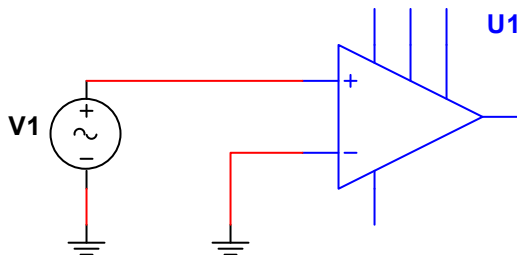


ENGENHARIA ELÉTRICA	7º8º	A
Curso	Série ou Período	Turma
Eletrônica Aplicada		NP1
Disciplina		Prova
Nome do Aluno		Nº. do Aluno
Assinatura	20/09/23 19:10 Hs	Luís Caldas
	Data	Professor

NOTA

Instruções: PROIBIDA a consulta de livros ou anotações. PERMITIDO uso de calculadoras. Duração da prova: 75 min.
ATENÇÃO: TODOS OS DISPOSITIVOS ELETRÔNICOS (CELULAR, IPAD E SIMILARES) DEVEM ESTAR DESLIGADOS E GUARDADOS, FORA DO ALCANCE DO ALUNO.
CADA QUESTÃO VALE 1,0 ponto – Total da prova = 8,0

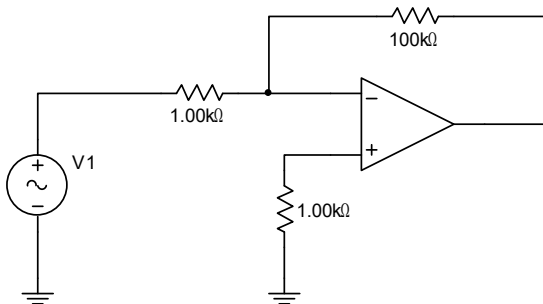
1.a Questão: (Valor 1,0) Determinar a tensão V_1 sabendo-se que $A_{OL} = 10^5$ (V/V) e $V_0 = 3V$.



Alternativas

- A) $V_1 = 300mV$
- B) $V_1 = 30mV$
- C) $V_1 = 3mV$
- D) $V_1 = 300\mu V$
- E) $V_1 = 30\mu V$ - ok

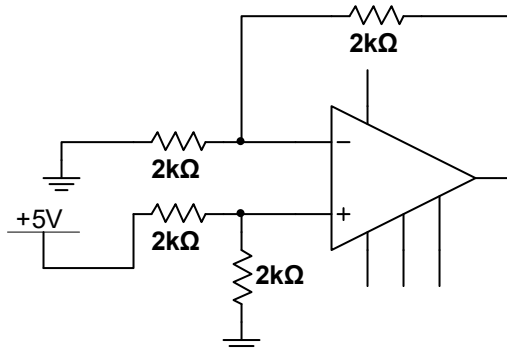
2.a Questão: (Valor 1,0) Um OPAMP na configuração conforme a seguir têm as seguintes características elétricas: produto ganho x largura de faixa igual a 1.5MHz e slew-rate igual a 1,0 V/ μs . Diante das limitações apresentadas para o dispositivo determine qual a amplitude máxima pico a pico que podemos aplicar na entrada V_1 , para um sinal alternativo, a fim de obter um sinal de saída dentro das conformidades, ou seja mantendo amplitude desejada e fidelidade do sinal na saída.



Alternativas

- A) $V_1 = 214,5mV$ - ok
- B) $V_1 = 107,2mV$
- C) $V_1 = 58,5mV$
- D) $V_1 = 150,5mV$
- E) $V_1 = 75,5mV$

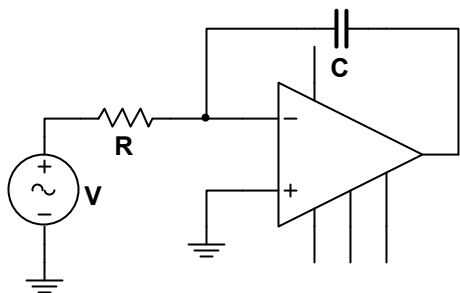
3.a Questão: (Valor 1,0) Para a configuração a seguir determinar a tensão V_0 na saída.



Alternativas

- A) $V_0 = 2,5V$
- B) $V_0 = 5,0V$ - ok
- C) $V_0 = 7,5V$
- D) $V_0 = 10V$
- E) $V_0 = 1,25V$

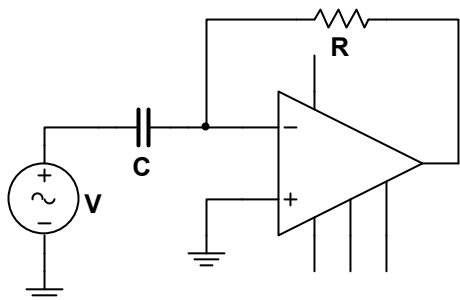
4.a Questão: (Valor 1,0) Para o integrador Miller o ganho na frequência de 1KHz é igual a 10. Determine a constante de tempo τ do integrador.



Alternativas

- A) $\tau = 15,9\mu\text{s}$ - ok
- B) $\tau = 5,3\mu\text{s}$
- C) $\tau = 14,7\text{ms}$
- D) $\tau = 12,4\mu\text{s}$
- E) $\tau = 7,25\text{ms}$

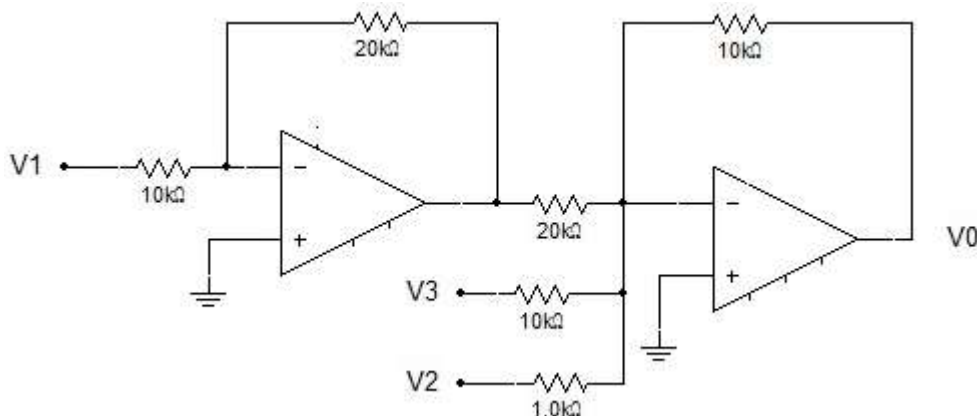
5.a Questão: (Valor 1,0) Para o diferenciador ideal foi aplicado um sinal de frequência de 1KHz e obtido na saída a mesma amplitude da entrada. Determine o valor aproximado da constante de tempo τ do diferenciador.



Alternativas

- A) $\tau = 120\mu\text{s}$
- B) $\tau = 130\mu\text{s}$
- C) $\tau = 140\text{ms}$
- D) $\tau = 160\mu\text{s}$ - ok
- E) $\tau = 125\text{ms}$

6.a Questão: (Valor 1,0) Para a configuração a seguir sabendo-se $V_1 = 10\text{sen}100t$, $V_2 = -1$ e $V_3 = 10\text{sen}200t$, calcular a tensão média e eficaz de saída.

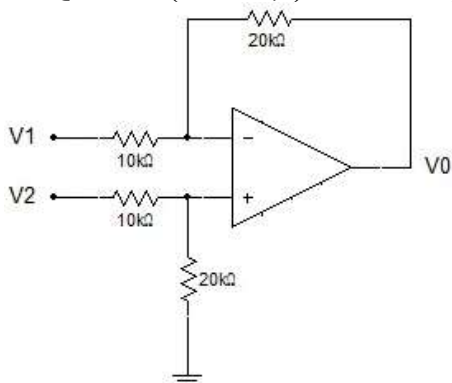


Alternativas:

- a. $V_{0DC} = 1\text{V}$ e $V_{0RMS} = 10\text{V}$.
- b. $V_{0DC} = 10\text{V}$ e $V_{0RMS} = 16,3\text{V}$
- c. $V_{0DC} = 1\text{V}$ e $V_{0RMS} = 17,7\text{V}$
- d. $V_{0DC} = -10\text{V}$ e $V_{0RMS} = 15,6\text{V}$
- e. $V_{0DC} = 10\text{V}$ e $V_{0RMS} = 12,25\text{V}$

$$R = V_{0DC} = 10\text{V} \text{ e } V_{0RMS} = 14,14\text{V}$$

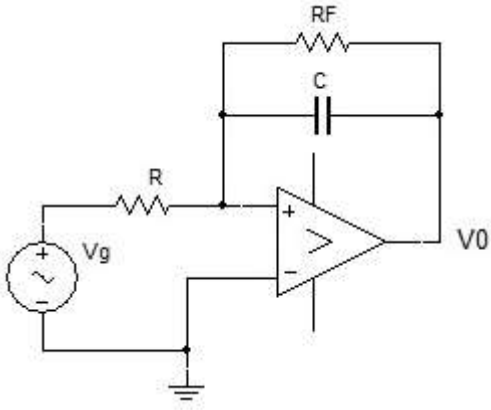
7.a Questão: (Valor 1,0) Determinar para a configuração a seguir a expressão da tensão de saída em V_0 .



Alternativas:

- A) $V_0 = V_2 - V_1$
- B) $V_0 = V_1 - V_2$
- C) $V_0 = 2V_2 - V_1$
- D) $V_0 = 2(V_2 - V_1)$ - ok
- E) $V_0 = -2(V_2 - V_1)$

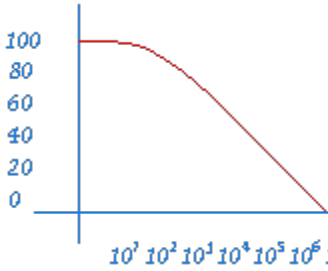
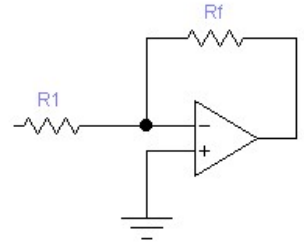
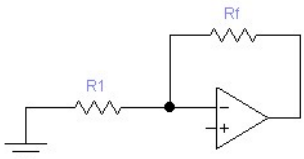
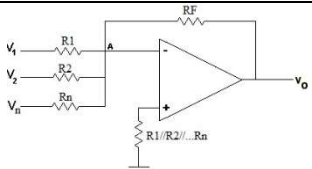
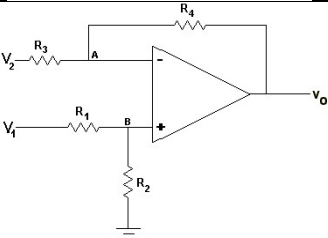
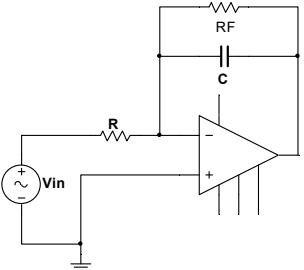
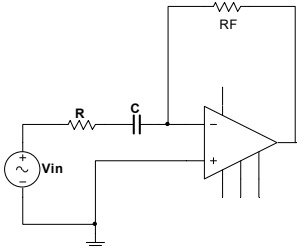
8.a Questão (Valor 1,0) Para a configuração a seguir sendo $R_F = 10K$, $R = 1K$ e $C = 10nF$. Podemos afirmar sobre a frequência de corte e a fase do circuito na frequência de corte igual a:



Alternativas:

- A) $f_c = 159\text{Hz}$ e $\varphi = 135^\circ$
- B) $f_c = 1,59\text{KHz}$ e $\varphi = 135^\circ$ - ok
- C) $f_c = 15,9\text{KHz}$ e $\varphi = 135^\circ$
- D) $f_c = 15,9\text{KHz}$ e $\varphi = -135^\circ$
- E) $f_c = 1,59\text{KHz}$ e $\varphi = -135^\circ$

FORMULÁRIO RESUMO – Eletrônica Aplicada

Tipo	Configuração	Método Algébrico
<p>Limitações e Características</p>	 <p>A graph showing the frequency response of an amplifier. The vertical axis represents gain in dB, ranging from 0 to 100 in increments of 20. The horizontal axis represents frequency in Hz on a logarithmic scale, with markers at 10¹, 10², 10³, 10⁴, 10⁵, and 10⁶. The curve starts at a gain of 100 dB at low frequencies and remains flat until approximately 10³ Hz, after which it rolls off at a rate of -20 dB/decade, reaching 0 dB at 10⁶ Hz.</p>	<p> $SR = wK E_{MAX}$ $f_T = \beta f_c$ $BW_{CL} = f_t \cdot \beta = A_{OL} \cdot f_c \cdot \beta \ (\beta = R_1 / (R_1 + R_f))$ $CMRR = A_d / A_c$ $V_D = V_{i1} - V_{i2} \ (V_{i1} = in+, V_{i2} = in-)$ $V_C = (V_{i1} + V_{i2}) / 2$ $V_0 = A_d V_D + A_c V_C$ $CMRR = 20 \log A_d / A_c$ </p>
<p>Inversor</p>	 <p>Circuit diagram of an inverting amplifier. The non-inverting input (+) is connected to ground. The inverting input (-) is connected to an input resistor R1 and a feedback resistor Rf. The output is labeled v0.</p>	<p> $A = -R_f / R_1$ $Z_{IN} = R_1$ $Z_0 = r_o / (1 + \beta A)$ </p>
<p>Não Inversor</p>	 <p>Circuit diagram of a non-inverting amplifier. The inverting input (-) is connected to ground through a resistor R1. The non-inverting input (+) is connected to the input through a resistor R1 and to the output through a feedback resistor Rf. The output is labeled v0.</p>	<p> $A = (1 + R_f / R_1)$ $Z_{IN} = Z_{(OPAMP)}$ $Z_0 = r_o / (1 + \beta A)$ </p>
<p>Somador</p>	 <p>Circuit diagram of an inverting summing amplifier. The non-inverting input (+) is connected to ground through a resistor R1/R2/.../Rn. The inverting input (-) is connected to multiple input resistors R1, R2, ..., Rn, each receiving an input voltage V1, V2, ..., Vn. A feedback resistor Rf connects the output to the inverting input. The output is labeled v0.</p>	<p>$V_0 = -R_f / R (V_1 + V_2 + \dots + V_N) \ p / R_1 = R_2 = \dots = R_N = R$</p>
<p>Subtrator</p>	 <p>Circuit diagram of a differential amplifier. The non-inverting input (+) is connected to input V1 through resistor R4 and to ground through resistor R2. The inverting input (-) is connected to input V2 through resistor R3 and to the output through resistor R4. The output is labeled v0.</p>	<p> $V_0 = \left[\frac{R_3 + R_4}{R_3} \left(\frac{R_2}{R_1 + R_2} \right) V_1 \right] - \frac{R_4}{R_3} V_2$ $V_0 = a V_1 - b V_2$ $V_0 = (1 + R_4 / R_3) K V_1 - R_4 / R_3 V_2$ $a = (1 + R_4 / R_3) K \ e \ b = R_4 / R_3 \Rightarrow a = (1 + b) K$ $1 + b = a / K \Rightarrow 1 + b > a, \text{ então } a < 1 + b \text{ ou } b > a + 1.$ </p>
<p>Integrador</p>	 <p>Circuit diagram of an inverting integrator. The non-inverting input (+) is connected to ground. The inverting input (-) is connected to an input resistor R and a feedback network consisting of a resistor Rf and a capacitor C in parallel. The input voltage is Vin. The output is labeled v0.</p>	<p> $V_0 = -1 / RC \int V_{IN} dt$ $f_c = \frac{1}{2 \pi R_f C} \quad f_T = \frac{1}{2 \pi R C}$ $V_0 / V_i = - (R_f / R) / \sqrt{(1^2 + (f / f_c)^2)}$ $A = -R_f / R$ $\varnothing = \text{atan}(f / f_c)$ $\varphi = 180^\circ - \varnothing$ </p>
<p>Diferenciador</p>	 <p>Circuit diagram of an inverting differentiator. The non-inverting input (+) is connected to ground. The inverting input (-) is connected to an input resistor R and a feedback capacitor C in parallel. The input voltage is Vin. The output is labeled v0.</p>	<p> $V_0 = -RC \frac{dV_{IN}}{dt}$ $f_T = \frac{1}{2 \pi R_f C} \quad f_c = \frac{1}{2 \pi R C}$ $V_0 / V_i = - (R_f / R) / \sqrt{(1^2 + (f_c / f)^2)}$ $f_T = f_b / A_{CL}$ $A_{CL} = -R_f / R$ $\varnothing = \text{atan}(f_c / f) \ e \ \varphi = \varnothing - 180^\circ$ </p>