

Home ► My courses ► [EEE 108_f17](#) ► Chapter 7 - BJT and MOS amplifiers ► Quiz 7 - BJT and MOS biasing, and small-signal models

Started on	Saturday, 25 November 2017, 7:33 PM
State	Finished
Completed on	Saturday, 25 November 2017, 8:26 PM
Time taken	53 mins 23 secs
Grade	4.00 out of 10.00 (40%)

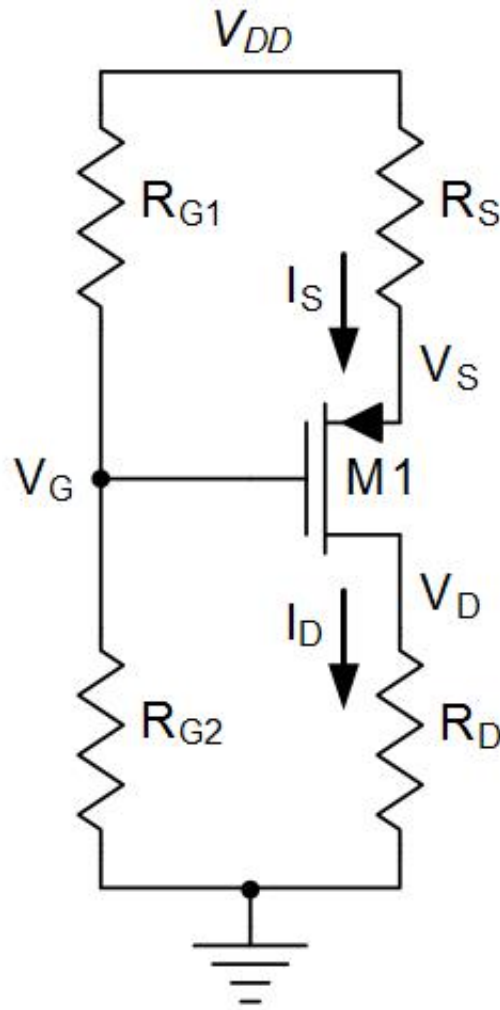
Question 1

Correct

Mark 2.00 out of 2.00

For the MOSFET bias circuit shown, what is the source voltage, V_S , in Volts?

Assume that the transistor is in the saturation region, and use: $V_{DD} = 13V$, $R_{G1} = 49.7k\Omega$, $R_{G2} = 42.5k\Omega$, $R_D = 4.3k\Omega$, $R_S = 7.3k\Omega$, $V_t = -0.8V$, and $|V_{on}| = 0.24$. (Remember that $|V_{on}| = |V_{ov}| = |V_{GS}| - |V_t|$) Neglect the effect of channel-length modulation and body effect.



Answer: 7.03



The correct answer is: 7.03

Correct

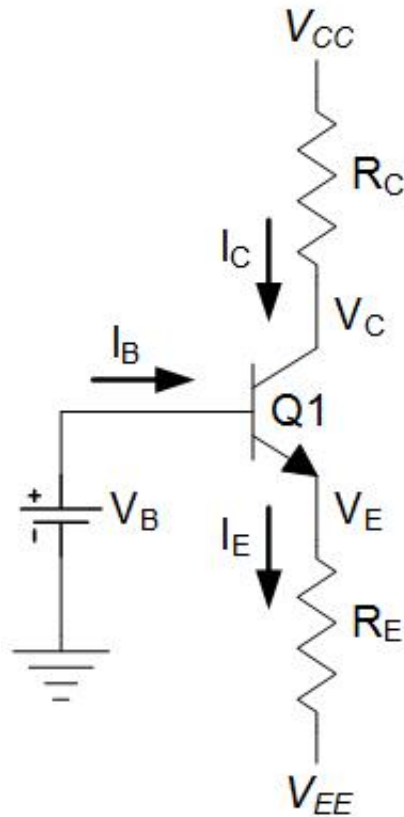
Marks for this submission: 2.00/2.00.

Question 2

Incorrect

Mark 0.00 out of
2.00

For the BJT bias circuit shown, what is the base current, I_B , in microamps? Use $V_{CC} = 9V$, $V_{EE} = -8V$, $V_B = -0.9V$, $R_C = 2.9k\Omega$, and $R_E = 5.8k\Omega$. Assume that the transistor is in the forward-active region, with $\beta = 117$ and $|V_{be(on)}| = 0.7V$. Neglect the effects of base-width modulation.



Answer: 13.44



The correct answer is: 9.4

Incorrect

Marks for this submission: 0.00/2.00.

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Practice Quiz 7 - BJT and MOS biasing, and small-signal models

Started on	Saturday, 25 November 2017, 9:57 PM
State	Finished
Completed on	Saturday, 25 November 2017, 9:57 PM
Time taken	11 secs
Grade	2.00 out of 10.00 (20%)

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Practice Quiz 7 - BJT and MOS biasing, and small-signal models

Started on	Saturday, 25 November 2017, 9:58 PM
State	Finished
Completed on	Saturday, 25 November 2017, 9:58 PM
Time taken	10 secs
Grade	0.00 out of 10.00 (0%)

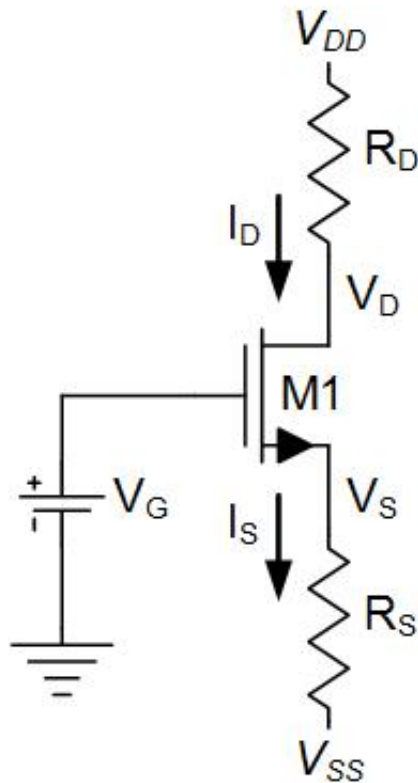
Question 1

Not answered

Mark 0.00 out of
2.00

For the MOSFET bias circuit shown, what is the drain voltage, V_D , in Volts?

Assume that the transistor is in the saturation region, and use: $V_{DD} = 8V$, $V_{SS} = -10V$, $V_G = -1.6V$, $R_D = 4.6k\Omega$, $R_S = 5.9k\Omega$, $V_t = 0.3V$, and $V_{on} = 0.47$. (Remember that $V_{on} = V_{ov} = V_{GS} - V_t$) Neglect the effect of channel-length modulation and body effect.



Answer:



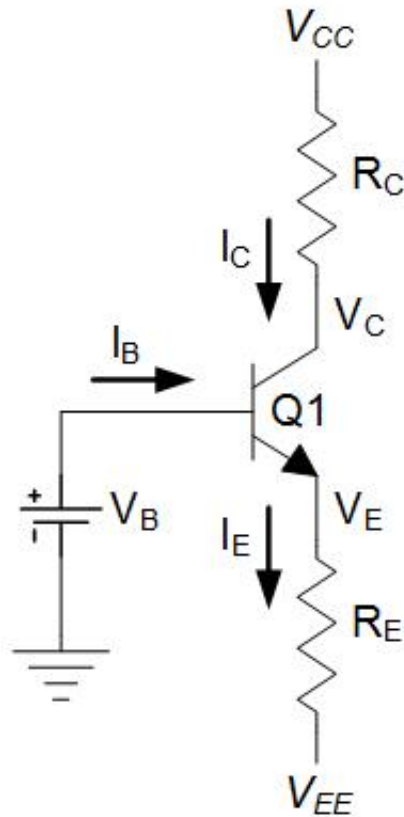
The correct answer is: 2.051

Question 2

Not answered

Mark 0.00 out of
2.00

For the BJT bias circuit shown, what is the collector voltage, V_C , in volts? Use $V_{CC} = 7V$, $V_{EE} = -7V$, $V_B = -2.9V$, $R_C = 4.1k\Omega$, and $R_E = 9.6k\Omega$. Assume that the transistor is in the forward-active region, with $\beta = 73$ and $|V_{be(on)}| = 0.7V$. Neglect the effects of base-width modulation.

Answer: ✗

The correct answer is: 5.568

Question 3

Not answered

Mark 0.00 out of
2.00

On printed circuit boards the DC biasing of BJTs is usually done using resistors to set the DC voltage levels and currents, and capacitors to separate the DC levels between different circuits.

Select one:

- ☐ True
- ☐ False

The correct answer is 'True'.

Question 4

Not answered

Mark 0.00 out of
2.00

What is the output resistance, r_{ds} , in $k\Omega$ for an PMOS FET operating in saturation with $I_d = 959\mu A$? Use: $\lambda = 0.14$

Answer: 


The correct answer is: 7.45

Question 5

Not answered

Mark 0.00 out of
2.00

What is the transconductance, g_m , in mA/V for an PNP BJT operating in the forward-active region at $27^\circ C$ with $I_c = 513\mu A$? Use $V_t = kT/q = 26mV$.

Answer: 

The correct answer is: 19.73

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Practice Quiz 7 - BJT and MOS biasing, and small-signal models

Started on	Saturday, 25 November 2017, 9:57 PM
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State	Finished
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Completed on	Saturday, 25 November 2017, 9:57 PM
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Time taken	21 secs
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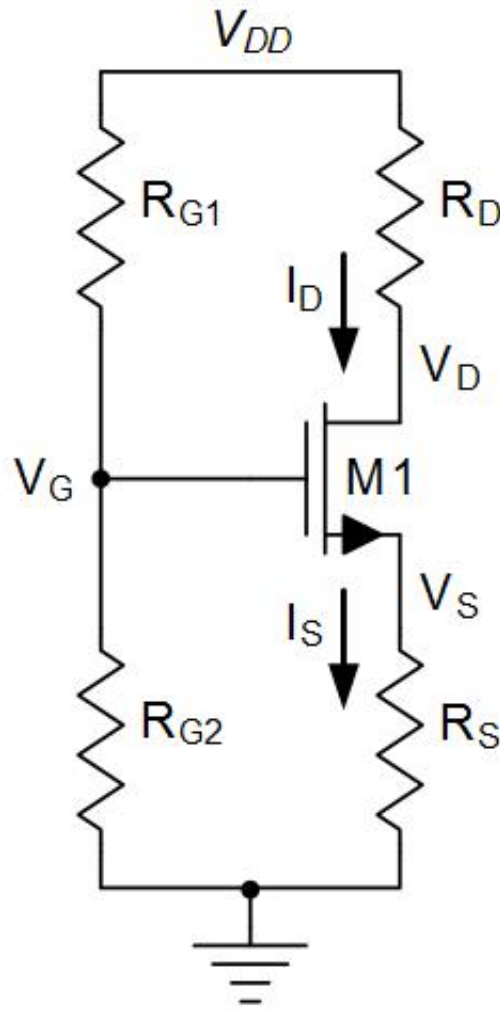
Grade	0.00 out of 10.00 (0%)
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Question 1

Not answered

Mark 0.00 out of
2.00

For the MOSFET bias circuit shown, what value of R_S in kilohms is needed to set the drain bias current to 0.18mA ? Assume that the transistor is in the saturation region, and use: $V_{DD} = 15V$, $R_{G1} = 48.5k\Omega$, $R_{G2} = 48.9k\Omega$, $R_D = 2.7k\Omega$, $V_t = 0.6V$, and $V_{on} = 0.34$. (Remember that $V_{on} = V_{ov} = V_{gs} - V_t$) Neglect the effect of channel-length modulation and body effect.

Answer: ✖

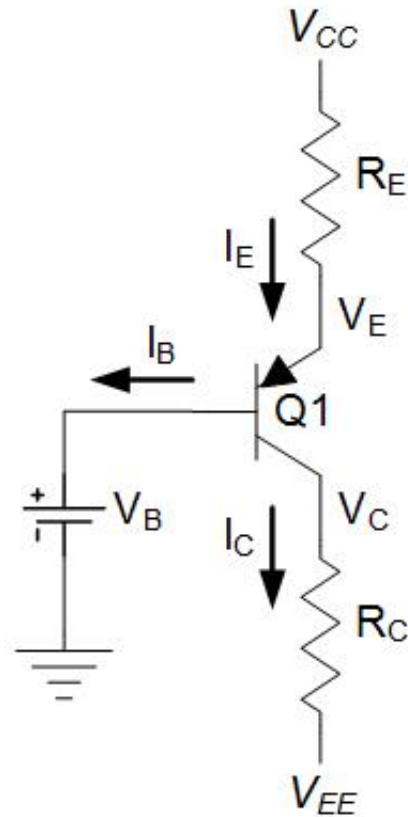
The correct answer is: 36.62

Question 2

Not answered

Mark 0.00 out of
2.00

For the BJT bias circuit shown, what is the collector voltage, V_C , in volts? Use $V_{CC} = 9V$, $V_{EE} = -9V$, $V_B = 0.0V$, $R_C = 1.2k\Omega$, and $R_E = 9.3k\Omega$. Assume that the transistor is in the forward-active region, with $\beta = 47$ and $|V_{be(on)}| = 0.7V$. Neglect the effects of base-width modulation.

Answer: ✗

The correct answer is: -7.95

Question 3

Incorrect

Mark 0.00 out of
2.00

On integrated circuits the DC biasing of BJTs is usually done using transistor current sources since large resistors and capacitors are too expensive.

Select one:

- ☐ True
- ☒ False ❌

The correct answer is 'True'.

Incorrect

Marks for this submission: 0.00/2.00.

Question 4

Not answered

Mark 0.00 out of
2.00

What is the output resistance, r_{ds} , in $k\Omega$ for an NMOS FET operating in saturation with $I_d = 266\mu A$? Use: $\lambda = 0.12$

Answer: ❌

The correct answer is: 31.33

Question 5

Not answered

Mark 0.00 out of
2.00

What is the base-to-emitter resistance, r_{π} , in $k\Omega$ for an PNP BJT operating in the forward-active region at $27^\circ C$ with $I_c = 368\mu A$? Use: $\beta = 14$ and $V_t = kT/q = 26mV$.

Answer: ❌

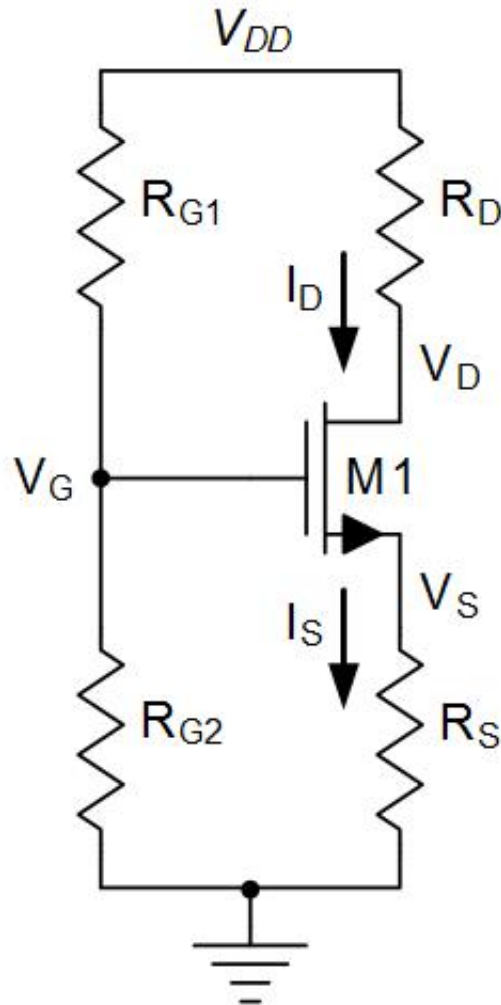
The correct answer is: 0.99

Question 1

Not answered

Mark 0.00 out of
2.00

For the MOSFET bias circuit shown, what value of R_D in kilohms is needed to allow the maximum possible peak-to-peak signal swing on the drain without clipping? Use: $V_{DD} = 13\text{V}$, $R_{G1} = 43.9\text{k}\Omega$, $R_{G2} = 43.5\text{k}\Omega$, $R_S = 9.6\text{k}\Omega$, $V_t = 0.6\text{V}$, and $V_{on} = 0.43$. (Remember that $V_{on} = V_{ov} = V_{gs} - V_t$) Neglect the effect of channel-length modulation and body effect. (Hint: Be sure to keep the MOSFET in saturation!)



Answer:



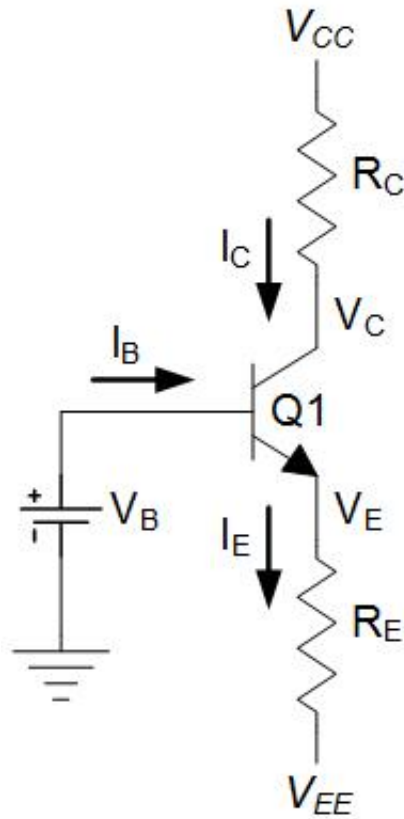
The correct answer is: 6.29

Question 2

Not answered

Mark 0.00 out of
2.00

For the BJT bias circuit shown, what is the emitter current, I_E , in milliamps? Use $V_{CC} = 7V$, $V_{EE} = -10V$, $V_B = 0.5V$, $R_C = 4.9k\Omega$, and $R_E = 6.0k\Omega$. Assume that the transistor is in the forward-active region, with $\beta = 53$ and $|V_{BE(on)}| = 0.7V$. Neglect the effects of base-width modulation.

Answer: ✗

The correct answer is: 1.63

Question 3

Correct

Mark 2.00 out of 2.00

To get a stable bias point as the β of a BJT varies, it is a good idea to set the bias current flowing through the base bias resistors to at least 10x the base current.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Correct

Marks for this submission: 2.00/2.00.

Question 4

Not answered

Mark 0.00 out of 2.00

What is the device transconductance, g_m , in mA/V for a PMOS FET operating in saturation with $I_d = 495\mu\text{A}$ and $V_{on} = |V_{gs} - V_t| = 148\text{mV}$? Neglect the effects of channel-length modulation and body effect.

Answer: ✗

The correct answer is: 6.69

Question 5

Not answered

Mark 0.00 out of 2.00

What is the transconductance, g_m , in mA/V for an NPN BJT operating in the forward-active region at 27°C with $I_c = 980\mu\text{A}$? Use $V_t = kT/q = 26\text{mV}$.

Answer: ✗

The correct answer is: 37.69

Question 3

Correct

Mark 2.00 out of
2.00

On integrated circuits the DC biasing of MOSFETs is usually done using transistor current sources since large resistors and capacitors are too expensive.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Correct

Marks for this submission: 2.00/2.00.

Question 4

Incorrect

Mark 0.00 out of
2.00

What is the open-circuit voltage gain, μ_f , in V/V for an PMOS FET operating in saturation with $I_d = 787\mu\text{A}$ and $V_{on} = |V_{gs} - V_t| = 625\text{mV}$? Use: $\lambda = 0.69$

Answer: ✗

The correct answer is: 4.64

Incorrect

Marks for this submission: 0.00/2.00.

Question 5

Not answered

Mark 0.00 out of
2.00

What is the collector-to-emitter resistance, r_o , in $k\Omega$ for an NPN BJT operating in the forward-active region at 27°C with $I_c = 399\mu\text{A}$? Use: $\beta = 103$, $V_A = 51\text{V}$ and $V_t = kT/q = 26\text{mV}$.

Answer: ✗

The correct answer is: 127.82

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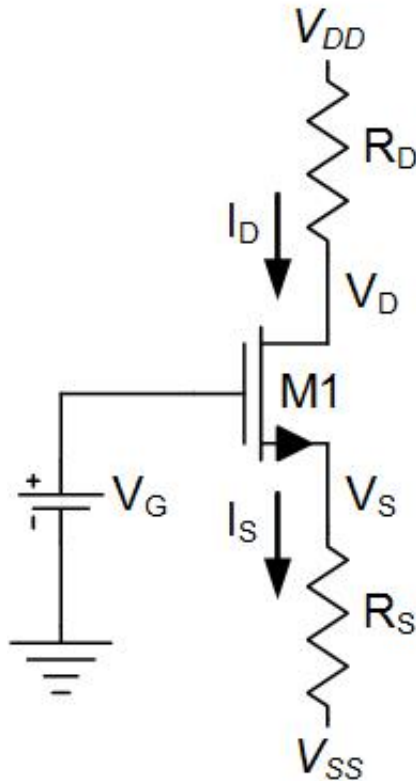
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State	Finished
Completed on	Saturday, 25 November 2017, 9:20 PM
Time taken	15 mins 13 secs
Grade	0.00 out of 10.00 (0%)

Question 1

Incorrect

Mark 0.00 out of
2.00

For the MOSFET bias circuit shown, what value of R_D in kilohms is needed to allow the maximum possible peak-to-peak signal swing on the drain without clipping? Use: $V_{DD} = 7V$, $V_{SS} = -6V$, $V_G = 0.3V$, $R_S = 4.8k\Omega$, $V_t = 0.5V$, and $V_{on} = 0.41$. (Remember that $V_{on} = V_{ov} = V_{gs} - V_t$) Neglect the effect of channel-length modulation and body effect. (Hint: Be sure to keep the MOSFET in saturation!)



Answer: -3.525



The correct answer is: 3.2

Incorrect

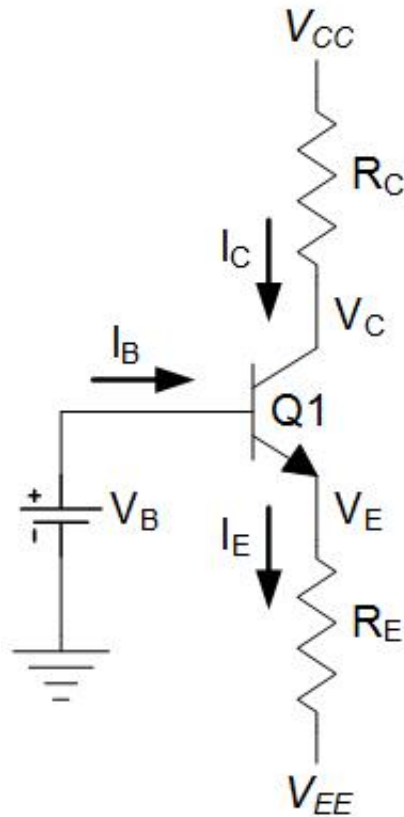
Marks for this submission: 0.00/2.00.

Question 2

Not answered

Mark 0.00 out of
2.00

For the BJT bias circuit shown, what is the emitter current, I_E , in milliamps? Use $V_{CC} = 10V$, $V_{EE} = -8V$, $V_B = 0.5V$, $R_C = 2.3k\Omega$, and $R_E = 7.0k\Omega$. Assume that the transistor is in the forward-active region, with $\beta = 129$ and $|V_{BE(on)}| = 0.7V$. Neglect the effects of base-width modulation.

Answer: ✗

The correct answer is: 1.11

Question 3

Not answered

Mark 0.00 out of
2.00

To get a stable bias point as the β of a BJT varies, it is a good idea to set the bias current flowing through the base bias resistors to the same value as the base current.

Select one:

- ☐ True
- ☐ False

The correct answer is 'False'.

Question 4

Not answered

Mark 0.00 out of
2.00

What is the device transconductance, g_m , in mA/V for a PMOS FET operating in saturation with $I_d = 903\mu\text{A}$? Use: $W/L = 92$ and $k'_p = 40\mu\text{A/V}^2$. Neglect the effects of channel-length modulation and body effect.

Answer: 

The correct answer is: 2.58

Question 5

Not answered

Mark 0.00 out of
2.00

What is the base-to-emitter resistance, r_{π} , in $k\Omega$ for an NPN BJT operating in the forward-active region at 27°C with $I_c = 69\mu\text{A}$? Use: $\beta = 66$ and $V_t = kT/q = 26\text{mV}$.

Answer: 

The correct answer is: 24.87

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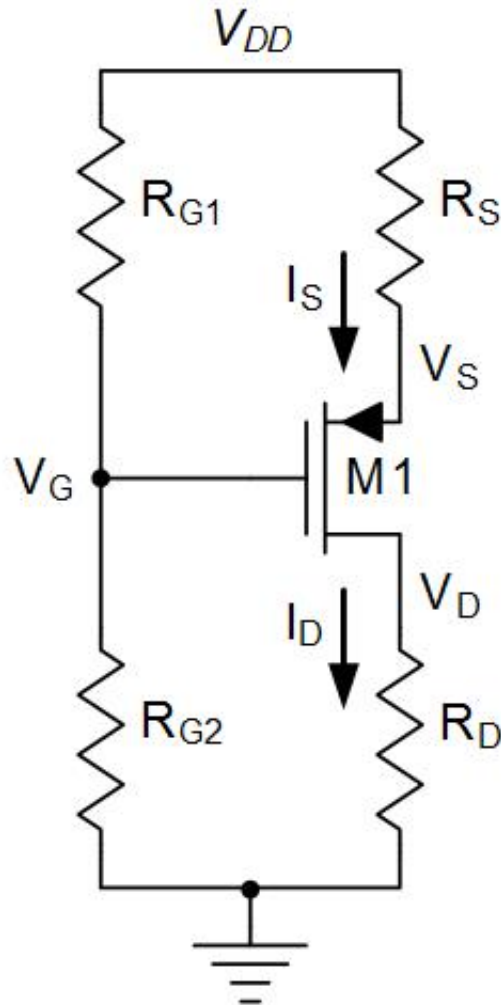
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State	Finished
Completed on	Saturday, 25 November 2017, 9:05 PM
Time taken	27 mins 3 secs
Grade	0.00 out of 10.00 (0%)

Question 1

Incorrect

Mark 0.00 out of 2.00

For the MOSFET bias circuit shown, what value of R_D in kilohms is needed to allow the maximum possible peak-to-peak signal swing on the drain without clipping? Use: $V_{DD} = 13\text{V}$, $R_{G1} = 42.9\text{k}\Omega$, $R_{G2} = 44.5\text{k}\Omega$, $R_S = 5.0\text{k}\Omega$, $V_t = -0.3\text{V}$, and $|V_{on}| = 0.37$. (Remember that $|V_{on}| = |V_{ov}| = |V_{gs}| - |V_t|$) Neglect the effect of channel-length modulation and body effect. (Hint: Be sure to keep the MOSFET in saturation!)



Answer: 5.21



The correct answer is: 3.03

Incorrect

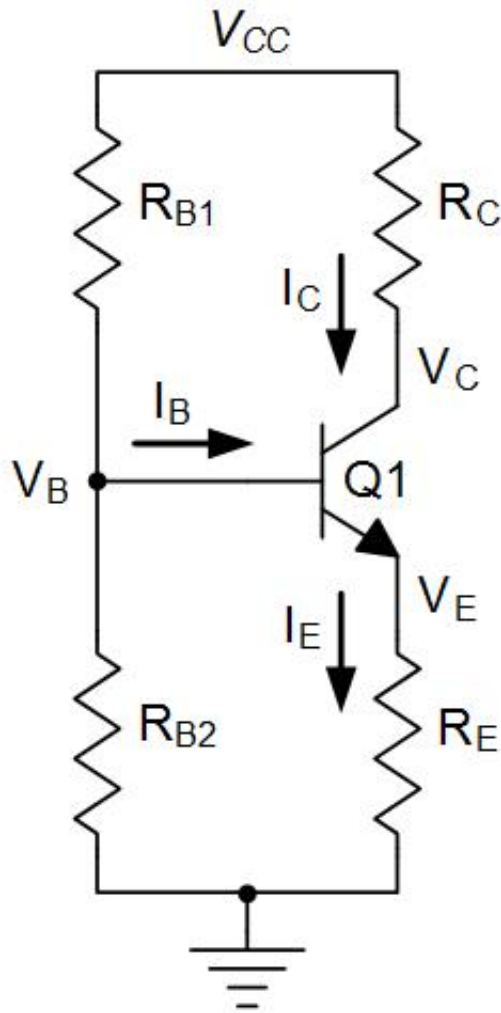
Marks for this submission: 0.00/2.00.

Question 2

Not answered

Mark 0.00 out of
2.00

For the BJT bias circuit shown, what is the base current, I_B , in microamps? Use $V_{CC} = 12V$, $R_{B1} = 33.9k\Omega$, $R_{B2} = 32.3k\Omega$, $R_C = 1.2k\Omega$, and $R_E = 2.2k\Omega$. Assume that the transistor is in the forward-active region, with $\beta = 72$ and $|V_{be(on)}| = 0.7V$. Neglect the effects of base-width modulation.

Answer: ✗

The correct answer is: 29.10

Question 3

Not answered

Mark 0.00 out of
2.00

On printed circuit boards the DC biasing of MOSFETs is usually done using transistor current sources, since large resistors and capacitors are too expensive.

Select one:

- ☐ True
- ☐ False

The correct answer is 'False'.

Question 4

Not answered

Mark 0.00 out of
2.00

What is the gate-to-source capacitance, C_{gs} , in fF for an NMOS FET operating in saturation with $W = 29\mu\text{m}$, $L = 0.43\mu\text{m}$ and $t_{ox} = 33$ angstroms?

Answer: 

The correct answer is: 86.99

Question 5

Not answered

Mark 0.00 out of
2.00

What is the collector-to-emitter resistance, r_o , in $k\Omega$ for an PNP BJT operating in the forward-active region at 27°C with $I_c = 61\mu\text{A}$? Use: $\beta = 30$, $V_A = 69\text{V}$ and $V_t = kT/q = 26\text{mV}$.

Answer: 

The correct answer is: 1131.15

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Quiz 7 - BJT and MOS biasing, and small-signal models

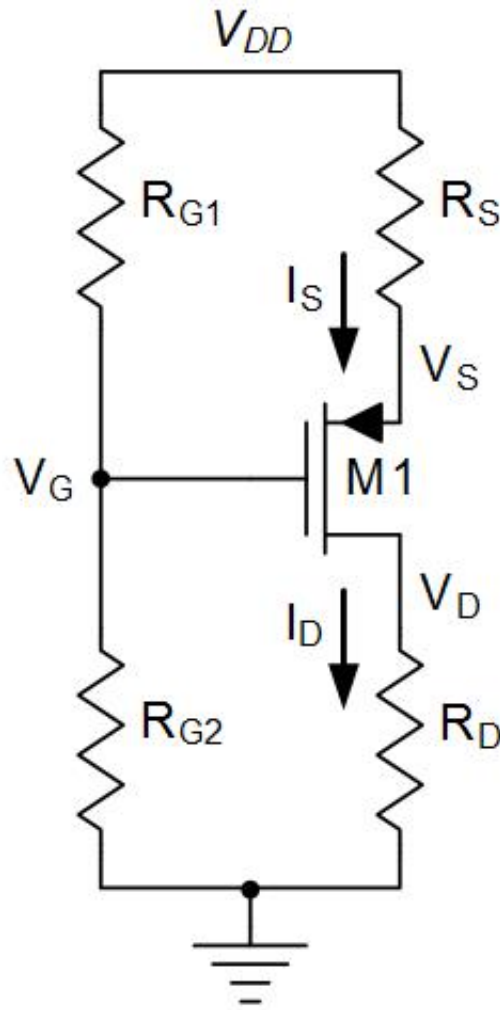
Started on	Saturday, 25 November 2017, 8:32 PM
State	Finished
Completed on	Saturday, 25 November 2017, 8:37 PM
Time taken	4 mins 57 secs
Grade	0.00 out of 10.00 (0%)

Question 1

Incorrect

Mark 0.00 out of
2.00

For the MOSFET bias circuit shown, what is the source current, I_S , in milliamps? Assume that the transistor is in the saturation region, and use: $V_{DD} = 11V$, $R_{G1} = 56.6k\Omega$, $R_{G2} = 49.1k\Omega$, $R_D = 1.4k\Omega$, $R_S = 7.1k\Omega$, $V_t = -0.7V$, and $|V_{on}| = 0.48$. (Remember that $|V_{on}| = |V_{ov}| = |V_{GS}| - |V_t|$) Neglect the effect of channel-length modulation and body effect.



Answer: .55



The correct answer is: 0.66

Incorrect

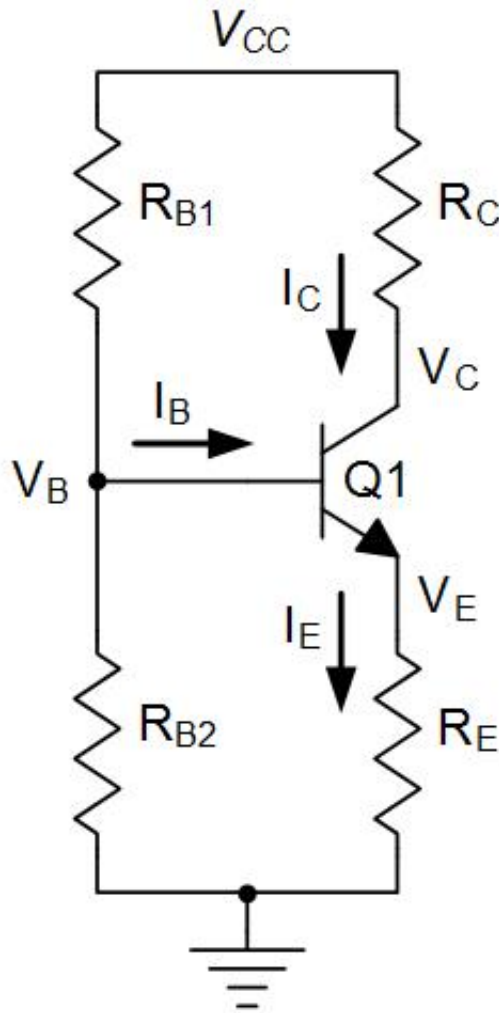
Marks for this submission: 0.00/2.00.

Question 2

Not answered

Mark 0.00 out of
2.00

For the BJT bias circuit shown, what is the collector current, I_C , in milliamps? Use $V_{CC} = 13V$, $R_{B1} = 38.2k\Omega$, $R_{B2} = 39.1k\Omega$, $R_C = 2.5k\Omega$, and $R_E = 2.5k\Omega$. Assume that the transistor is in the forward-active region, with $\beta = 63$ and $|V_{be(on)}| = 0.7V$. Neglect the effects of base-width modulation.

Answer: ✗

The correct answer is: 2.06

Question 3

Not answered

Mark 0.00 out of
2.00

To get a stable bias point as the β of a BJT varies, it is a good idea to set the bias current flowing through the base bias resistors to at least 10x the base current.

Select one:

- ☐ True
- ☐ False

The correct answer is 'True'.

Question 4

Not answered

Mark 0.00 out of
2.00

What is the back-gate transconductance, g_{mb} , in mA/V for an NMOS FET operating in saturation with $I_d = 470\mu\text{A}$ and $V_{sb} = 1.2\text{V}$? Use: $W/L = 62$, $k'_n = 100\mu\text{A/V}^2$, $\gamma = 0.5\text{ V}^{0.5}$ and $2\phi_f = 0.6\text{V}$.

Answer: 

The correct answer is: 0.450

Question 5

Not answered

Mark 0.00 out of
2.00

What is the transconductance, g_m , in mA/V for an NPN BJT operating in the forward-active region at 27°C with $I_c = 727\mu\text{A}$? Use $V_t = kT/q = 26\text{mV}$.

Answer: 

The correct answer is: 27.96

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Quiz 7 - BJT and MOS biasing, and small-signal models

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State	Finished
Completed on	Saturday, 25 November 2017, 8:32 PM
Time taken	5 mins 42 secs
Grade	0.00 out of 10.00 (0%)

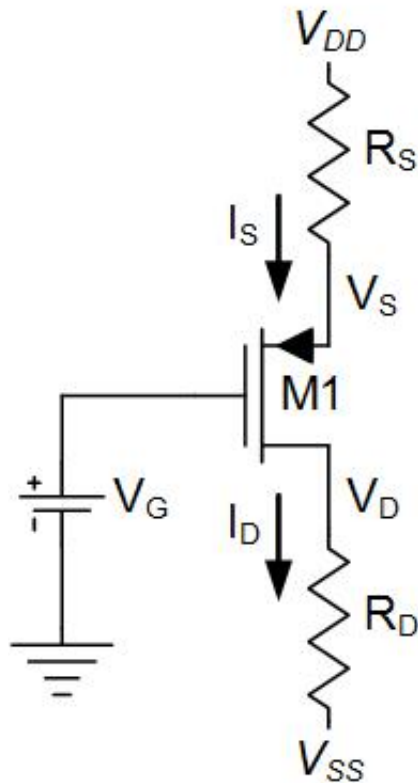
Question 1

Incorrect

Mark 0.00 out of
2.00

For the MOSFET bias circuit shown, what is the source voltage, V_S , in Volts?

Assume that the transistor is in the saturation region, and use: $V_{DD} = 8V$, $V_{SS} = -8V$, $V_G = 0.8V$, $R_D = 3.7k\Omega$, $R_S = 9.8k\Omega$, $V_t = -0.5V$, and $|V_{on}| = 0.44$. (Remember that $|V_{on}| = |V_{ov}| = |V_{GS}| - |V_t|$) Neglect the effect of channel-length modulation and body effect.



Answer: 0.74



The correct answer is: 1.74

Incorrect

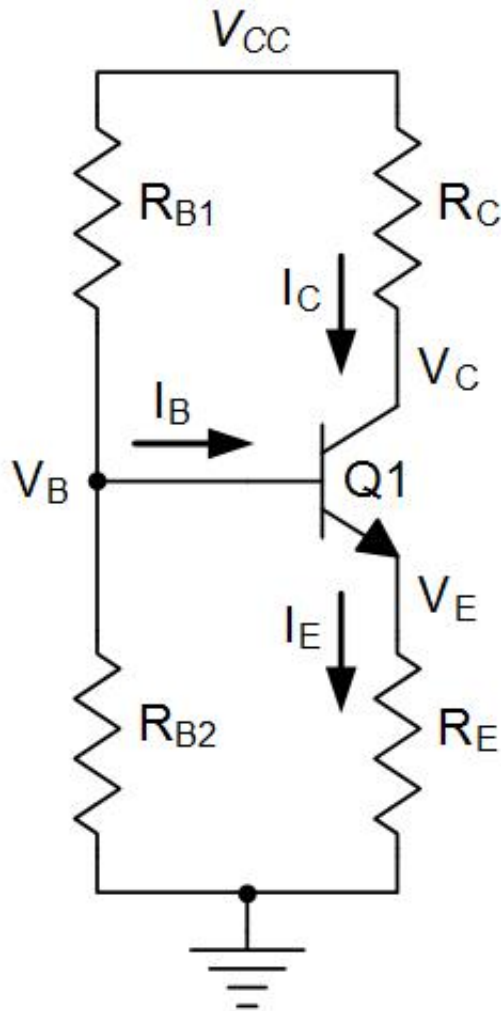
Marks for this submission: 0.00/2.00.

Question 2

Not answered

Mark 0.00 out of
2.00

For the BJT bias circuit shown, what is the emitter voltage, V_E , in volts? Use $V_{CC} = 10\text{V}$, $R_{B1} = 28.1\text{k}\Omega$, $R_{B2} = 31.9\text{k}\Omega$, $R_C = 3.1\text{k}\Omega$, and $R_E = 2.6\text{k}\Omega$. Assume that the transistor is in the forward-active region, with $\beta = 73$ and $|V_{BE(on)}| = 0.7\text{V}$. Neglect the effects of base-width modulation.

Answer: ✗

The correct answer is: 4.28

Question 3

Not answered

Mark 0.00 out of
2.00

On printed circuit boards the DC biasing of BJTs is usually done using transistor current sources, since large resistors and capacitors are too expensive.

Select one:

- ☐ True
- ☐ False

The correct answer is 'False'.

Question 4

Not answered

Mark 0.00 out of
2.00

What is the back-gate transconductance, g_{mb} , in mA/V for an PMOS FET operating in saturation with $I_d = 134\mu\text{A}$ and $|V_{sb}| = 0.5\text{V}$? Use: $W/L = 86$, $k'_p = 40\mu\text{A/V}^2$, $\gamma = 0.5\text{ V}^{0.5}$ and $|2\phi_f| = 0.6\text{V}$.

Answer: 

The correct answer is: 0.229

Question 5

Not answered

Mark 0.00 out of
2.00

What is the open-circuit voltage gain, μ_f , in V/V for an NPN BJT operating in the forward-active region at 27°C with $I_c = 780\mu\text{A}$? Use: $\beta = 112$, $V_A = 77\text{V}$ and $V_t = kT/q = 26\text{mV}$.

Answer: 

The correct answer is: 2961.54