First & Last name student 1 …….…… First & Last name student 2 …….…… Group …….

Dates/Time range …….……. Lab workstation number ….…….

The matrix parameters of the two-port networks

A) $Z_1 =$ $Z_2 =$

B) Experimental determination of **A**-parameters $R_{a1} =$ $R_{a2} =$

Measured values									Calculated values based on measurements				
Condition $I_2 = 0$				Condition $U_2 = 0$					A_{11}	A_{12}	A_{21}	A_{22}	$\Delta\boldsymbol{A}$
U_1	U_2	U_{a1}	I_1	U_1	U_{a1}	I_1	U_{a2}	I_2					
[V]	[V]	*[V]*	[mA]	[V]	[V]	[mA]	*[V]*	[mA]	-	[kΩ]	[mS]	-	-

$\delta = |1 - \Delta\boldsymbol{A}| =$ $\leq$ 5%

C) Experimental determination of **Z**-parameters

Measured values								Calculated values based on measurements			
Condition $I_2 = 0$				Condition $I_1 = 0$				Z_{11}	Z_{12}	Z_{21}	Z_{22}
U_1	U_2	U_{a1}	I_1	U_1	U_2	U_{a2}	I_2				
[V]	[V]	*[V]*	[mA]	[V]	[V]	*[V]*	[mA]	[kΩ]	[kΩ]	[kΩ]	[kΩ]

$\delta = \dfrac{|Z_{12} - Z_{21}|}{Z_{12}} =$ $\leq$ 5%

D) The Z-parameters are determined by calculation starting from the A-parameters

$Z'_{11} =$ $\delta_{11} =$ $Z'_{12} =$ $\delta_{12} =$

$Z'_{21} =$ $\delta_{21} =$ $Z'_{22} =$ $\delta_{22} =$

E) Theoretical and experimental determination of **Y**-parameters

$Y_{11t} =$ $|Y_{11t}| =$ $arg\{Y_{11t}\} =$

$Y_{12t} =$ $|Y_{12t}| =$ $arg\{Y_{12t}\} =$

$Y_{21t} =$ $|Y_{21t}| =$ $arg\{Y_{21t}\} =$

$Y_{22t} =$ $|Y_{22t}| =$ $arg\{Y_{22t}\} =$

Measured values										Calculated values based on measurements			
Condition $U_2 = 0$					Condition $U_1 = 0$					$\|Y_{11}\|$	$\|Y_{12}\|$	$\|Y_{21}\|$	$\|Y_{22}\|$
$\|U_1\|$	$\|U_{C1}\|$	$\|I_1\|$	$\|U_{C2}\|$	$\|I_2\|$	$\|U_2\|$	$\|U_{C1}\|$	$\|I_1\|$	$\|U_{C2}\|$	$\|I_2\|$				
[V]	*[V]*	[mA]	*[V]*	[mA]	[V]	*[V]*	[mA]	*[V]*	[mA]	[mS]	[mS]	[mS]	[mS]

Measured values				Calculated values based on measurements			
Condition $U_2 = 0$		Condition $U_1 = 0$		$arg\{Y_{11}\}$	$arg\{Y_{21}\}$	$arg\{Y_{22}\}$	$arg\{Y_{12}\}$
$\Delta t_{U_{C1}-U_1}$	$\Delta t_{U_{C2}-U_1}$	$\Delta t_{U_{C2}-U_2}$	$\Delta t_{U_{C1}-U_2}$				
[µs]	[µs]	[µs]	[µs]	[°]	[°]	[°]	[°]

Calculation of the error for the magnitudues of the Y-parameters:

$\delta_{11} =$

$\delta_{12} =$

$\delta_{21} =$

$\delta_{22} =$

Calculation of the error for the phases of the Y-parameters:

$\delta_{11} =$

$\delta_{12} =$

$\delta_{21} =$

$\delta_{22} =$

F) $H_{U21gt} =$ $\left|H_{U21gt}\right| =$

$U_1 =$

f [kHz]	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5
$U_2\ [V]$										
$\left\|H_{U21g}\right\| = \frac{U_2}{U_1}$										
$\left\|H_{U21g}\right\|_t$										

Graph $\left|H_{U21g}\right|$ What type of filter is obtained?.....

G) $H_{U21gt} =$ $arg\{H_{U21gt}\} =$

f [kHz]	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5
Δt										
φ [degrees]										
φ_t [degrees]										

Graph $arg\{H_{U21g}\}$

H) Complete the formula and the obtained value:

$Y_{11t} =$ $|Y_{11t}| =$ $arg\{Y_{11t}\} =$

$Y_{12t} =$ $|Y_{12t}| =$ $arg\{Y_{12t}\} =$

$Y_{21t} =$ $|Y_{21t}| =$ $arg\{Y_{21t}\} =$

$Y_{22t} =$ $|Y_{22t}| =$ $arg\{Y_{22t}\} =$

Measured values										Calculated values based on measurements			
Condition $U_2 = 0$					Condition $U_1 = 0$					$\|Y_{11}\|$	$\|Y_{12}\|$	$\|Y_{21}\|$	$\|Y_{22}\|$
$\|U_1\|$	$\|U_{R1}\|$	$\|I_1\|$	$\|U_{R2}\|$	$\|I_2\|$	$\|U_2\|$	$\|U_{R1}\|$	$\|I_1\|$	$\|U_{R2}\|$	$\|I_2\|$				
[V]	*[V]*	[mA]	*[V]*	[mA]	[V]	*[V]*	[mA]	*[V]*	[mA]	[mS]	[mS]	[mS]	[mS]

Measured values				Calculated values based on measurements			
Condition $U_2 = 0$		Condition $U_1 = 0$		$arg\{Y_{11}\}$	$arg\{Y_{21}\}$	$arg\{Y_{22}\}$	$arg\{Y_{12}\}$
$\Delta t_{U_{R1}-U_1}$	$\Delta t_{U_{R2}-U_1}$	$\Delta t_{U_{R2}-U_2}$	$\Delta t_{U_{R1}-U_2}$				
[µs]	[µs]	[µs]	[µs]	[°]	[°]	[°]	[°]

Calculation of the error for the Y-parameters module

$\delta_{11} =$

$\delta_{12} =$

$\delta_{21} =$

$\delta_{22} =$

Calculation of the error for the Y-parameters phase

$\delta_{11} =$

$\delta_{12} =$

$\delta_{21} =$

$\delta_{22} =$

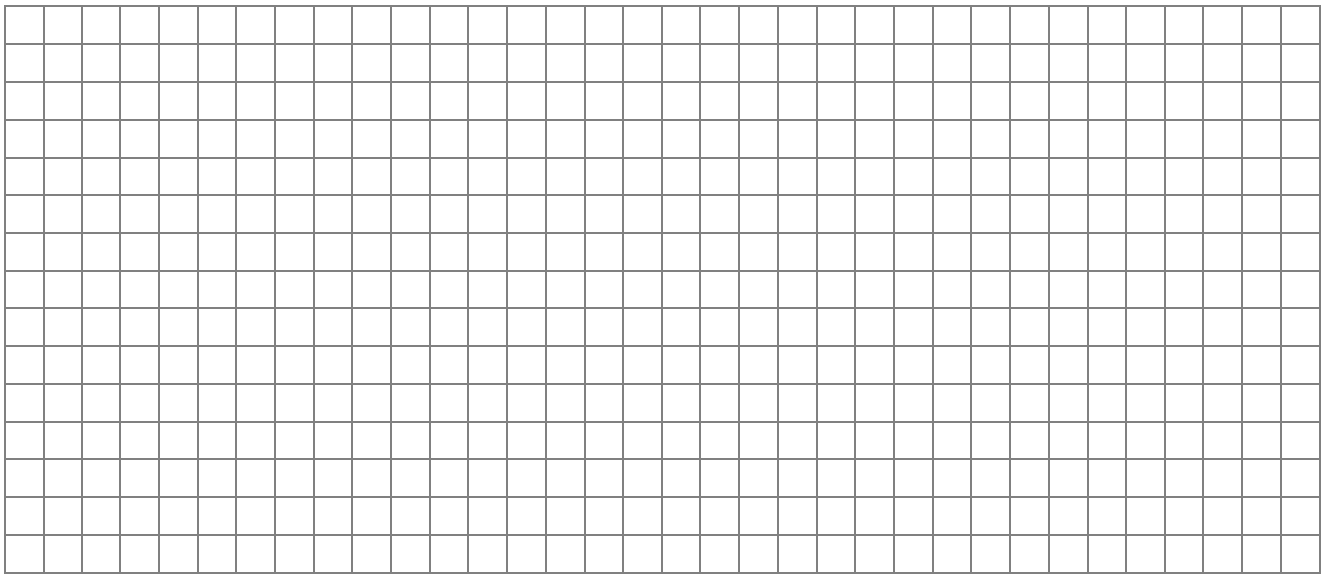
I) $H_{U21gt} =$ $\quad |H_{U21gt}| =$

$U_1 =$

f [kHz]	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5
$U_2\ [V]$										
$\lvert H_{U21g}\rvert = \frac{U_2}{U_1}$										
$\lvert H_{U21g}\rvert_t$										

Graph $|H_{U21g}|$ What type of filter is obtained?.....

J) $H_{U21gt} =$ $\quad arg\{H_{U21gt}\} =$

f [kHz]	0,5	1	1,5	2	2,5	3	3,5	4	4,5	5
Δt										
φ [degrees]										
φ_t [degrees]										

Graph $arg\{H_{U21g}\}$