

$$V_{DS} = 1$$

-2

$$I_{DS} = 1\text{m}$$

$$I_{DS} = \frac{K}{r} (V_{GS} - V_T)^r$$

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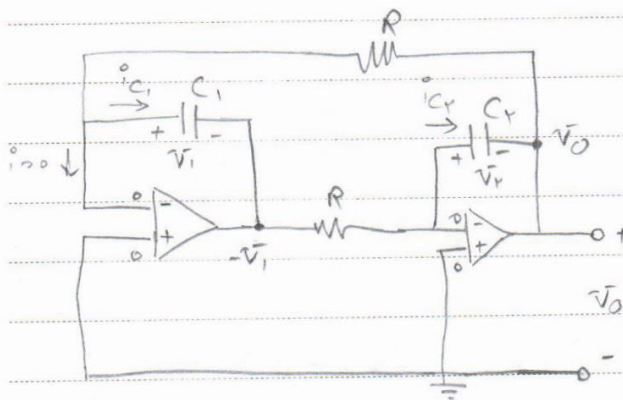
$$\Rightarrow 1\text{m} = 1\text{m} \times (V_{GS} - 1)^r$$

$$\Rightarrow V_{GS} = 2 \Rightarrow V_{DS} > V_{GS} - V_T$$

$$1 \gg 1 - 1 \checkmark$$

$$\Rightarrow V_G = 2$$

$$\frac{1}{r+1} \times V_O = 1 \Rightarrow V_O = 1\text{V}$$



$$\frac{V_O}{100\text{k}} = I_{C1} \Rightarrow \frac{V_O}{100\text{k}} = +V_1' \mu$$

$$\frac{-V_1}{100\text{k}} = I_{C2} = -V_O' \mu$$

$$\Rightarrow 10 V_O = V_1' \Rightarrow \frac{10 V_O}{0} = V_1$$

$$10 V_1 = V_O' \Rightarrow \frac{100 V_O}{0} = 10 V_O \Rightarrow 100 V_O = 10 V_O$$

$$\Rightarrow (10 - 100) V_O = 0 \Rightarrow 5 = 100 \Rightarrow 5 = \pm 10$$

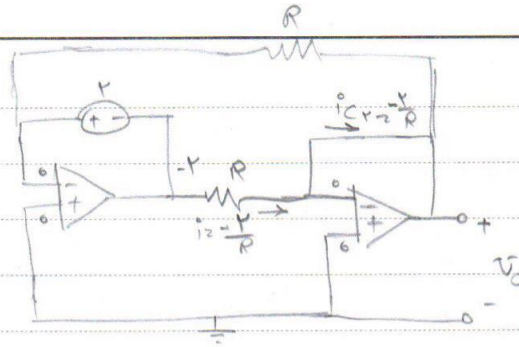
$$\Rightarrow V_O = A e^{10t} + B e^{-10t}$$

$$\Rightarrow V_O' = 10 A e^{10t} - 10 B e^{-10t}$$

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$t = 0 :$



$$i_{C1} = \frac{-V}{100k} \Rightarrow \frac{-V}{100k}$$

$$\Rightarrow \boxed{+V_O' + V_O}$$

$$\Rightarrow V_O(0^+) = 0 = A + B$$

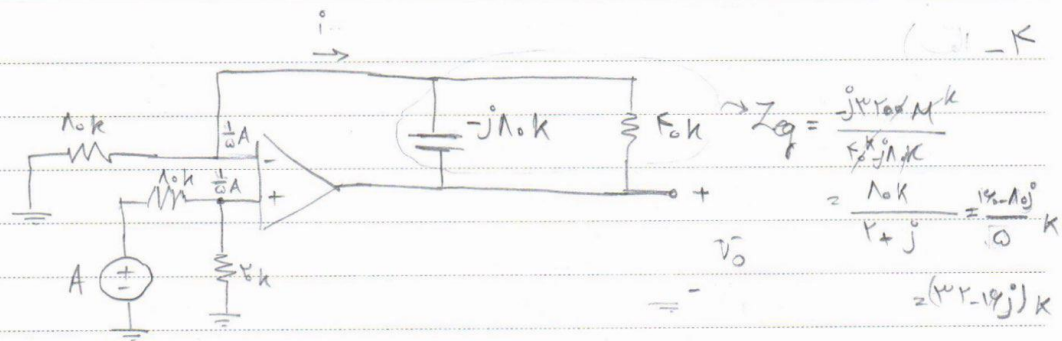
$$\rightarrow A = +1$$

$$V_O'(0^+) = \frac{V}{100k} = 10A - 10B \Rightarrow A - B = \frac{V}{100k} \quad B = -1$$

$$\Rightarrow \boxed{V_O = e^{+10t} - e^{-10t}}$$

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$$\text{KCL: } i_0 = \frac{-\frac{1}{10}A}{10k} = -\frac{A}{100k}$$

$$\text{KVL: } \frac{1}{10}A - v_0 = -\frac{A}{100k} (10k - j10k) \Rightarrow v_0 = \frac{1}{10}A + \frac{1}{100k}A(1 - j)$$

$$= \frac{1}{100k}A(1 - j + 10)$$

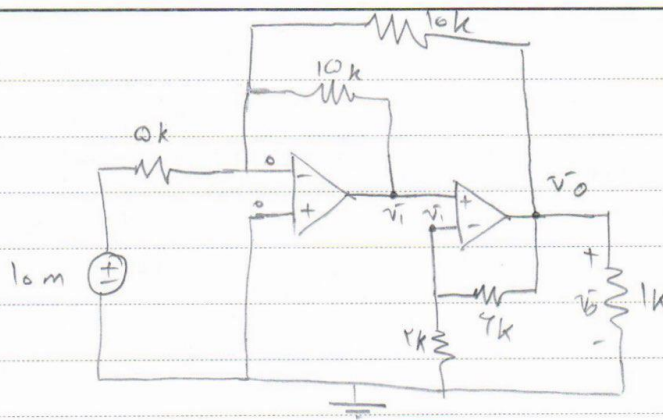
$$A, 100 \Rightarrow v_0 = 1 - j \Rightarrow |v_0| = \sqrt{1^2 + 1^2} = \sqrt{2} \quad (\text{الف})$$

$$\angle v_0 = \tan^{-1} \frac{-1}{1} = -0.707 \text{ rad}$$

$$\Rightarrow v_0 = \sqrt{2} \cos(\omega t - 0.707)$$

$$|v_0| = \frac{1}{100k} \times \sqrt{2} \times A < 10 \Rightarrow A < 100k, 1000$$

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$$\text{KCL: } \frac{-10\text{m}}{10\text{k}} + \frac{-v_1}{10\text{k}} + \frac{-v_0}{1\text{k}} = 0 \Rightarrow 40\text{m} + 10v_1 + 10v_0 = 0$$

$$\text{KCL: } \frac{v_1}{4\text{k}} + \frac{v_1 - v_0}{4\text{k}} = 0 \Rightarrow 10v_1 = v_0$$

$$\Rightarrow 40\text{m} + \frac{v_0}{4} + 10v_0 = 0 \Rightarrow v_0 = -\frac{10\text{m}}{4}$$

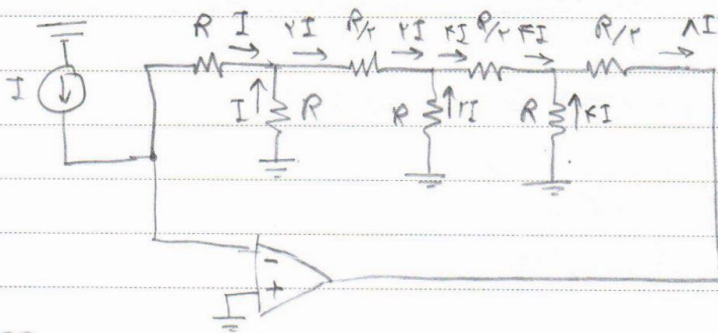
$$1 \text{ } \swarrow : R_1 = R \parallel R = \frac{R}{2} \quad 3 \text{ } \swarrow : R_3 = \frac{R}{2} \quad (9) - 4$$

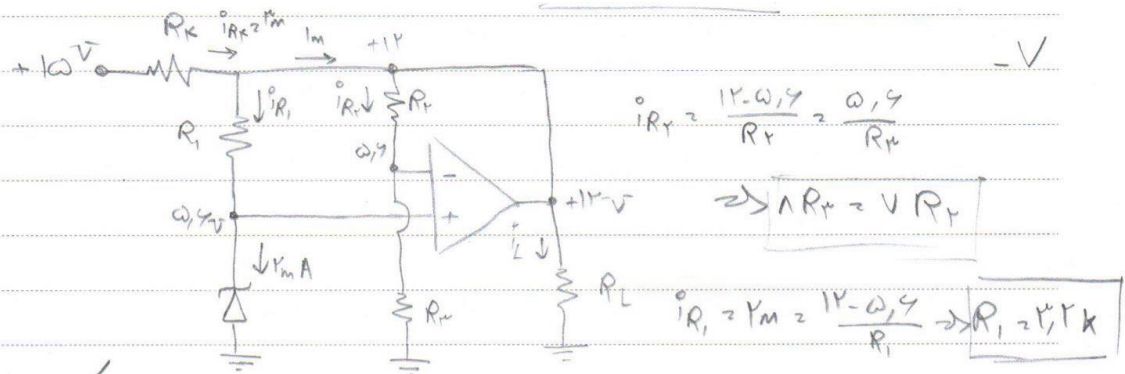
$$2 \text{ } \swarrow : R_2 = (R + \frac{R}{2}) \parallel R = \frac{R}{2} \quad 4 \text{ } \swarrow : R_4 = \frac{R}{2}$$

$$I_1 = I \quad I_2 = 2I \quad I_3 = KI \quad I_4 = -AI \quad (10)$$

$$V_1 = -I_1 R = -IR \quad V_2 = -I_2 R = -2IR \quad (11)$$

$$V_3 = -I_3 R = -KIR \quad V_4 = +I_4 \frac{R}{2} + V_3 = -AI \frac{R}{2} - KIR = -AIR$$





$R_K = 1k\Omega \Rightarrow i_{R_K} = 1mA$

$R_F = 1k\Omega \Rightarrow R_F = 1k\Omega$