IN3170/4170 2021 otes on solutions of the Inspera exam

These notes are published due to popular demand by the students and are not to be taken as a quality controlled set of solutions *Make sure that your copy of this examination paper is*

complete before answering.

Abstract

These notes on the IN3170/4170 2021 online exam are published due to popular demand by the students and are not to be taken as either a quality controlled set of solutions nor as being nicely presented and formated. I just did my best to quickly dump the notes of the online system here together with the tasks.

Chapter 5

Solution task 1

$\lambda = 0.05$ with ± 0.002 tolerance

Solution task 2

$v_{GS} = [1.40, 1.41]\text{V}$
$V_{sat} = [0.75, 0.76]\text{V}$

Chapter 6/7

Solution task 3

$R_O = (r_o + R_2) \,||\, R_1 = \frac{(r_o+R_2)\cdot R_1}{R_1+R_2+r_o}$
$G_M = g_m \frac{r_o}{r_o+R_2}$
$A = G_M \cdot R_O = g_m \cdot \frac{R_1 \cdot r_o}{R_1+R_2+r_o}$

Solution task 4

$g_m = [1000, 1100]\mu\text{A/V}$
$r_o = [24500, 25500]\Omega$
$A_0 = [26, 27]\text{V/V}$
$W = [10.1, 10.2]\mu\text{m}$

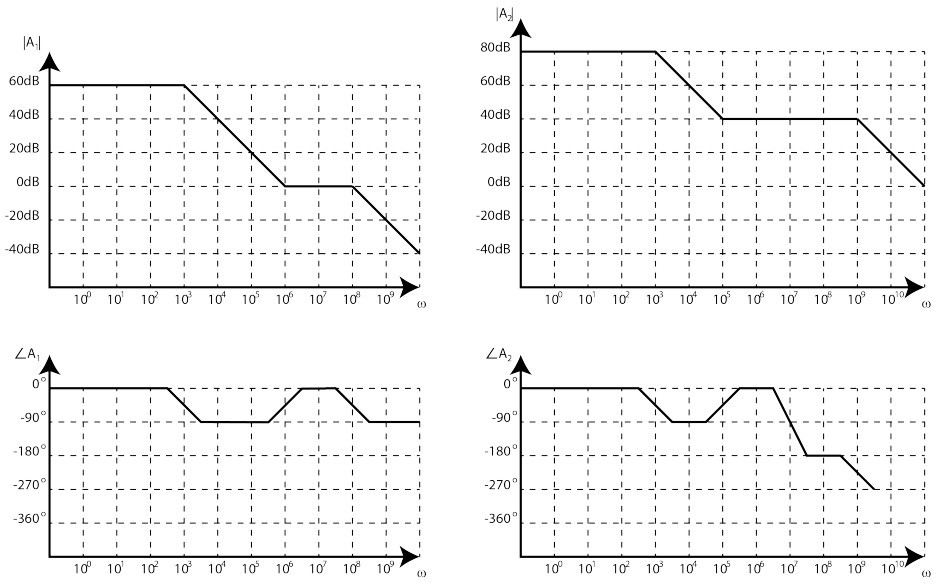


Figure 1: Solution task 7

Chapter 8

Solution task 5

$A = [44, 45]\text{V/V}$

Chapter 9/10 and Bode Plots

Task 6

Solution task 6

$A_{DC} = 30\text{V/V}$
$C_{gd} = [62, 66]\text{fF}$

Task 7

Solution task 7

See figure 1

Chapter 15 and Combinational Logic Circuits

Solution task 8

fastest to slowest: (3,4,2,1)

Solution task 9

PUN5

Solution task 10

See figure 2

Solution task 11

See figure 3

Sequential Logic

Solution task 12

See figure 4

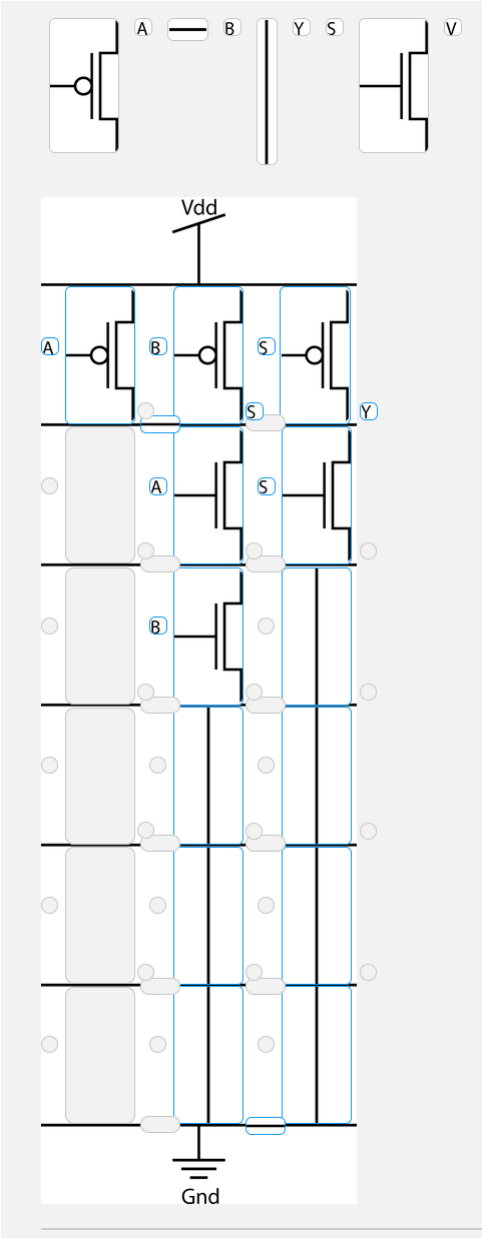


Figure 2: Solution task 10 (one of many correct possibilities)

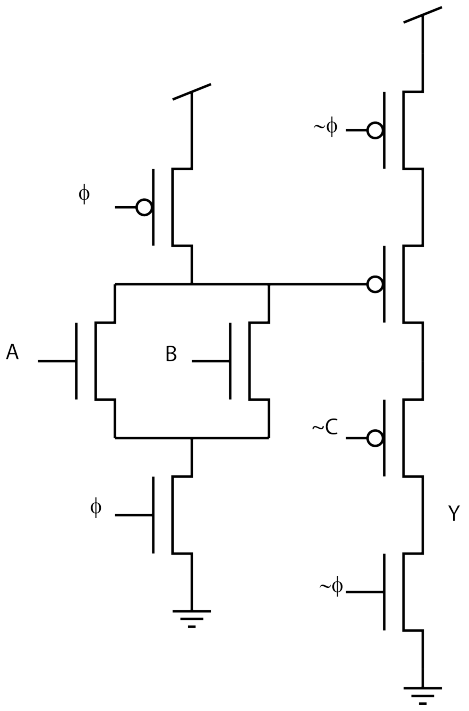
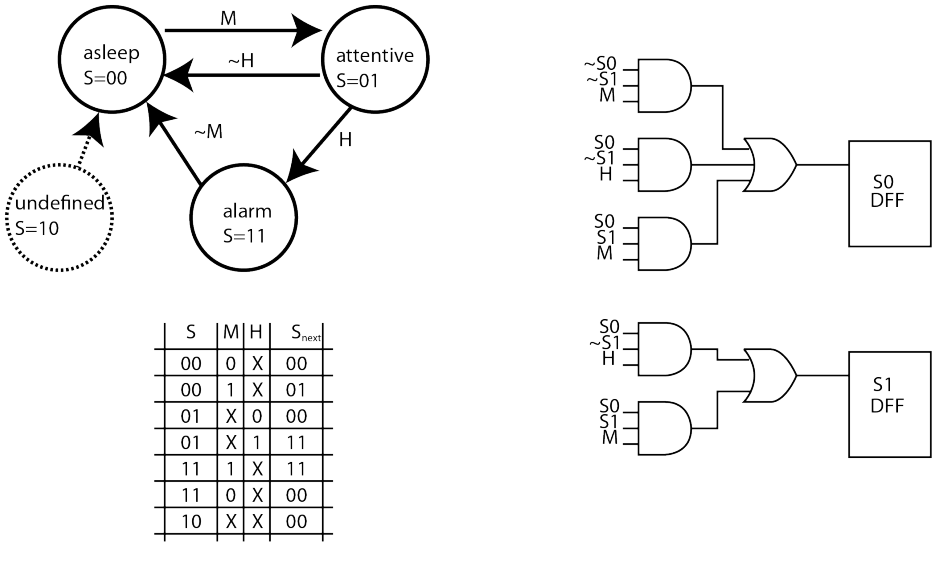


Figure 3: Solution task 11



S	M	H	S_{next}
00	0	X	00
00	1	X	01
01	X	0	00
01	X	1	11
11	1	X	11
11	0	X	00
10	X	X	00

S0=(~S0*~S1*M)+(S0*~S1*H)+(S1*S0*M)
S1=(S0*~S1*H)+(S0*S1*M)

Figure 4: Solution task 12