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전기전자공학개론 학기말 고사
정답지. 2024. 12. 19

1. a) $X_L = j2\pi fL = j2\cdot3\cdot5k\cdot4m = j120\Omega$ 5점

b) $X_C = -j\frac{1}{2\pi fC} = -j\frac{1}{2\cdot3\cdot5k\cdot\frac{1}{3}\mu} = -j100\Omega$ 5점

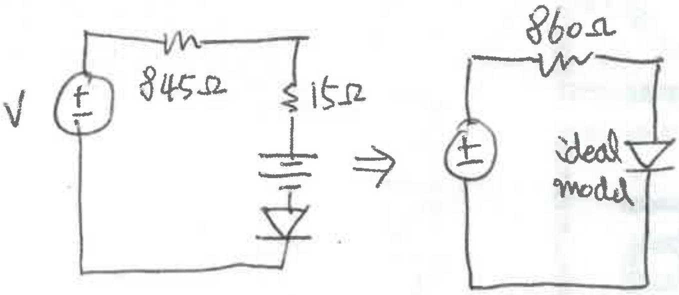
c) $Z = R + (X_L + X_C) = 100 + j20\ \Omega$ 5점

d) $Y = G + (B_L + B_C)$

$= \frac{1}{100} + j\left(-\frac{1}{120} + \frac{1}{100}\right)$

$= \frac{1}{100} + j\frac{1}{600}\ \mho$ 5점

2. If we apply a piecewisewise linear model diode to the circuit



a) $I_D = \frac{4.3}{860} = 5\ mA$ 10점

b) $V_D = 0.7 + 15\cdot5\times10^{-3} = 0.775V$ 10점

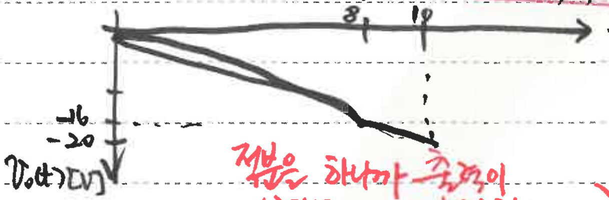
3. Integrator (미분기는 생각하고 낸 문제라

a) $i_i + i_f = 0 \quad \therefore \frac{v_i}{R} + C\frac{dv_o(t)}{dt} = 0$

$\therefore v_o(t) = -\frac{1}{RC}\int v_i(t)\,dt$

$= -\frac{1}{2}\int v_i(t)\,dt$ 10점

b) $v_o(t) = \begin{cases} -\frac{1}{4}t^2, & 0 \le t \le 8 \\ -16 - 4(t-8) + (t-8)^2, & 8 \le t \le 10 \end{cases}$



10점

적분은 하니까 출력이 어렵습니다. 미안합니다)

10점

4. a) BJT: ~~Binary~~ Bipolar Junction Transistor 5점

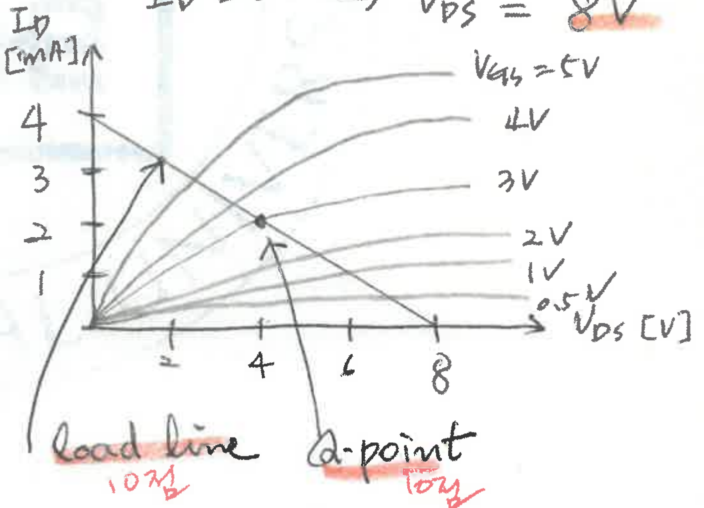
~~b)~~ MOSFET: Metal Oxide Semiconductor Field Effect Transistor 5점

b) BJT controls the current through it by input current. 5점

FET controls the current through it by the input voltage. 5점

5. a) $V_{DS} = 0 \Rightarrow I_D = 4mA$

$I_D = 0 \Rightarrow V_{DS} = 8V$



b) $V_{GS} = V_{DD}\frac{R_2}{R_1 + R_2} = 8\cdot\frac{3k}{3k + 5k}$

$= 3\ [V]$

$\therefore$ Q-point $\simeq$ (2mA, 4V)