Assignment nr. 1

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **19.4 dB** and a noise factor of **1.29 dB** at the design frequency **4.00 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 2

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **23.4 dB** and a noise factor of **1.28 dB** at the design frequency **2.30 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **6%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 3

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **24.6 dB** and a noise factor of **1.25 dB** at the design frequency **1.40 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 4

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.1 dB** and a noise factor of **1.31 dB** at the design frequency **3.00 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 5

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.3 dB** and a noise factor of **1.29 dB** at the design frequency **2.20 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **5%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 6

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.7 dB** and a noise factor of **1.15 dB** at the design frequency **1.50 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 7

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **23.8 dB** and a noise factor of **1.11 dB** at the design frequency **1.50 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 8

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **18.3 dB** and a noise factor of **1.35 dB** at the design frequency **4.30 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 9

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **19.9 dB** and a noise factor of **1.31 dB** at the design frequency **3.40 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 10

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.2 dB** and a noise factor of **1.20 dB** at the design frequency **3.20 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project (***.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 11

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **24.2 dB** and a noise factor of **1.22 dB** at the design frequency **1.45 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 12

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.5 dB** and a noise factor of **1.05 dB** at the design frequency **1.30 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 13

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.9 dB** and a noise factor of **1.38 dB** at the design frequency **2.80 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project (***.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 14

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **23.1 dB** and a noise factor of **1.23 dB** at the design frequency **1.85 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 15

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.0 dB** and a noise factor of **1.41 dB** at the design frequency **3.05 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 16

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **20.4 dB** and a noise factor of **1.18 dB** at the design frequency **3.35 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 17

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **19.8 dB** and a noise factor of **1.44 dB** at the design frequency **4.75 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 18

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **19.2 dB** and a noise factor of **1.23 dB** at the design frequency **3.70 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **6%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 19

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **18.3 dB** and a noise factor of **1.38 dB** at the design frequency **4.25 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **5%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 20

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.3 dB** and a noise factor of **1.14 dB** at the design frequency **2.50 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **6%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 21

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.3 dB** and a noise factor of **1.14 dB** at the design frequency **2.95 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 22

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **24.9 dB** and a noise factor of **1.24 dB** at the design frequency **1.25 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **5%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 23

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **18.7 dB** and a noise factor of **1.32 dB** at the design frequency **3.95 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 24

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **17.8 dB** and a noise factor of **1.43 dB** at the design frequency **4.55 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **5%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

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Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 25

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **24.0 dB** and a noise factor of **1.17 dB** at the design frequency **1.60 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 26

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **19.7 dB** and a noise factor of **1.15 dB** at the design frequency **3.55 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

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Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 27

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **17.7 dB** and a noise factor of **1.34 dB** at the design frequency **4.60 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

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2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

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Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 28

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **19.7 dB** and a noise factor of **1.25 dB** at the design frequency **3.25 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

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Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 29

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.9 dB** and a noise factor of **1.29 dB** at the design frequency **2.05 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 30

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **23.6 dB** and a noise factor of **1.11 dB** at the design frequency **1.25 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 31

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **20.2 dB** and a noise factor of **1.37 dB** at the design frequency **4.30 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 32

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.3 dB** and a noise factor of **1.09 dB** at the design frequency **2.15 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 33

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **20.3 dB** and a noise factor of **1.15 dB** at the design frequency **3.00 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **5%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 34

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.9 dB** and a noise factor of **1.34 dB** at the design frequency **3.05 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 35

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **24.2 dB** and a noise factor of **1.33 dB** at the design frequency **1.45 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 36

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.6 dB** and a noise factor of **1.29 dB** at the design frequency **2.10 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **5%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 37

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **19.3 dB** and a noise factor of **1.37 dB** at the design frequency **4.20 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 38

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **17.3 dB** and a noise factor of **1.20 dB** at the design frequency **4.80 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 39

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **20.1 dB** and a noise factor of **1.34 dB** at the design frequency **3.20 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **6%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 40

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.4 dB** and a noise factor of **1.35 dB** at the design frequency **2.30 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 41

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.5 dB** and a noise factor of **1.15 dB** at the design frequency **1.55 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 42

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **20.9 dB** and a noise factor of **1.39 dB** at the design frequency **3.85 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 43

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.5 dB** and a noise factor of **1.24 dB** at the design frequency **2.80 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 44

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **20.3 dB** and a noise factor of **1.21 dB** at the design frequency **3.85 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **5%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 45

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.6 dB** and a noise factor of **1.35 dB** at the design frequency **3.55 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 46

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.2 dB** and a noise factor of **1.41 dB** at the design frequency **3.35 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **6%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 47

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.8 dB** and a noise factor of **1.29 dB** at the design frequency **2.40 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **5%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 48

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **20.0 dB** and a noise factor of **1.37 dB** at the design frequency **3.35 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 49

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.2 dB** and a noise factor of **1.08 dB** at the design frequency **2.00 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 50

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.8 dB** and a noise factor of **1.30 dB** at the design frequency **1.85 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 51

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **23.4 dB** and a noise factor of **1.24 dB** at the design frequency **2.10 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 52

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **23.5 dB** and a noise factor of **1.07 dB** at the design frequency **1.30 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **5%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 53

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **23.1 dB** and a noise factor of **1.12 dB** at the design frequency **2.00 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project (***.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 54

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **19.6 dB** and a noise factor of **1.27 dB** at the design frequency **4.40 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **6%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 55

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **24.4 dB** and a noise factor of **1.17 dB** at the design frequency **1.60 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **5%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery <u>**deadline**</u>: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (<u>**all**</u> component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files <u>**must**</u> be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of <u>**complete**</u> data.

There are bonus/penalty points that are added to/subtracted from the final grade, which <u>**can**</u> be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>**Penalty**</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>**Bonus**</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 56

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.8 dB** and a noise factor of **1.14 dB** at the design frequency **2.15 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **6%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 57

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **22.8 dB** and a noise factor of **1.20 dB** at the design frequency **1.40 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **9%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery <u>**deadline**</u>: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (<u>**all**</u> component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files <u>**must**</u> be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of <u>**complete**</u> data.

There are bonus/penalty points that are added to/subtracted from the final grade, which <u>**can**</u> be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>**Penalty**</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>**Bonus**</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 58

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **21.6 dB** and a noise factor of **1.08 dB** at the design frequency **2.00 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 59

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **19.6 dB** and a noise factor of **1.25 dB** at the design frequency **3.45 GHz**. At the output of the amplifier insert an order **5** bandpass filter with fractional bandwidth of the passband **7%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **deadline**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**all** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **must** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **complete** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **can** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

Penalty

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54143, ATF 35143, ATF 55143, ATF 58143 etc.)
5. **-1p**, using the NE 71084 transistor

Bonus

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)

Assignment nr. 60

MDCR Project

1. Assignment

Design a low-noise multi-stage transistor amplifier required to provide a power gain of **24.4 dB** and a noise factor of **1.15 dB** at the design frequency **1.65 GHz**. At the output of the amplifier insert an order **6** bandpass filter with fractional bandwidth of the passband **8%** around the design frequency. The amplifier must work with a 50Ω source and 50Ω load.

The matching networks and filter must be implemented with transmission lines (stubs: L7-L8). The use of the transistors we used in lectures and laboratories examples is not permitted (NE 71084, ATF 34143)

Delivery **<u>deadline</u>**: last day of the semester (02.06.2024, 23:59:59)

The finalized design will be submitted online in the exam interface on http://rf-opto.etti.tuiasi.ro/, namely:

1. Final **schematic** (**<u>all</u>** component values will be entered individually on the site + schematic as printscreen)
2. If you use other transistors than those in the ADS 2003 libraries (e.g. s2p **S-parameter files**), those files **<u>must</u>** be submitted.
3. **Results** (G,NF as printscreen)
4. Handwritten calculus for the matching networks (initial values) and the filter (**!! "andrei" factor**: on paper/**scanned**)
5. (Optional) ADS project **(*.zap**) + Explanatory document if required to justify the bonus points.

2. Grading

The basic grade depends on meeting the requirements in the design data and submission of **<u>complete</u>** data.

There are bonus/penalty points that are added to/subtracted from the final grade, which **<u>can</u>** be transferred to the lab grade if the final project grade exceeds 10.

In establishing the basic grade (to which the bonuses are added) the coincidence (including partial) of the element values is verified, between the individual submissions of all students or with the examples presented at the lab/lectures. Two identical values lead to penalties on both submissions. The more the repeated value is found in individual submissions, the higher the penalty.

<u>Penalty</u>

1. **-2p**, lack of the handwritten calculus for the initial lines in the amplifier/filter (**i.e. "andrei" factor**)
2. **-2p**, usage of lumped elements (L,C) instead of transmission lines in the matching networks or filter
3. **-1(2)p**, exceeding the submission deadline, until (after) the first week of the exams session (09.06. 2024)
4. **-2p**, using an ATF 34143 family transistor (family: i.e. ATF 54<u>143</u>, ATF 35<u>143</u>, ATF 55<u>143</u>, ATF 58<u>143</u> etc.)
5. **-1p**, using the NE 71084 transistor

<u>Bonus</u>

1. **+1p**, using two different transistors for the two stages of the amplifier
2. **+1p**, using a different PBF filter schematic than in the example (i.e. coupled lines)
3. **+2p**, upgrading line models from ideal transmission lines to microstrip lines (substrate: alumina 15 mil)
4. **+1(2)p**, design (complete design) of transistor bias schematics
5. **+2p**, broadband unconditional stability for the transistors (resistors)