Unit 4 - WEEK 2

Week 2 Assignment 2

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2020-02-12, 23:59 IST.

1) *2 points*

For the circuit shown in Fig 2.1, find the closest value of V_B by considering $V_{EB(on)} \approx 0.6$ V and $\beta = 99$. Select the correct option from the following:

a) 11.4 V
b) – 9.87 V
c) 2.127 V
d) 1.036 V
e) 5.7 V

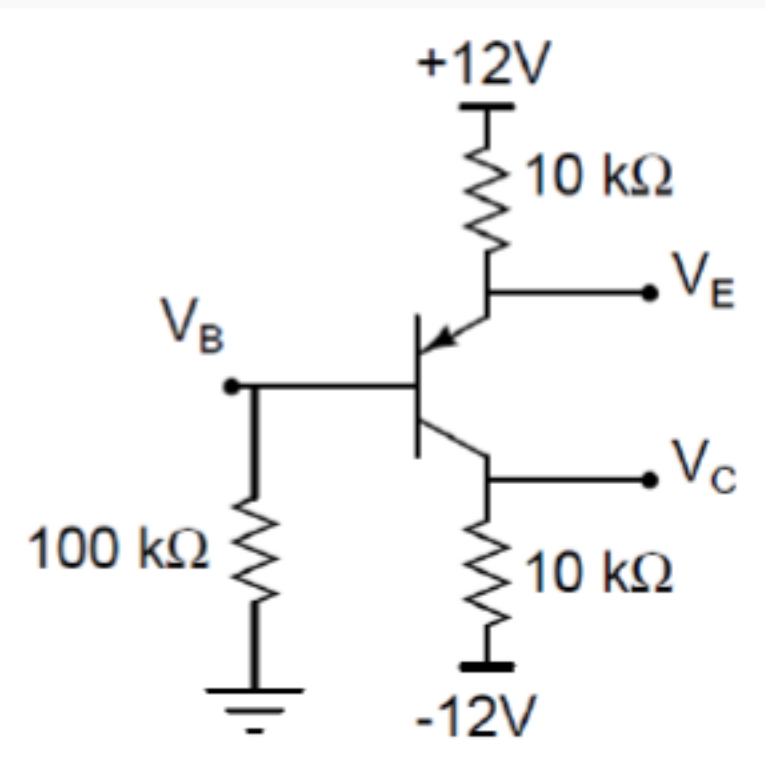


Fig 2.1

a)
b)
c)
d)
e)

No, the answer is incorrect.
Score: 0
Accepted Answers:
d)

2) *2 points*

For the circuit shown in Fig 2.1, find the value of V_C. Select the correct option from the following:

a) –1.74 V b) 10.26 V c) 0.3 V d) 0 V e) -1.23 V

a)
b)
c)
d)
e)

No, the answer is incorrect.
Score: 0
Accepted Answers:
a)

3) *1 point*

The V–I characteristics of an NPN transistor in active region of operation is given in Table 2.1.

V_{BE}(V)	0.50	0.51	0.52	0.53	0.54	0.55	0.56	0.57	0.58	0.59
I_B(µA)	0.48	0.72	1.08	1.61	2.40	3.58	5.35	7.98	11.90	17.76
I_C(mA)	0.096	0.144	0.22	0.322	0.48	0.716	1.07	1.596	2.38	3.552

Table 2.1

Then, find the closest input resistance (in KΩ) value of the transistor for V_{BE} = 0.535 V. Select the correct option from the following:

a) 3.80 b) 2.55 c) 26.32 d) 1.887 e) 12.66

a)
b)
c)
d)
e)

No, the answer is incorrect.
Score: 0
Accepted Answers:
e)

4) *1 point*

From the V–I characteristics of Table 2.1, find the value of transconductance, g_m for V_{BE} = 0.515 V. Select the correct option from the following:

a) 23.6 mS
b) 35.4 mS
c) 7.9 mS
d) 10.2 mS
e) 4.8 mS
f) 7.6 mS

a)
b)
c)
d)
e)
f)

No, the answer is incorrect.
Score: 0
Accepted Answers:
f)

5) *1 point*

For the circuit shown in the Fig 2.2, identify the correct I – V characteristics from given options:

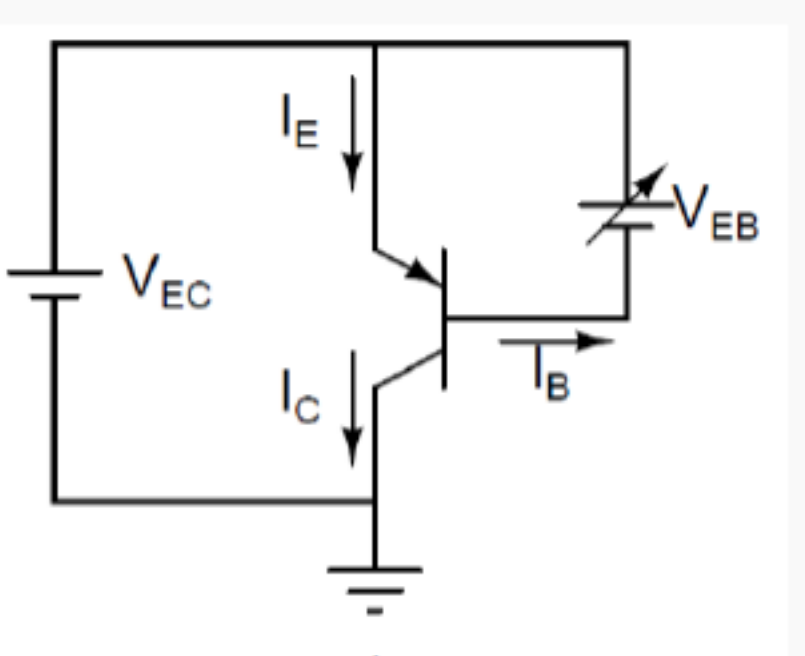
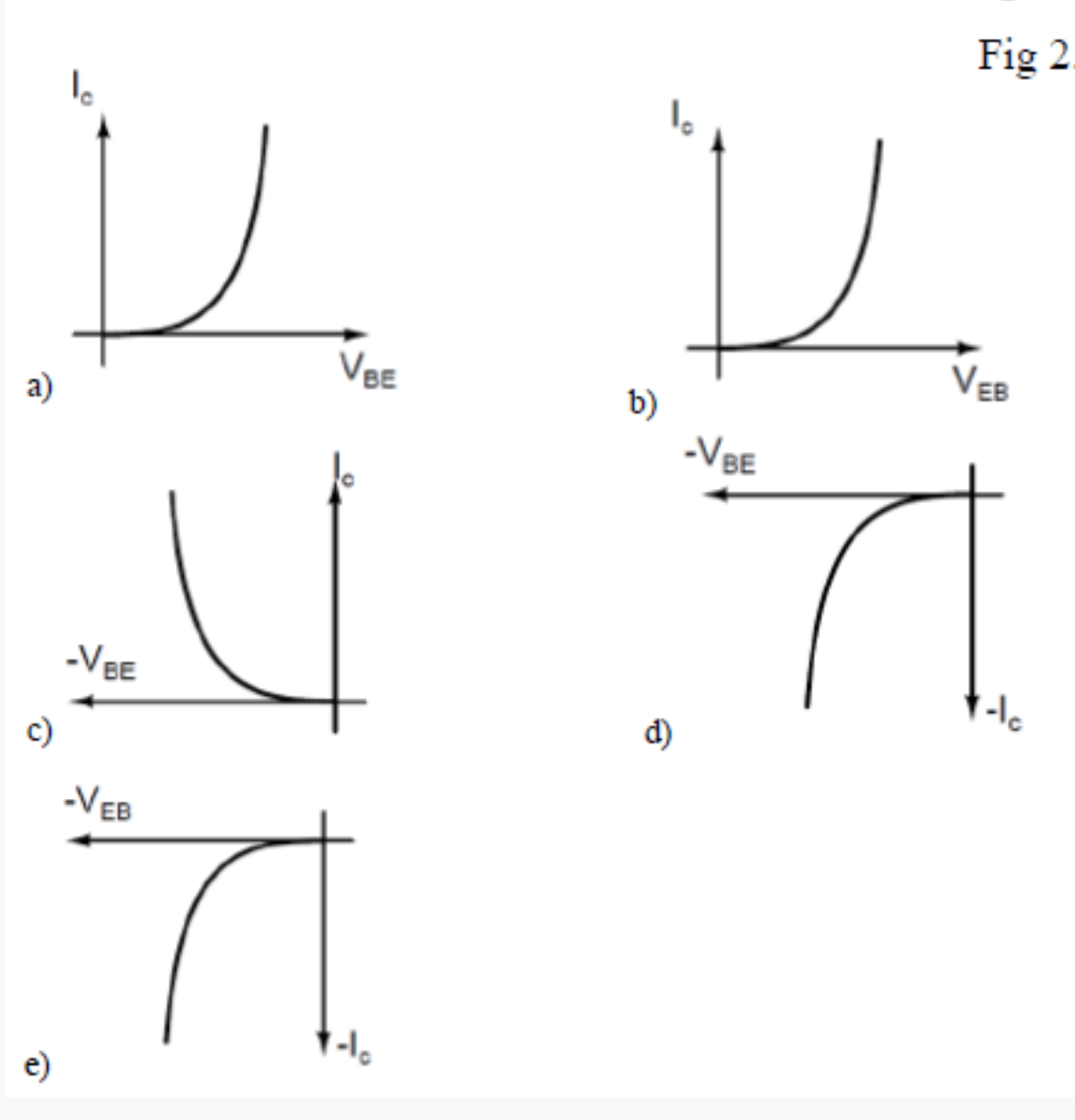


Fig 2.2



a)
b)
c)
d)
e)

No, the answer is incorrect.
Score: 0
Accepted Answers:
b)
c)

6) *2 points*

For the circuit shown in Fig 2.3, consider

$\mu_p \frac{\epsilon_{ox}}{t_{ox}} \frac{W}{L} = K\frac{W}{L} = 0.5$ mA/V², $V_{thp} = -0.5$ V,

$\lambda \approx 0$ V⁻¹, $R_1 = R_2 = 10$ kΩ. Find the maximum value of resistor, R (in kΩ) such that the p – channel remains in pinched off condition. (i.e., the device remains in saturation region of operation). Select the correct option from the following:

a) 12
b) 24
c) 5.6
d) 10
e) 3.4

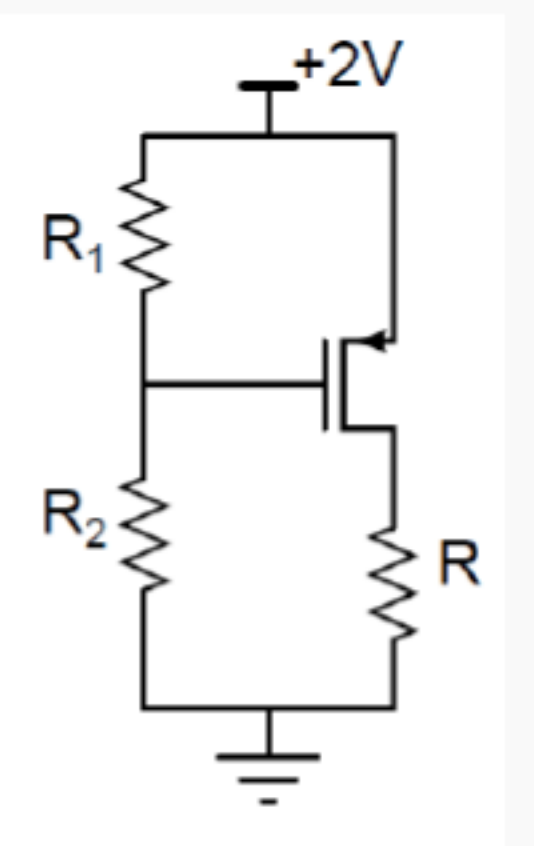


Fig 2.3

a)
b)
c)
d)
e)

No, the answer is incorrect.
Score: 0
Accepted Answers:
b)

7) *2 points*

For the circuit shown in Fig 2.4, consider the values of device parameters: $\mu_n \frac{\epsilon_{ox}}{t_{ox}} \frac{W}{L} = K\frac{W}{L}$ = 1 mA/V², V_{thn} = 0.5 V, $\lambda \approx 0$ V⁻¹. Find the value of resistor R_2 (in kΩ) to get I_{DS} = 100µA. Select the correct option from the following:

a) 12
b) 9
c) 6
d) 11
e) 18

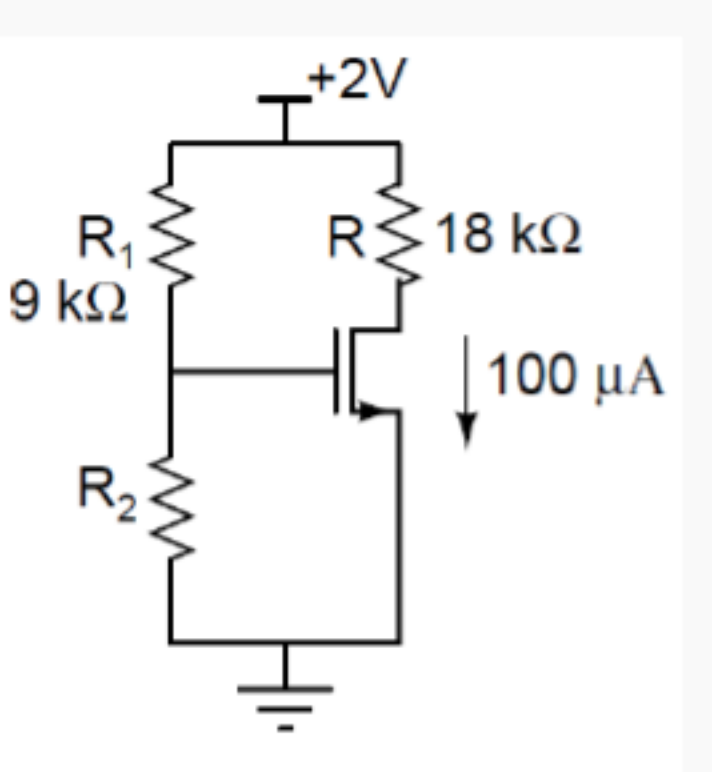


Fig 2.4

a)
b)
c)
d)
e)

No, the answer is incorrect.
Score: 0
Accepted Answers:
d)

8) *1 point*

Find the "output resistance, r_o" looking into collector terminal of the transistor given in Fig 2.5. Considering $V_{BE(on)} \approx 0.7$ V, $\beta = 120$ and the early voltage V_A = 48 V. Select the correct option from the following:

a) 100 kΩ
b) 75 kΩ
c) 50 kΩ
d) 6.48 kΩ
e) 54 kΩ

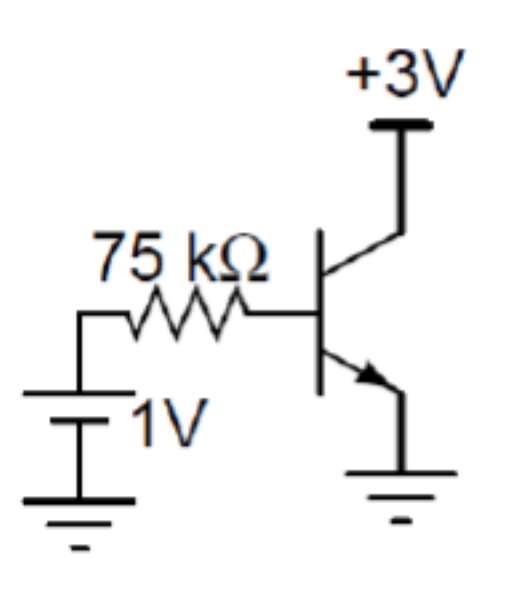


Fig 2.5

a)
b)
c)
d)
e)

No, the answer is incorrect.
Score: 0
Accepted Answers:
a)

9) *1 point*

Calculate the closest value of V_{EB} for I_C = 0.5 mA. Given, the reverse saturation current of PNP transistor $I_S^{(C)} = 10^{-12}$ mA, $\beta = 80$, thermal equivalent voltage V_T = 25 mV and early voltage is very high. Select the correct option from the following:

a) 633.53 mV
b) 643.65 mV
c) 656.72 mV
d) 668.97 mV
e) 673.44 mV
f) 688.34 mV

a)
b)
c)
d)
e)
f)

No, the answer is incorrect.
Score: 0
Accepted Answers:
e)

10) *2 points*

For the circuit shown in Fig 2.6, consider K = $\mu_n C_{ox}$ = 120 µA/V², W = 8 µm, L = 1 µm, V_{thn} = 0.5 V, $\lambda \approx 0$ V⁻¹. Find the required value of R to get I_{DS} = 120µA? Select the correct option from the following:

a) 33.33 kΩ
b) 15 kΩ
c) 16.66 kΩ
d) 25 kΩ
e) 50 kΩ
f) 20.83 kΩ

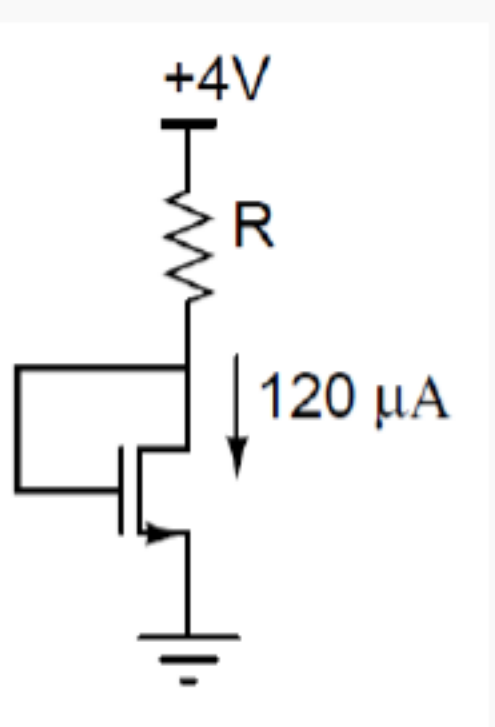


Fig 2.6

a)
b)
c)
d)
e)
f)

No, the answer is incorrect.
Score: 0
Accepted Answers:
d)

11) *2 points*

For the circuit shown in Fig 2.7, consider V_{thn} = 0.4 V and V_{thp} = – 0.5 V. Find the range of $V_{O(DC)}$ such that both NMOS and PMOS transistors are in saturation region. Select the correct option from the following:

a) 0.4 V to 1.3 V
b) 0.4 V to 1.4 V
c) 0.5 V to 1.4 V
d) 0.4 V to 1.5 V
e) 0.5 V to 1.3 V

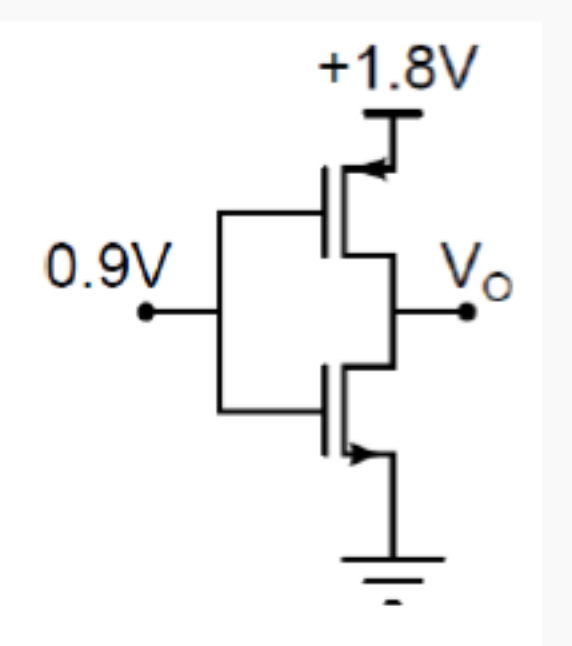


Fig 2.7

a)
b)
c)
d)
e)

No, the answer is incorrect.
Score: 0
Accepted Answers:
c)

12) *1 point*

Find the minimum base current (I_B) required to drive the transistor in saturation region as shown in Fig 2.8. Given, $V_{CE(Sat)}$ = 0.2 V and β = 100. Select the correct option from the following:

a) 14 µA
b) 20 µA
c) 28 µA
d) 15 µA
e) 30 µA

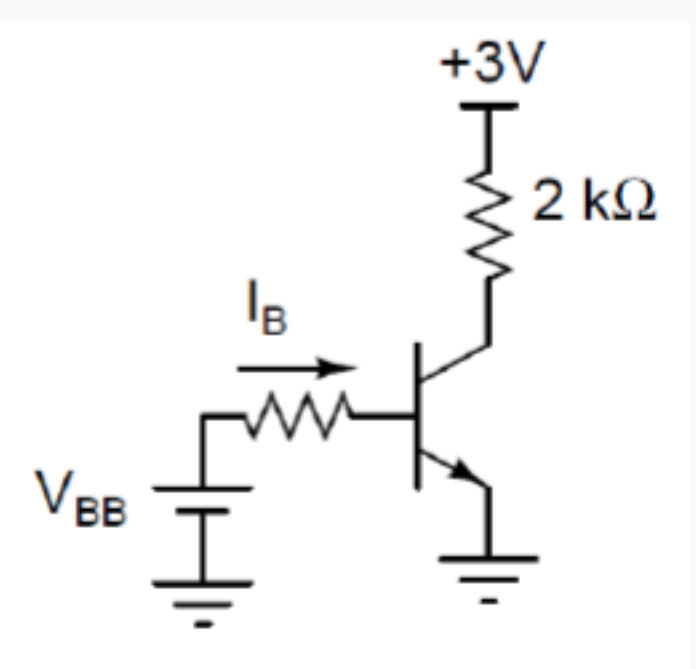


Fig 2.8

a)
b)
c)
d)
e)

No, the answer is incorrect.
Score: 0
Accepted Answers:
a)

13) *2 points*

For the circuit shown in Fig 2.9, consider α = 0.99 and V_{BE} = 0.7 V. Find the value of collector current? Select the correct option from the following:

$\left[Hint : \alpha = \frac{\beta}{1+\beta}\right]$

a) 1.55 mA
b) 3.1 mA
c) 93.93 µA
d) 31.31 µA
e) 9.3 mA

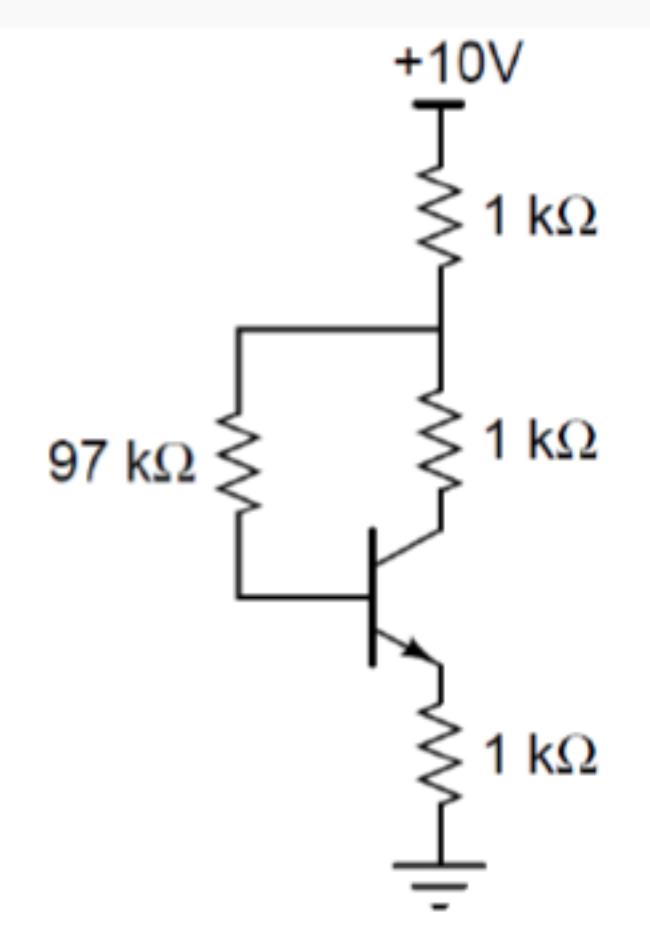


Fig 2.9

a.
b.
c.
d.
e.

No, the answer is incorrect.
Score: 0
Accepted Answers:
b.