

Started on Sunday, 12 November 2017, 2:34 PM

State Finished

Completed on Sunday, 12 November 2017, 2:39 PM

Time taken 4 mins 40 secs

Grade 3.0 out of 10.0 (30%)

Question 1

Correct

Mark 2.0 out of 2.0

A BJT with it's base-emitter junction forward biased and it's base-collector junction forward biased is in :

Select one:

- ☐ a. Reverse-Active
- ☐ b. Forward-Active
- ☐ c. None of these
- ☒ d. Saturation ✓
- ☐ e. Cutoff

The correct answer is: Saturation

Correct

Marks for this submission: 2.0/2.0.

Question 2

Correct

Mark 0.0 out of 2.0

An NPN BJT with $V_{be} > 0$ and $V_{bc} > 0$ is operating in saturation.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **0.0/2.0**.

Question 3

Incorrect

Mark 0.0 out of 2.0

If the common-base current gain α for an NPN BJT in the forward-active region is equal to 0.968, then what is the common-emitter current gain β for this transistor? Since β is very sensitive to small changes in α , be sure to use α to at least 3 decimal places when calculating your answer!

Answer: 0.492



The correct answer is: 30.2

Incorrect

Marks for this submission: 0.0/2.0.

Question 4

Correct

Mark 1.0 out of 2.0

Which of the following is true in modern bipolar junction transistors?

Select one:

- ☐ a. The base is kept narrow to minimize recombination in the base
- ☐ b. The minority carrier concentration in the base decreases almost linearly from the emitter to the collector
- ☐ c. Carriers diffuse across the base and are collected by the collector
- ☒ d. All of these ✓
- ☐ e. The emitter doping is much higher than the base doping to minimize the number of carriers injected from the base into the emitter

The correct answer is: All of these

CorrectMarks for this submission: 2.0/2.0. Accounting for previous tries, this gives **1.0/2.0**.

Question 5

Correct

Mark 0.0 out of 2.0

In the forward-active region, current flows out of the emitter of an NPN BJT.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **0.0/2.0**.

Started on Sunday, 12 November 2017, 2:40 PM

State Finished

Completed on Sunday, 12 November 2017, 2:50 PM

Time taken 10 mins 44 secs

Grade 6.0 out of 10.0 (60%)

Question 1

Correct

Mark 1.0 out of 2.0

If an NPN BJT at 25°C with a constant collector current of 100μA has a V_{be} voltage of 760mV, then what will V_{be} be for this same BJT at 100°C ?

Select one:

- ☐ a. 910mV
- ☒ b. 610mV ✓
- ☐ c. None of these
- ☐ d. 820mV
- ☐ e. 700mV

The correct answer is: 610mV

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **1.0/2.0**.

Question 2

Correct

Mark 0.0 out of 2.0

The forward-active region of operation for BJTs is the region most often used to build amplifiers.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **0.0/2.0**.

Question 3

Correct

Mark 2.0 out of 2.0

If the common-emitter current gain β for an NPN BJT in the forward-active region is equal to 55.0, then what is the common-base current gain α for this transistor? Since α only varies slightly, be sure to give your answer for α to at least 3 decimal places!

Answer: 

The correct answer is: 0.982

Correct

Marks for this submission: 2.0/2.0.

Question 4

Correct

Mark 1.0 out of 2.0

Which of the following is true for an NPN BJT operating in the forward-active region ?

Select one:

- ☒ a. The emitter current consists primarily of electrons injected from the emitter into the base ✓
- ☐ b. The collector current consists primarily of electrons injected from the collector into the base
- ☐ c. None of these
- ☐ d. Some base current flows to replace electrons which are lost as holes diffusing across the base recombine
- ☐ e. The base current consists primarily of electrons injected from the emitter into the base

The correct answer is: The emitter current consists primarily of electrons injected from the emitter into the base

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **1.0/2.0**.

Question 5

Correct

Mark 2.0 out of 2.0

Just like any PN junction, the reverse bias leakage currents for a BJT will decrease as temperature increases.

Select one:

- ☐ True
- ☒ False ✓

The correct answer is 'False'.

Correct

Marks for this submission: 2.0/2.0.

Started on Sunday, 12 November 2017, 2:51 PM

State Finished

Completed on Sunday, 12 November 2017, 2:57 PM

Time taken 6 mins 2 secs

Grade 6.0 out of 10.0 (60%)

Question 1

Correct

Mark 1.0 out of 2.0

If an NPN BJT at 300°K with a constant collector current of 10 μ A has a V_{be} voltage of 620mV, then what will V_{be} be for this same BJT if the collector current is increased to 1mA?

Select one:

- ☐ a. 680mV
- ☐ b. 560mV
- ☐ c. None of these
- ☐ d. 800mV
- ☒ e. 740mV ✓

The correct answer is: 740mV

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **1.0/2.0**.

Question 2

Correct

Mark 2.0 out of 2.0

In the forward-active region the collector current of an NPN BJT consists of holes injected from the emitter into the base, which then diffuse across the base and are collected by the collector.

Select one:

- ☐ True
- ☒ False ✓

The correct answer is 'False'.

Correct

Marks for this submission: 2.0/2.0.

Question 3

Incorrect

Mark 0.0 out of 2.0

If the DC base-emitter junction voltage, V_{be} , for an NPN BJT in the forward-active region is equal to 741 mV then what is the collector current flowing in this BJT, I_c , in milliamps? Assume that the saturation current for this BJT, I_s , is equal to 8 fA. (Note that 1 fA = 1 femtoamp = 1×10^{-15} A.) Neglect the effects of base-width modulation. Also assume that the thermal voltage is equal to $V_t = kT/q = 26\text{mV}$. Since I_c is very sensitive to small changes in V_{be} , be sure to use V_{be} to the nearest millivolt when calculating your answer!

Answer: ✗

The correct answer is: 19.08

Incorrect

Marks for this submission: 0.0/2.0.

Question 4

Correct

Mark 1.0 out of 2.0

Which of the following is true in modern bipolar junction transistors?

Select one:

- ☐ a. The base is kept wide to minimize recombination in the base
- ☒ b. The emitter doping is much higher than the base doping to minimize the number of carriers injected from the base into the emitter ✓
- ☐ c. Carriers diffuse across the base and are collected by the emitter
- ☐ d. All of these
- ☐ e. The minority carrier concentration in the base decreases exponentially from the emitter to the collector

The correct answer is: The emitter doping is much higher than the base doping to minimize the number of carriers injected from the base into the emitter

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **1.0/2.0**.

Question 5

Correct

Mark 2.0 out of 2.0

A plot of the collector current versus V_{be} for a BJT looks the same as the I-V plot for a diode, since I_c is controlled by the voltage across the base-emitter junction.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Correct

Marks for this submission: 2.0/2.0.

Started on Saturday, 18 November 2017, 1:51 PM

State Finished

Completed on Saturday, 18 November 2017, 1:55 PM

Time taken 3 mins 42 secs

Grade 4.0 out of 10.0 (40%)

Question 1

Correct

Mark 2.0 out of 2.0

An PNP BJT operating in the saturation region has :

Select one:

- ☐ a. $V_{be} > 0$ and $V_{bc} < 0$
- ☐ b. $V_{be} < 0$ and $V_{bc} > 0$
- ☒ c. $V_{be} < 0$ and $V_{bc} < 0$ ✓
- ☐ d. None of these
- ☐ e. $V_{be} > 0$ and $V_{bc} > 0$

The correct answer is: $V_{be} < 0$ and $V_{bc} < 0$

Correct

Marks for this submission: 2.0/2.0.

Question 2

Correct

Mark 0.0 out of 2.0

A PNP BJT with $V_{be} > 0$ and $V_{bc} < 0$ is operating in cutoff.

Select one:

- ☐ True
- ☒ False ✓

The correct answer is 'False'.

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **0.0/2.0**.

Question 3

Not answered

Mark 0.0 out of 2.0

If the DC collector current, I_c , for an NPN BJT in the forward-active region is equal to 45.9 mA then what is the voltage across the base-emitter junction, V_{be} , in millivolts? Assume that the saturation current for this BJT, I_s , is equal to 33 fA. (Note that 1 fA = 1 femtoamp = 1×10^{-15} A.) Neglect the effects of base-width modulation. Also assume that the thermal voltage is equal to $V_t = kT/q = 26$ mV. Since I_c is very sensitive to small changes in V_{be} , be sure to give your answer to the nearest millivolt!

Answer: 

The correct answer is: 727

Question 4

Correct

Mark 2.0 out of 2.0

Which of the following is true for a PNP BJT operating in the forward-active region ?

Select one:

- ☐ a. The emitter current consists primarily of holes injected from the emitter into the base
- ☒ b. All of these ✓
- ☐ c. Some base current flows to replace electrons which are lost as holes diffusing across the base recombine
- ☐ d. The collector current consists primarily of holes injected from the emitter into the base
- ☐ e. The base current consists primarily of electrons injected from the base into the emitter

The correct answer is: All of these

Correct

Marks for this submission: 2.0/2.0.

Question 5

Correct

Mark 0.0 out of 2.0

In saturation the current gain of a BJT is lower, and is often referred to as the “forced beta”.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **0.0/2.0**.

Started on Saturday, 18 November 2017, 3:08 PM

State Finished

Completed on Saturday, 18 November 2017, 3:11 PM

Time taken 2 mins 41 secs

Grade 5.0 out of 10.0 (50%)

Question 1

Correct

Mark 1.0 out of 2.0

Which of the following is true for an NPN BJT operating in the forward-active region ?

Select one:

- ☐ a. The emitter current consists primarily of holes injected from the base into the emitter
- ☐ b. The collector current consists primarily of electrons injected from the collector into the base
- ☐ c. The base current consists primarily of electrons injected from the emitter into the base
- ☐ d. Some base current flows to replace electrons which are lost as holes diffusing across the base recombine
- ☒ e. None of these ✓

The correct answer is: None of these

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **1.0/2.0**.

Question 2

Correct

Mark 0.0 out of 2.0

If the base-emitter junction of a BJT is reverse biased and the base-collector junction is reverse biased, then the BJT is operating in the cutoff region of operation.

Select one:

- ☒ True ✓
- ☐ False

The correct answer is 'True'.

Correct

Marks for this submission: 2.0/2.0. Accounting for previous tries, this gives **0.0/2.0**.

Question 3

Not answered

Mark 0.0 out of 2.0

If the DC collector current, I_c , for an NPN BJT in the forward-active region is equal to 7.4 mA and the DC base current, I_b , is equal to 61.3 μA , then what is the common-emitter current gain β for this transistor?

Answer: ✗

The correct answer is: 120.7

Question 4

Correct

Mark 2.0 out of 2.0

If an NPN BJT at 300°K with a constant collector current of 1mA has a V_{be} voltage of 780mV, then what will V_{be} be for this same BJT if the collector current is decreased to 100 μ A?

Select one:

- ☐ a. 840mV
- ☐ b. None of these
- ☒ c. 720mV ✓
- ☐ d. 780mV
- ☐ e. 660mV

The correct answer is: 720mV

Correct

Marks for this submission: 2.0/2.0.

Question 5

Correct

Mark 2.0 out of 2.0

For a BJT each PN junction can be either forward or reverse biased, which gives 2 possible regions of operation.

Select one:

- ☐ True
- ☒ False ✓

The correct answer is 'False'.

Correct

Marks for this submission: 2.0/2.0.