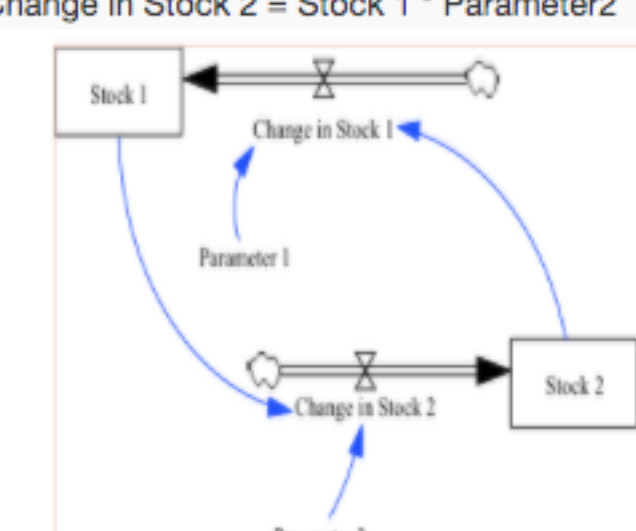
1 point

8) Consider the SFD shown.

Initial value of $Stock1 = \text{Initial value of } Stock2 = +1$. Also,

Change in $Stock 1 = Stock 2 * \text{Parameter1}$

Change in $Stock 2 = Stock 1 * \text{Parameter2}$



Suppose we set $Parameter1 = -1$ and $Parameter2 = -1$ then the resulting behaviour will be:

- Exponential growth/ collapse
- Goal seeking
- Oscillations
- S-shaped growth

No, the answer is incorrect.

Score: 0

Accepted Answers: Goal seeking

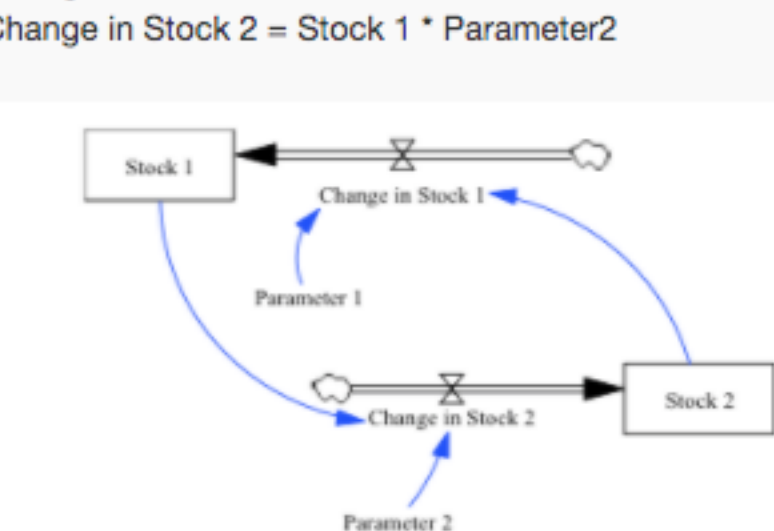
1 point

9) Consider the SFD shown.

Initial value of $Stock1 = \text{Initial value of } Stock2 = +1$. Also,

Change in $Stock 1 = Stock 2 * \text{Parameter1}$

Change in $Stock 2 = Stock 1 * \text{Parameter2}$



Suppose we set $Parameter1 = +1$ and $Parameter2 = -1$ then the resulting behaviour will be:

- Exponential growth/ collapse
- Goal seeking
- Oscillations
- S-shaped growth

No, the answer is incorrect.

Score: 0

Accepted Answers: Oscillations