

Unit 8 - WEEK 6

Course outline

How does an NPTEL online course work?

Week 0 Assignment 0

WEEK 1

WEEK 2

WEEK 3

WEEK 4

WEEK 5

WEEK 6

- Lecture 44 : Common Collector and Common Drain Amplifiers
- Lecture 45 : Common Collector and Common Drain Amplifiers (Contd.): Analysis (Part A)
- Lecture 46 : Common Collector and Common Drain Amplifiers (Contd.): Analysis (Part B)
- Lecture 47 : Common Collector and Common Drain Amplifiers (Contd.): Numerical Examples (Part A)
- Lecture 48 : Common Collector and Common Drain Amplifiers (Contd.): Numerical Examples (Part B)
- Lecture 49 : Common Base and Common Gate Amplifiers : Analysis (Part A)
- Lecture 50 : Common Base and Common Gate Amplifiers : Analysis (Part B)
- Lecture 51 : Common Base and Common Gate Amplifiers (Contd.): Numerical Examples (Part A)
- Lecture 52 : Common Base and Common Gate Amplifiers (Contd.): Numerical Examples (Part B)
- Lecture 53 : Common Base and Common Gate Amplifiers (Contd.): Numerical Examples (Part C)
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Week 6 Lecture material

Quiz : Week 6 Assignment 6

Week 6 Feedback Form

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Supplementary material

Download Videos

Detail solution

Live Interactive Session

Text Transcripts

Week 6 Assignment 6

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

Due on 2020-03-11, 23:59 IST.

Common data for Q 6.1 to Q 6.3:

The circuit shown in Fig 6.1 is a common collector amplifier.

The values of device parameters for NPN transistor are given as: $V_{BE(on)} \approx 0.6$ V, $V_{CE(sat)} \approx 0.3$ V, $\beta = 100$, early voltage $V_A = 50$ V, $C_{\pi} = 10$ pF, $C_{\mu} = 5$ pF, thermal equivalent voltage $V_T = 26$ mV.

The other parameters of the amplifier are given as: $V_{BB} = 6$ V, $V_{CC} = 10$ V, $R_S = 100$ k Ω , $R_E = 9.8$ k Ω , $R_C = 2$ k Ω , $C_L = 100$ pF.

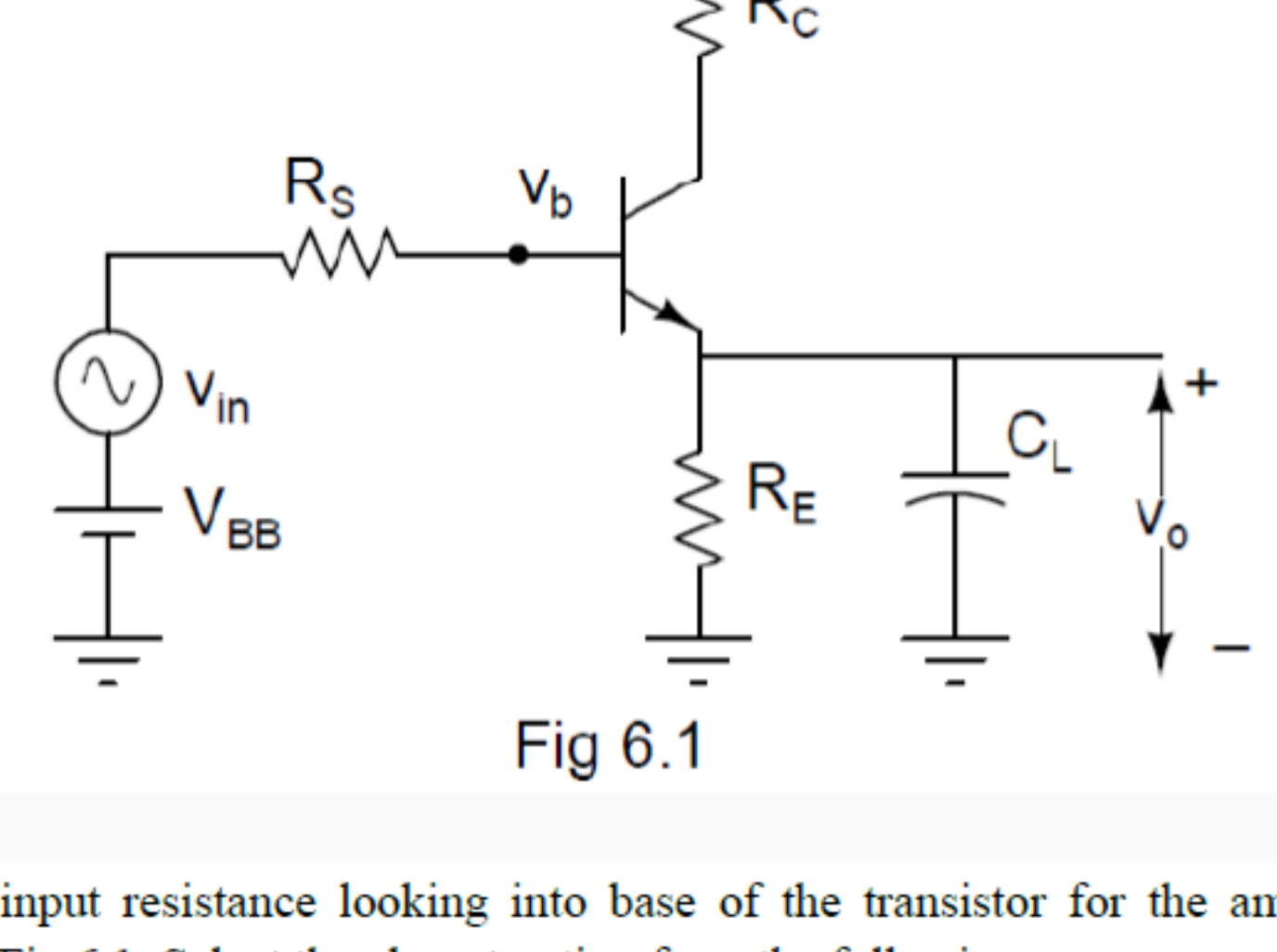


Fig 6.1

1) Find the input resistance looking into base of the transistor for the amplifier circuit as shown in Fig 6.1. Select the closest option from the following:

- a) 890 k Ω
- b) 100 k Ω
- c) 5.2 k Ω
- d) 1.1 M Ω
- e) 300 k Ω

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: a)

2) Find voltage gain, $\frac{V_o}{V_{in}}$ of the amplifier circuit shown in Fig 6.1. Select the closest option from the following:

- a) 1
- b) 0.1
- c) 188
- d) 0.9
- e) 38

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: d)

3) Find the maximum output signal swing (without significant distortion) for an input sinusoidal signal of the amplifier circuit shown in Fig 6.1. Select the closest option from the following:

- a) 9.8 V_{P-P}
- b) 4.9 V_{P-P}
- c) 3.8 V_{P-P}
- d) 4.1 V_{P-P}
- e) 7.6 V_{P-P}

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: e)

Common data for Q 6.4 to Q 6.6

The circuit shown in Fig 6.2 is a common drain amplifier.

The values of device parameters for the NMOS transistor are given as: $V_{thn} = 1$ V, $\frac{kW}{L} = 1$ mA / V, $\lambda = 0.01$ V⁻¹, $C_{gs} = 10$ pF, $C_{gd} = 2$ pF.

The other parameters of the amplifier are: $R_S = 10$ k Ω , $R_L = 1$ k Ω and $C_L = 100$ pF. The supply voltage, $V_{dd} = 10$ V and biasing voltage, $V_{GG} = 5$ V.

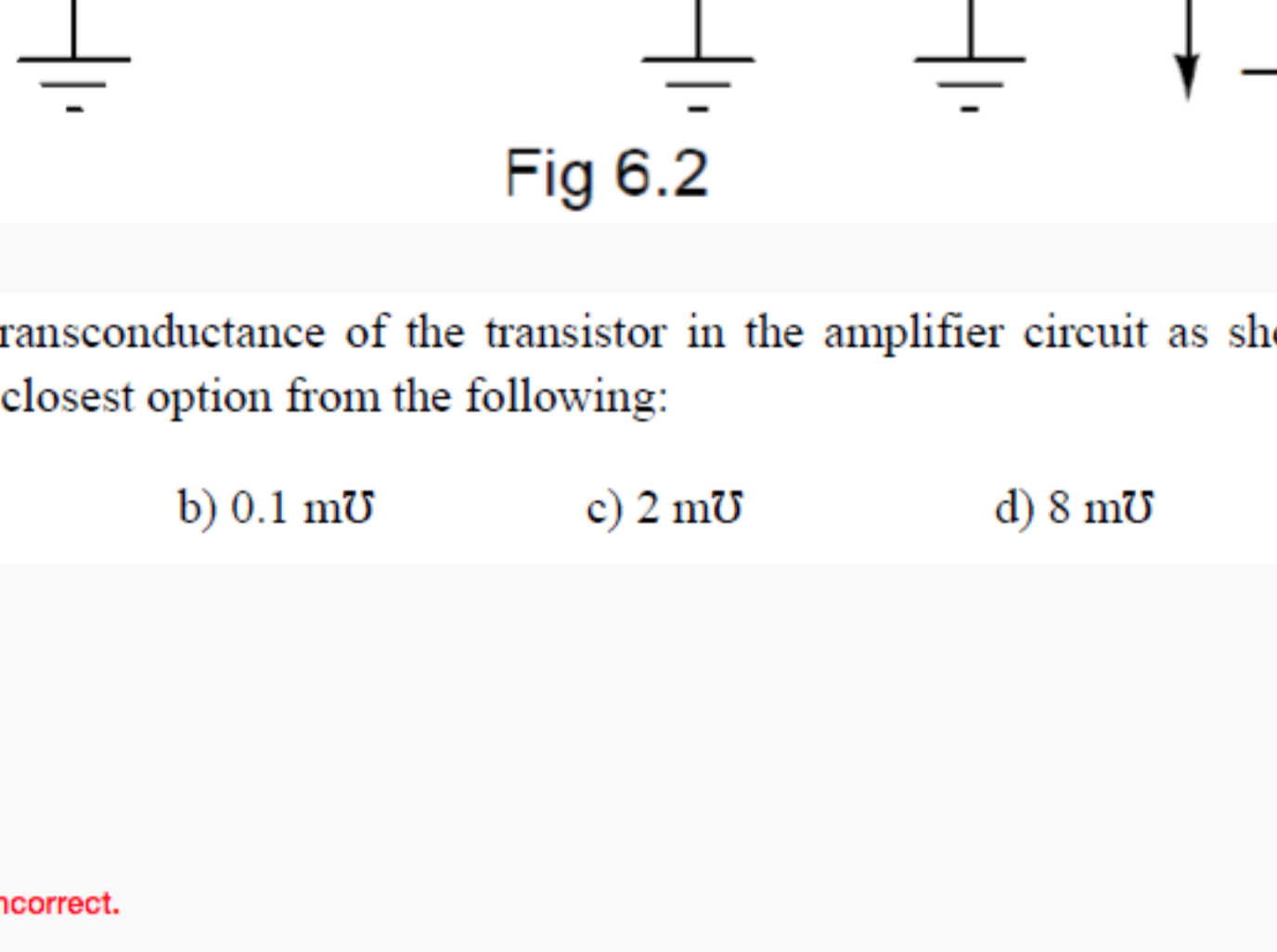


Fig 6.2

4) Find the transconductance of the transistor in the amplifier circuit as shown in Fig 6.2. Select the closest option from the following:

- a) 77 m Ω
- b) 0.1 m Ω
- c) 2 m Ω
- d) 8 m Ω
- e) 4 m Ω

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: c)

5) Find the output resistance of the amplifier circuit as shown in Fig 6.2. Select the closest option from the following:

- a) 500 Ω
- b) 330 Ω
- c) 1 k Ω
- d) 1.5 k Ω
- e) 11 k Ω

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: d)

6) Find the upper cutoff frequency of the gain $\frac{V_o}{V_{in}}$ of the amplifier shown in Fig 6.2. Select the closest option from the following:

- a) 4.5 MHz
- b) 3 MHz
- c) 19 MHz
- d) 28 MHz
- e) 89MHz

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: b)

Common data for Q 6.7 to Q 6.10

The circuit shown in Fig 6.3 is a common base amplifier.

The values of device parameters for NPN transistor are given as: $V_{BE(on)} \approx 0.6$ V, $V_{CE(sat)} = 0.3$ V, $\beta = 150$, early voltage $V_A = 50$ V, $C_{\pi} = 10$ pF, $C_{\mu} = 5$ pF, thermal equivalent voltage, $V_T = 26$ mV.

The other parameters of the amplifier are: $V_{CC} = 12$ V, $R_1 = 6.7$ k Ω , $R_2 = 5.3$ k Ω , $R_C = 4$ k Ω , $R_E = 4.7$ k Ω , $C_1 = 10$ μ F, R_S is very large, $C_L = 100$ pF. Assume, the value of C_B is very high.

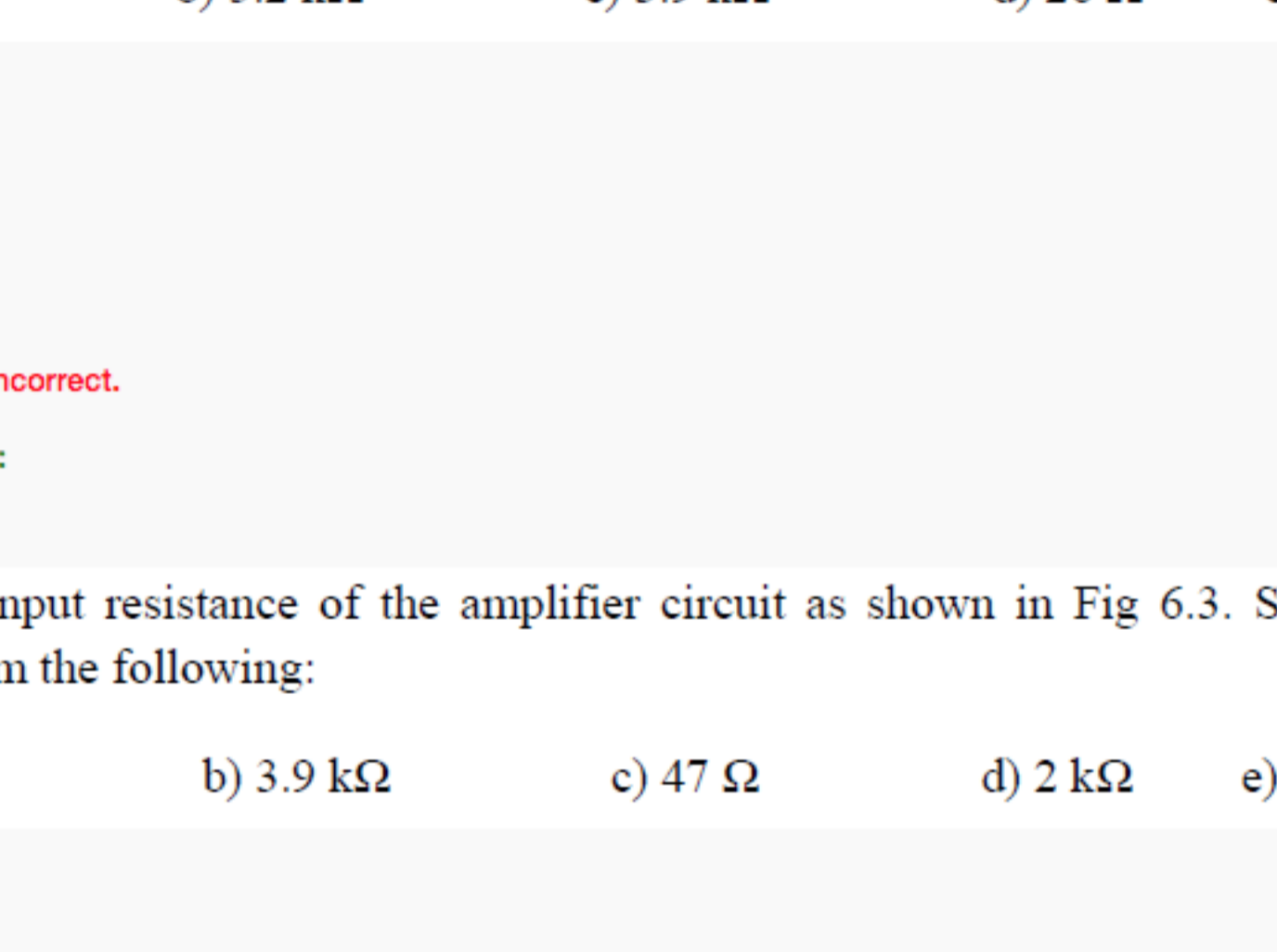


Fig 6.3

7) Find the value of small signal resistance, r_{π} of the transistor for the amplifier circuit as shown in Fig 6.3. Select the closest option from the following:

- a) 2.6 k Ω
- b) 5.2 k Ω
- c) 3.9 k Ω
- d) 26 Ω
- e) 52 Ω

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: c)

8) Find the input resistance of the amplifier circuit as shown in Fig 6.3. Select the closest option from the following:

- a) 2.6 k Ω
- b) 3.9 k Ω
- c) 47 Ω
- d) 2 k Ω
- e) 27.7 Ω

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: e)

9) Find the input capacitance of the amplifier circuit as shown in Fig 6.3. Select the closest option from the following:

- a) 10 pF
- b) 5 pF
- c) 15 pF
- d) 105 pF
- e) 10 μ F

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: a)

10) Find the upper cut off frequency of the amplifier circuit as shown in Fig 6.3. Select the closest option from the following:

- a) 2.4 MHz
- b) 8 kHz
- c) 50 kHz
- d) 379 kHz
- e) 410 kHz

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: d)

Common data for Q 6.11 to Q 6.13

The circuit shown in Fig 6.4 is a common gate amplifier.

The values of device parameters for the PMOS transistor are given as: $\frac{kW}{L} = 2$ mA/V, $V_{thn} = 1$ V, $\lambda = 0.01$ V⁻¹, $C_{gs} = 10$ pF, $C_{gd} = 2$ pF.

The other parameters of the amplifier are: $R_1 = 28$ k Ω , $R_2 = 32$ k Ω , $R_D = 3$ k Ω , and $C_L = 100$ pF. Assume, the value of C_G is very high.

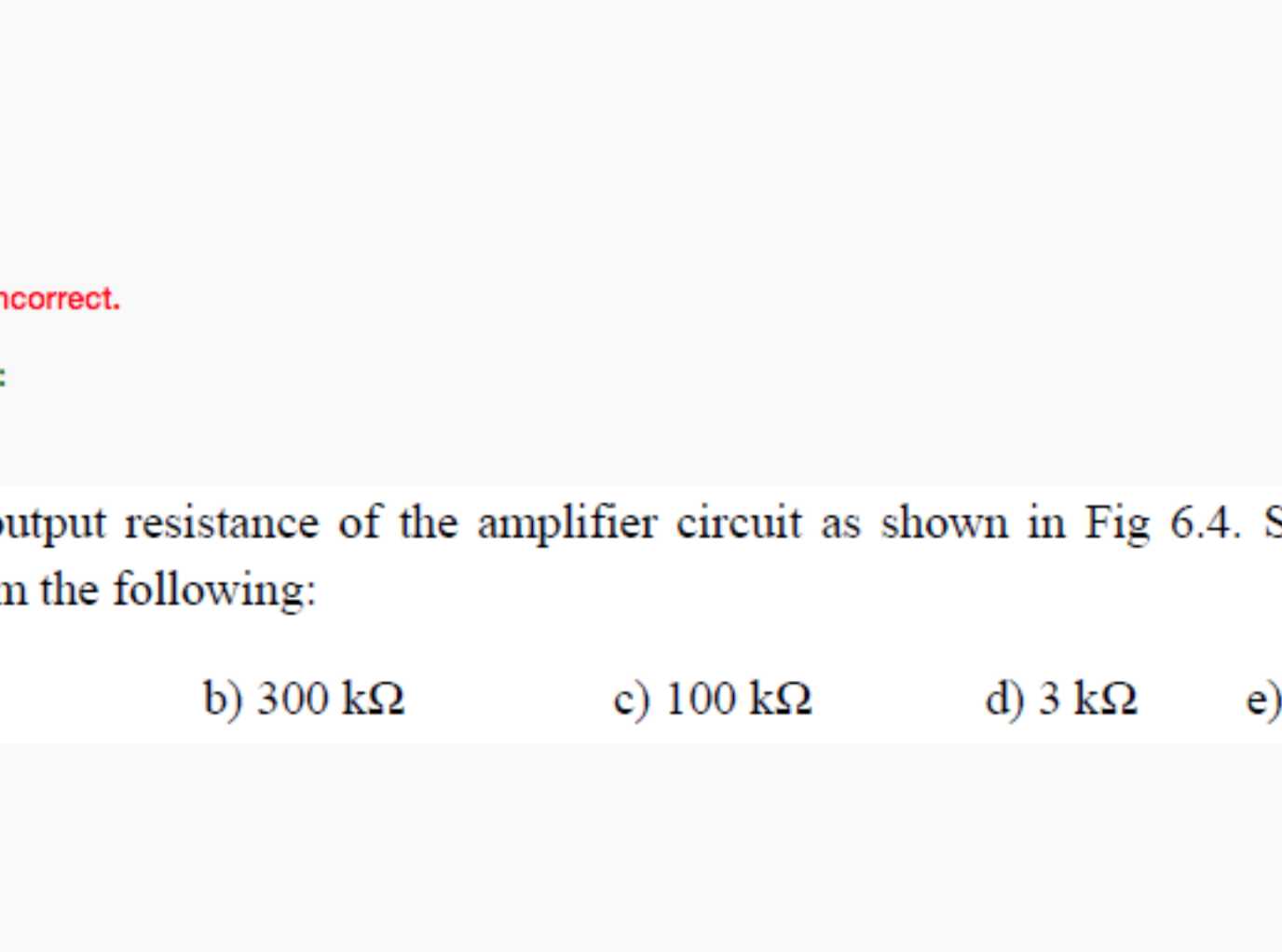


Fig 6.4

11) Find the value of small signal parameter output resistance, r_{ds} of the MOSFET as shown in Fig. 6.4. Select the closest option from the following:

- a) 50 k Ω
- b) 3 k Ω
- c) 100 k Ω
- d) 282 k Ω
- e) 1 k Ω

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: a)

12) Find the current gain of the amplifier circuit as shown in Fig 6.4. Select the closest option from the following:

- a) 1
- b) 0.85
- c) 141
- d) 16.6
- e) 85

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: d)

13) Find the output resistance of the amplifier circuit as shown in Fig 6.4. Select the closest option from the following:

- a) 50 k Ω
- b) 300 k Ω
- c) 100 k Ω
- d) 3 k Ω
- e) 1 k Ω

- a)
- b)
- c)
- d)
- e)

No, the answer is incorrect. Score: 0

Accepted Answers: d)