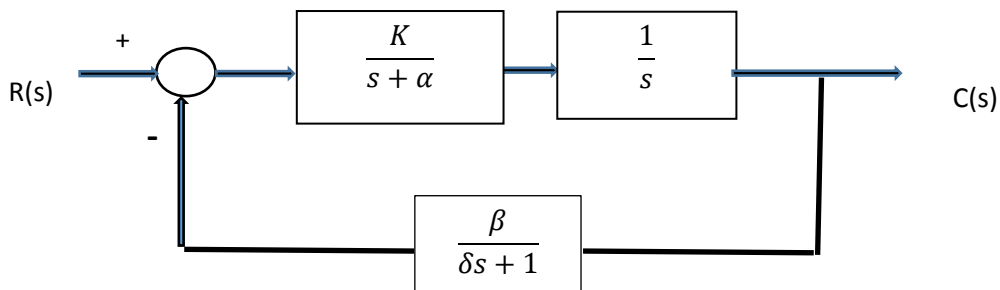**Automatic Control**

LAB 5

Mathematical Modeling of Physical Systems

Objectives: The objective of this exercise is to see the sensitivity of Transfer function due to parameter variations.

List of Equipment/Software

 MATLAB, Simulink

TASKS (by hand) : For the given general feedback system

1) Determine the sensitivity of transfer function T(s) to small changes in **K**

$$T(s) = \frac{C(s)}{R(s)}$$

2) Determine the sensitivity of transfer function T(s) to small changes in α
3) Determine the sensitivity of transfer function T(s) to small changes in β
4) Determine the sensitivity of transfer function T(s) to small changes in δ
5) Show that your sensitivity calculations are logical if the nominal values of parameters used from the following table. For each case please state that the system is overdamped (**O**), underdamped (**U**) or critically damped (**C**). If it is instable, please note it.

Case	K	α	β	δ	O, U, or C
1	1	2	1	0	
2	1.5	2	1	0	
3	10	2	1	0	
4	-1	2	1	0	
5	1	10	1	0	
6	1	100	1	0	
7	1	-5	1	0	
8	1	2	10	0	
9	1	2	-1	0	
10	1	2	1	2	