**Automatic Control INF (06LSLLM, 06LSLOA)**

# *am Simulation*

Surname Name ID

**Design Report**

**Develop the design procedure through**

* **a MATLAB script, named s123456\_design.m. The relevant transfer functions and variables must be named as follow:**
  + Plant transfer function **G**
  + Steady state controller transfer function **C\_SS**
  + Analog controller transfer function **C0**
  + Digital controller transfer function **Cd**
  + Constant magnitude locus **T\_p** (in dB)
  + Constant magnitude locus **S\_p** (in dB)
  + Desired cross-over frequency **wc\_des**
  + Constant magnitude locus **M\_T\_HF** (in dB)
  + Constant magnitude locus **M\_S\_LF** (in dB)
* **a Simulink file, named s123456\_sim.slx.**

**Save all the design results in the s123456.mat, by using the statement**

**>> save s123456**

In all the above files, replace s123456 with your own ID.

This part is of the exam is evaluated only if the required 4 files (s123456\_design.m, s123456\_sim.slx, s123456.mat, s123456\_Design\_Report\_INF.docx) are correctly delivered.   
If the designed controller does not stabilize the feedback control system, the score of this part is 0 points.

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***Steady state requirements analysis and design (3 points; quit the evaluation in the presence of either a “destabilizing” steady state controller or wrong type of the control system)***

System type = 1

Css(s) = 0.8

***Sinusoidal disturbance requirements analysis (0.5 points)***

MTHF = -41.9382 db *c,des* = 10 rad/s

***Transient and requirements analysis (0.5 points)***

** =0.48 *Tp* = 1.47 db *Sp* =3.52 db *c,des* = 7.52 rad/s

***Design procedure description (3 points)***

Describe here the main steps of your design procedure (no MATLAB code!)

***Design results and performance evaluation (10 points)***

C0(s) = ((Kc\*K)/s^r) \* (1+s/wz)\*(1/(1+s/wp)) K= 1.3335,Kc=0.8,r=0,wz=0.97,wp=145.54

in dc-gain form (-1, wrong form, quit if absent)

(e.g.,  , this is only an example!)

Cd(z) = 77.064\*(z-0.9856)/(z+0.0438) polynomial form (-1, wrong form, quit if absent)

Ts = Discretization method

Performance are evaluated according to the following criteria.

* 2 points for each satisfied requirement (with tolerance 5%);
* 1 point for each unsatisfied requirement with error between 5% and 15%;
* 0 points for each unsatisfied requirement with error between 15% and 20%;
* - 1 point for each unsatisfied requirement with error between 20% and 25%;
* - 2 points for each unsatisfied requirement with error > 25%.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Requirement | 1 | 2 | 3 | 4 |
| Value | 0.374 | 0.011 | 13.5649 | 0.1537 |

*Cut and paste in the space below the plot of all the relevant variables needed to provide evidence of the achieved performance.*