

Mechanical Control Systems (ME 4473)

Recitation - 2

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- **Agenda:**

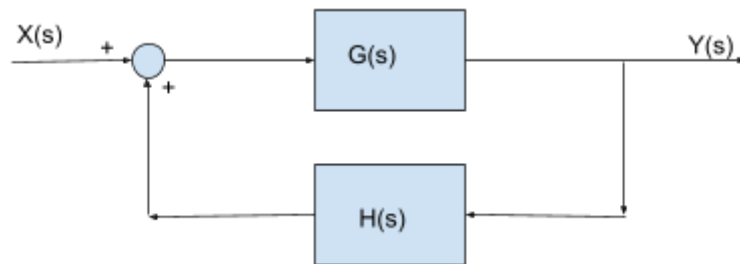
- Revision (Definitions & Terms)
- Problems(Transfer Function, Block Diagram Reduction)

- **Definitions**

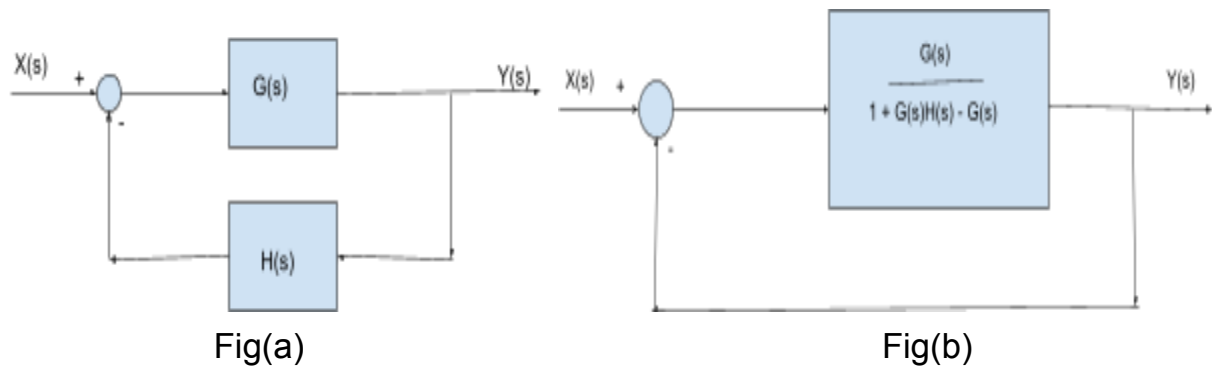
- Open Loop Transfer Function:
- Closed Loop Transfer Function:
- Time Delay:

- **Questions**

- The block diagram below represents a lesser known “Positive Feedback Control System”. Derive the transfer function for the system.



- For a given Block Diagram:



1. What is the Open Loop Transfer Function of a & b?
2. What is the Closed Loop Transfer Function of a & b?

3. Are those two systems equivalent?

4. If yes, which one of the above Open Loop Transfer functions is correct?

5. Assume: $G(s) = \frac{1}{(s+1)}$, $H(s) = \frac{1}{(s+2)}$. Add a gain of $k = 1, 3$ to the system and compare its step response using Simulink.

@ Simulink

- List all the steps for Reducing Block Diagrams

1.

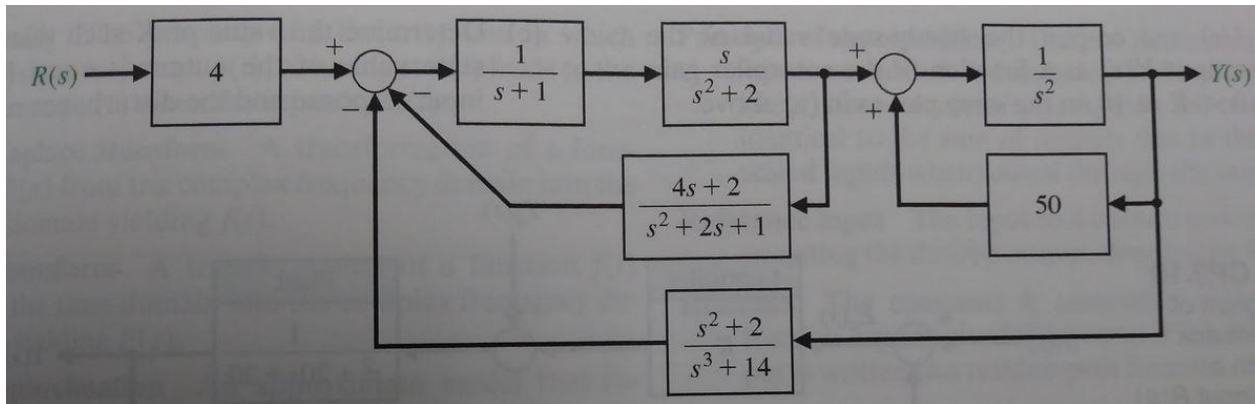
2.

3.

4.

5.

- For the Block Diagram Below:



1. Compute the Closed Loop Transfer Function for the system using Matlab.

2. Evaluate the step response of the whole system and equivalent system using Simulink.

Conclusion:

1. ..

2. ..

Bibliography:**1. Control System Lectures:**

<https://www.youtube.com/watch?v=rJOZ4dj0hnw>

(Open Loop Transfer Function takes account of the whole system and is useful in Frequency response techniques to decide what the controller should do)

2. Modern Control Systems, Dorf, Bishop, 13th Edition