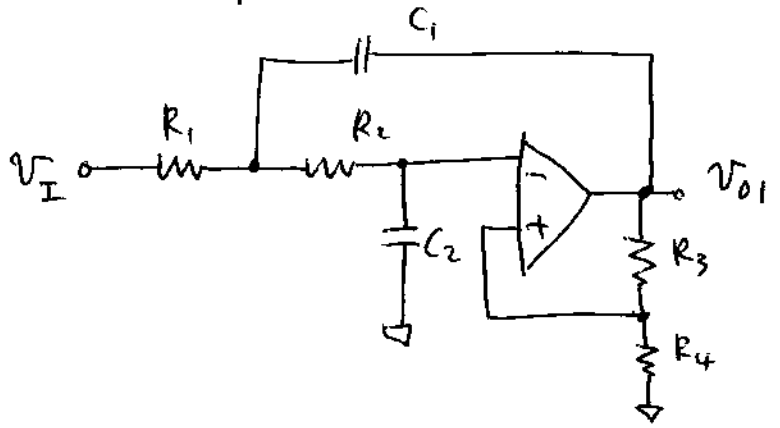
기말고사 대비.

① $f_{o1} = 0.997 \times 100 = 99.7\ Hz$

$Q_1 = 2.018$

$f_{o2} = 0.494 \times 100 = 49.4\ Hz$

(i) 2차 LPF 단



$R_1 = R_2 = R$, $C_1 = C_2 = C$

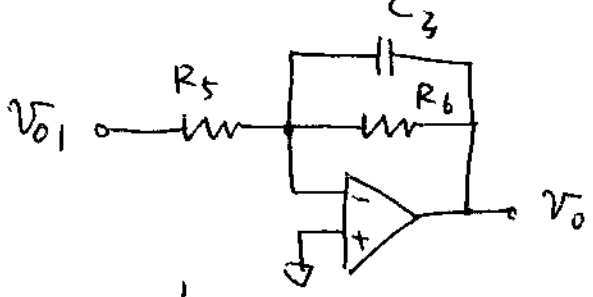
$RC = \dfrac{1}{2\pi \times 99.7} = 1.6 \times 10^{-3}$

$K = 3 - \dfrac{1}{2.018} = 2.51 = 1 + \dfrac{R_3}{R_4}$

$C = C_1 = C_2 = 0.01\,\mu f$, $R = R_1 = R_2 = 160\,k\Omega$

$R_3 = 15.1\,k\Omega$, $R_4 = 10\,k\Omega$

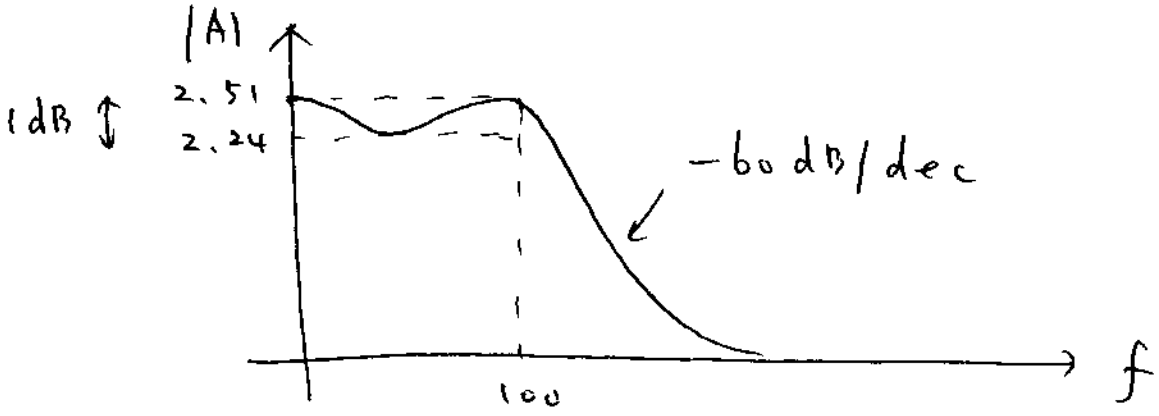
(ii) 1차 LPF 단



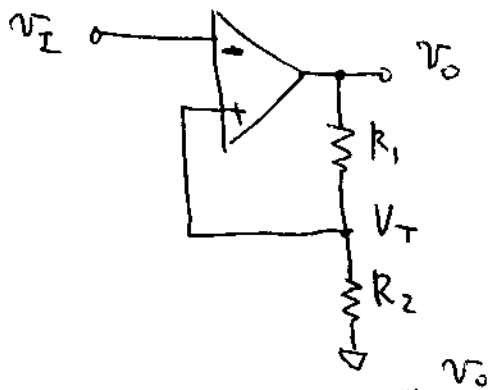
$R_6 C_3 = \dfrac{1}{2\pi \times 49.4} = 3.2 \times 10^{-3}$

$C_3 = 0.01\,\mu F$, $R_6 = 320\,k\Omega$, $R_5 = 320\,k\Omega$

(i) At (i) mid $\quad A_{dc} = 2.51 \times (-1) = -2.51$



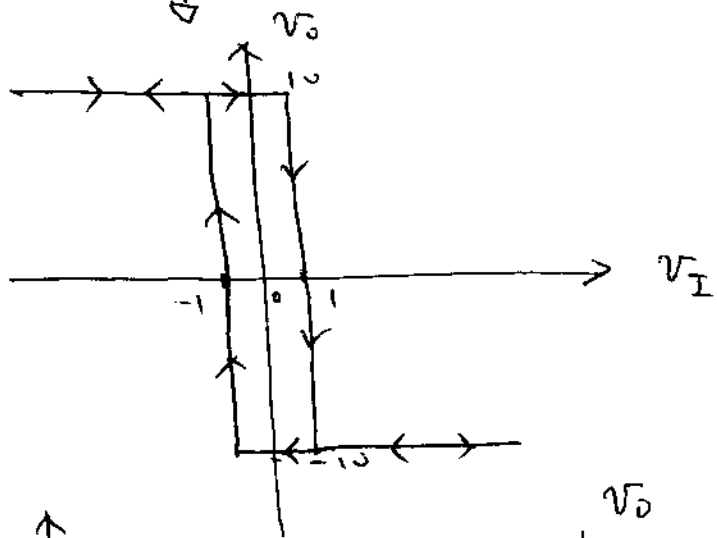
(2)

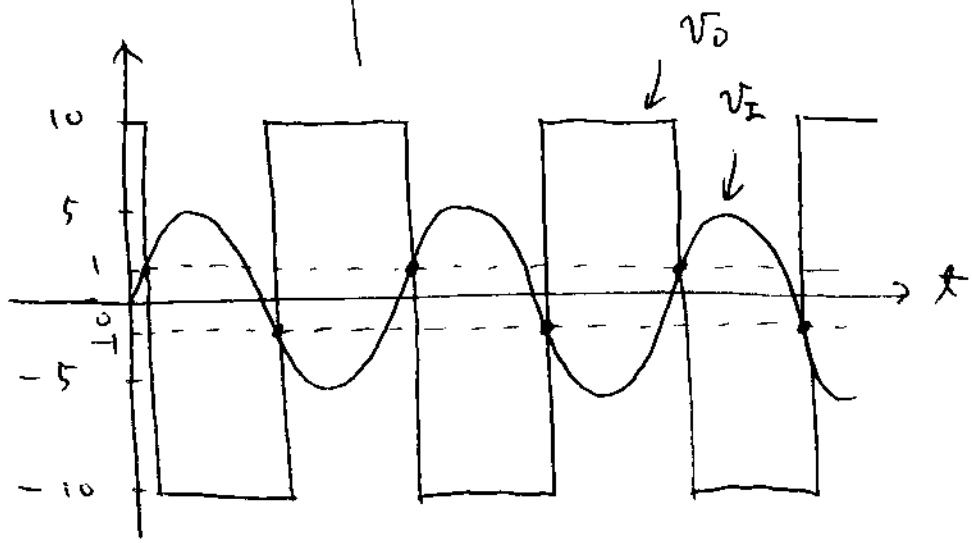


$V_{sat} = \pm 10\,V$

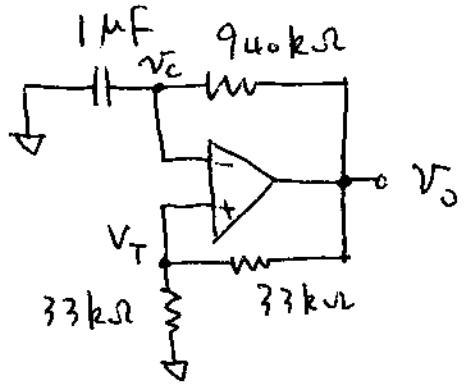
$V_T = \dfrac{R_2}{R_1 + R_2} V_{sat} = \pm 1$

$R_1 = 90\,k\Omega$, $R_2 = 10\,k\Omega$





(3)



$V_{sat} = \pm 10V$

$V_T = \frac{33}{33+33} V_{sat} = \pm 5V$

(i) $v_o = +10V$ 일 때 $V_T = 5V$

v_c 는 $+10V$ 를 향해 $\tau = RC = 10^{-6} \times 940 \times 10^{3}$ 의 시정수를 충전.

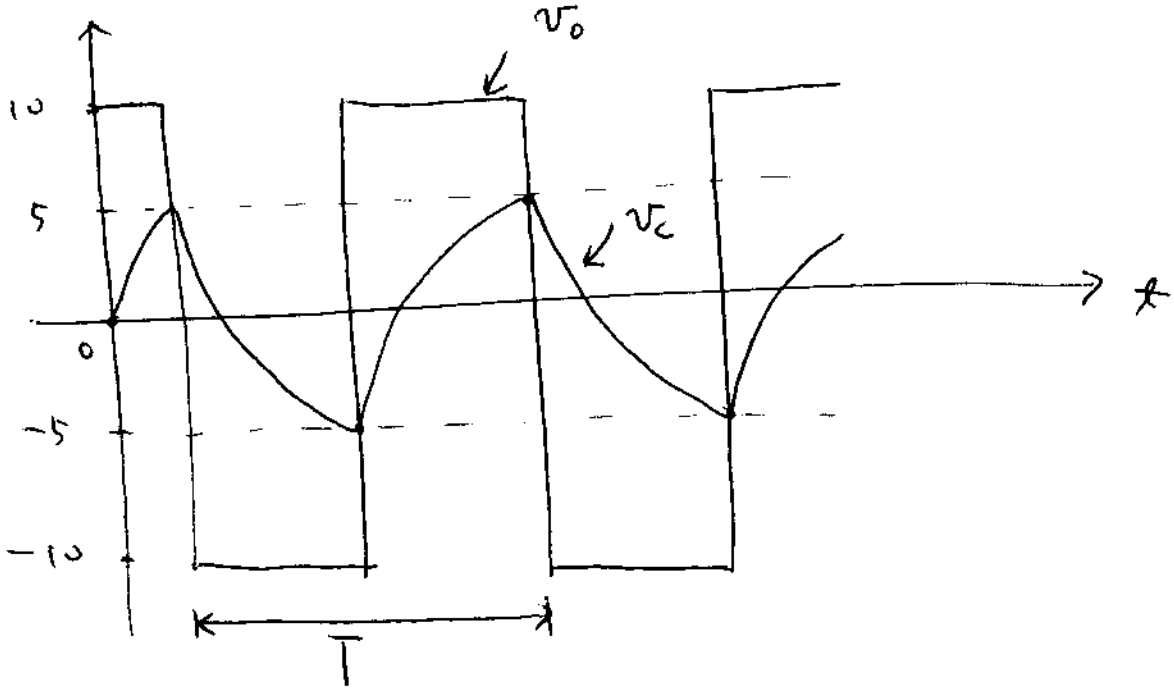
$= 0.94\ s$

v_c 가 V_T 를 초과하면 $v_o = -10$ 로 바뀜.

(ii) $v_o = -10V$ 일 때 $V_T = -5V$

v_c 는 $-10V$ 를 향해 $\tau = 0.94s$ 의 시정수를 충전

v_c 가 V_T 보다 낮아지면 $v_o = +10V$ 로 바뀜.

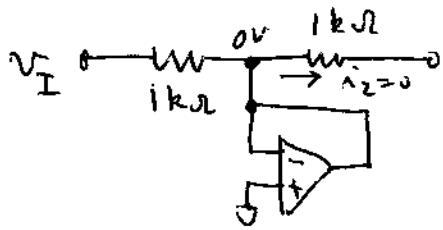


$T = 2RC \ln\left(1 + 2 \times \frac{33}{33}\right) = 2 \times 0.94 \times \ln 3$

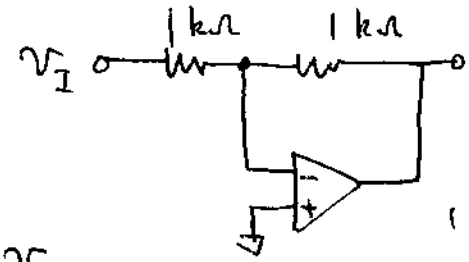
$= 2.065\ s.$

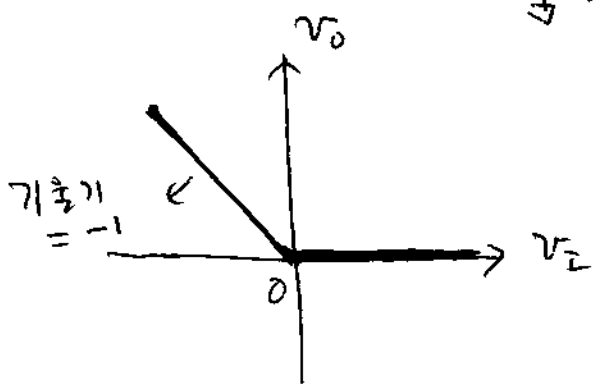
④

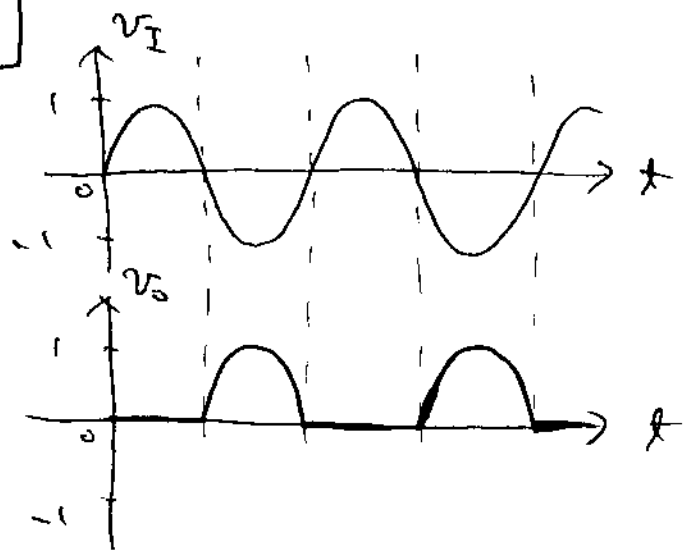
(i) $V_I > 0$ 일 때, D1 ON, $V_o = 0$, D2 OFF



(ii) $V_I < 0$ 일 때, D2 ON, D1 OFF

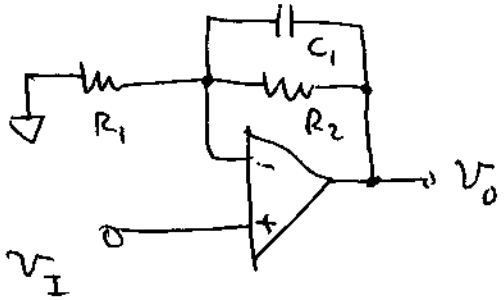






⑤ $GBP = 1 \times 10^6$

ⓐ $100 \times 10^3 = 10^5 < 10^6 \Rightarrow$ 1단으로 구현

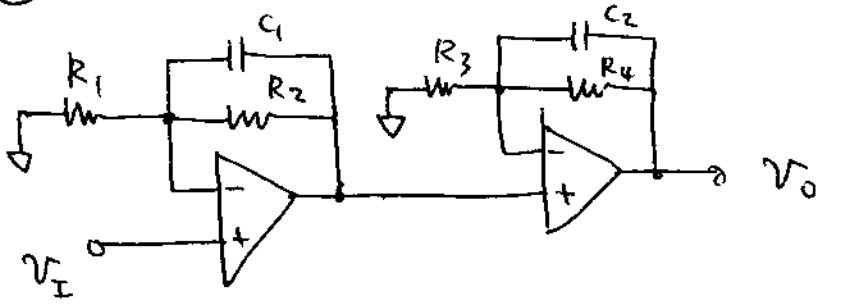


$$R_2 C_1 = \frac{1}{2\pi \times 10^3} = 1.592 \times 10^{-3}$$

$C_1 = 0.01\,\mu F$, $R_2 = 159.2\,k\Omega$

$1 + \frac{R_2}{R_1} = 100$ 이므로 $R_1 = 1.61\,k\Omega$

(b) $100 \times 10^5 = 10^7 > 10^6$ ⇒ 2단으로 구성



$$1 + \frac{R_2}{R_1} = 10 \quad , \quad 1 + \frac{R_4}{R_3} = 10$$

$$R_2 C_1 = \frac{1}{2\pi \times 10^5} \quad , \quad R_4 C_2 = \frac{1}{2\pi \times 10^5}$$

$$= 1.592 \times 10^{-6} \quad , \quad = 1.592 \times 10^{-6}$$

$C_1 = C_2 = 0.1\,nF$

$R_2 = R_4 = 15.92\,k\Omega$

$R_1 = R_3 = 1.77\,k\Omega$