School of Computer Science and Engineering
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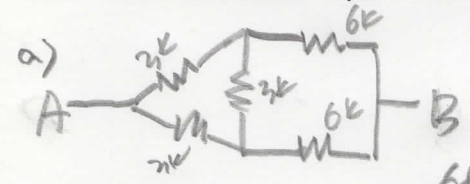
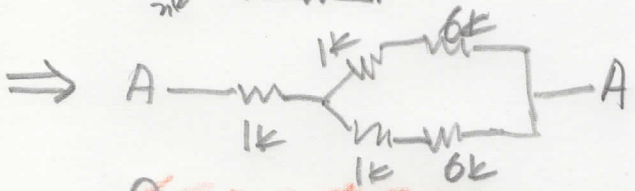
2024. 전기전자공학개론 중간고사 정답지.

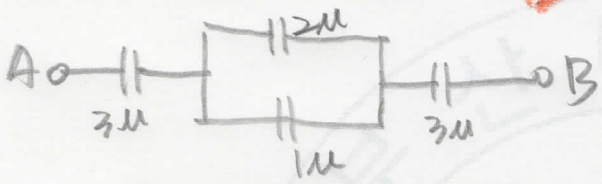
1. a)





$\therefore R_{AB} = 4.5\ k\Omega$ 5점

b)



$\therefore C_{AB} = 1\ \mu F$ 5점

2. $10m + \frac{V_s}{6k} + \frac{V_s}{3k} - 4\frac{V_s}{3k} = 0$

$V_s = 10m \cdot \frac{6k}{5} = 12\ [V]$

$\therefore V_o = \frac{4k}{4k+2k} V_s = 8\ [V]$ 10점

3, b) $\frac{V_o + 10}{2k} - 1m + \frac{V_o}{2k} = 0$

$\therefore V_o = 6\ [V]$ 5점

a) $-10 + i \cdot 2k + (i + 1m)2k = 0$

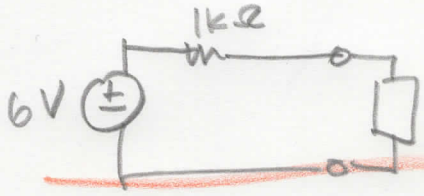
$8 = 4k \cdot i \quad \therefore i = 2mA$

$\therefore i_o = 3mA$ 10점

c) $R_{Th} = 1k\Omega$

$V_{oc} = V_o = 6\ [V]$

$= V_{Th}$



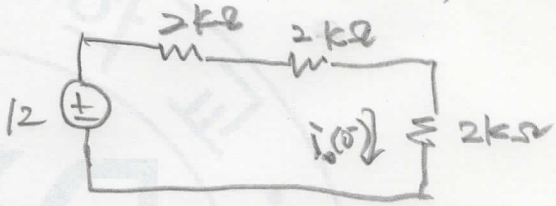
10점

d) $R_L = 1k\Omega$

$P_{max} = 1 \times 10^3 \cdot (3 \times 10^{-3})^2$

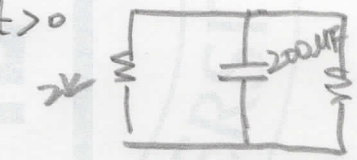
$= 9\ [mW]$ 5점

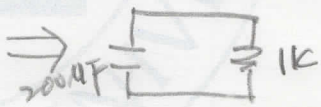
4. a) $i_o(0^+) = i_o(0^-)$, at $t = 0^-$



$\therefore i_o(0^+) = \frac{12}{6k} = 2\ [mA]$ 5점

b) $t > 0$





$\therefore \tau = RC = 0.2\ [s]$ 5점

c) $v(t) = k_1 + k_2 e^{-t/0.2}, \quad t > 0$

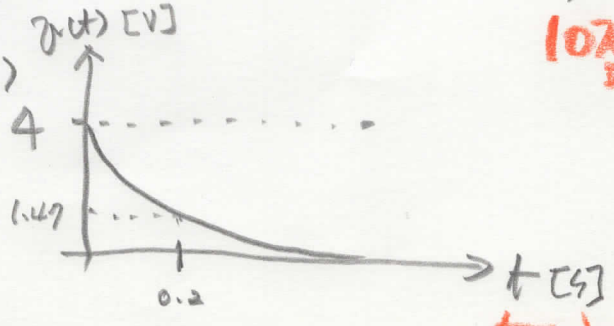
$v(\infty) = k_1 = 0$

$v(0) = k_2 = 4\ [V]$

$\therefore v(t) = 4e^{-t/0.2}\ [V], \quad t > 0$

10점

d)



5점

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2024. 중간고사

5. a) $\frac{d^2v(t)}{dt^2} + \frac{1}{RC}\frac{dv(t)}{dt} + \frac{1}{LC}v(t) = 0$

$\frac{d^2v(t)}{dt} + 3\frac{dv(t)}{dt} + 2v(t) = 0$

10점

b) $s^2 + 3s + 2 = 0$

$(s+1)(s+2) = 0$ 5점

c) $v(t) = k_1e^{-t} + k_2e^{-2t}, \quad t>0$

$v(0) = k_1 + k_2 = 2$

at the top node

$\frac{v(t)}{R} + C\frac{dv(t)}{dt} + i_L(t) = 0$

$\left.\frac{dv(t)}{dt}\right|_{t=0} = -\frac{v(0)}{RC} - \frac{i_L(0)}{C}$

$= -3v(0) - i_L(0)$

$= -8$

$\left.\frac{dv(t)}{dt}\right|_{t=0} = -k_1e^{-t} - k_2e^{-2t}\Big|_{t=0}$

$= -k_1 - 2k_2$

$= -8$

$k_1 + k_2 = 2$

$k_1 + 2k_2 = 8$

$\therefore k_2 = 6, \quad k_1 = -4$

$\therefore v(t) = -4e^{-t} + 6e^{-2t}$ [V], $t>0$

10점