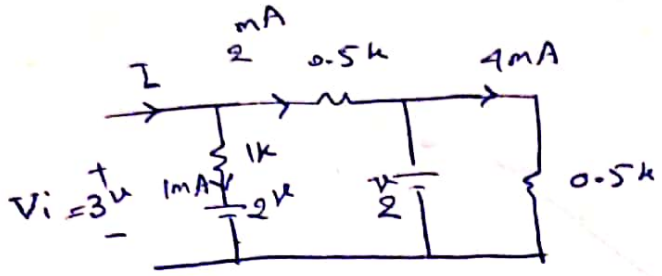
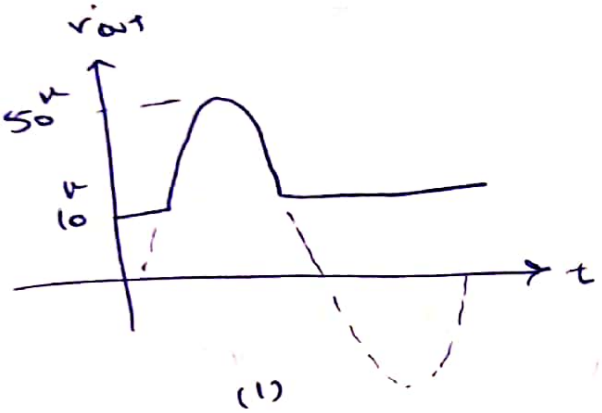
(Solutions

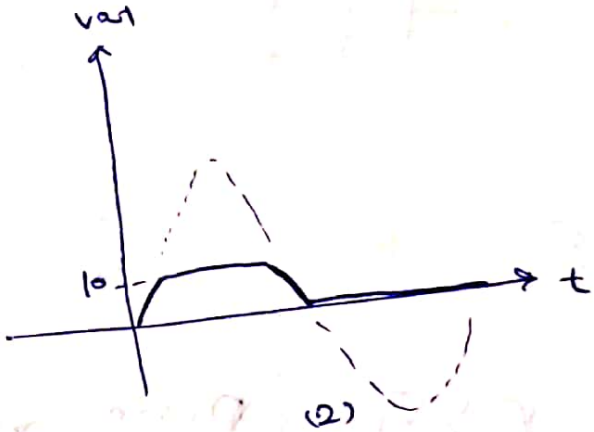
① D_1 & D_2 : on



$$I = \frac{3-2}{0.5k\Omega} + \frac{3-2}{1k\Omega} = 2mA + 1mA = 3mA$$

②





$v_i < 0$ D_1 off D_2 on

$0 < V_i < 10$ D_1 off D_2 on

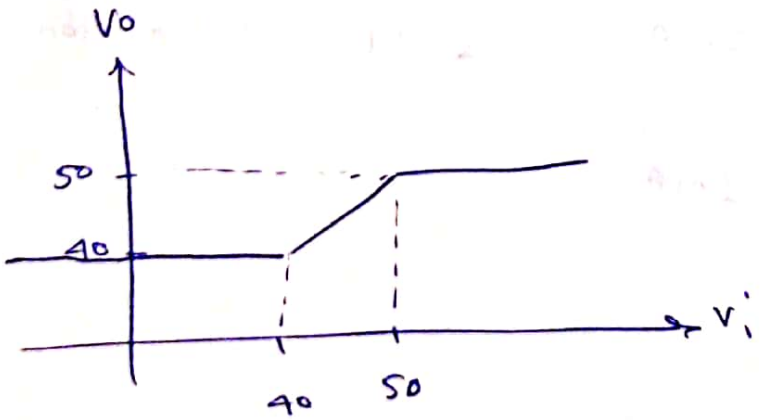
$v_i > 10$ D_2 off D_1 off

$v_i < 10$ D_1, D_2 off

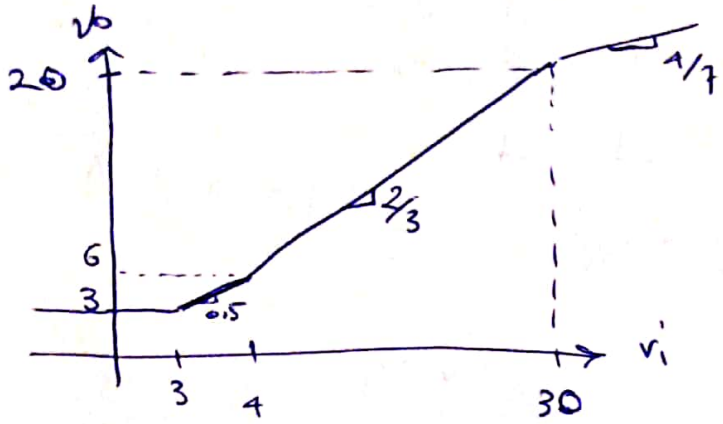
$0 \leq v_i \leq 20$ { D_1 on, D_2 off

$v_i > 20$ { D_1 on, D_2 on

③



④

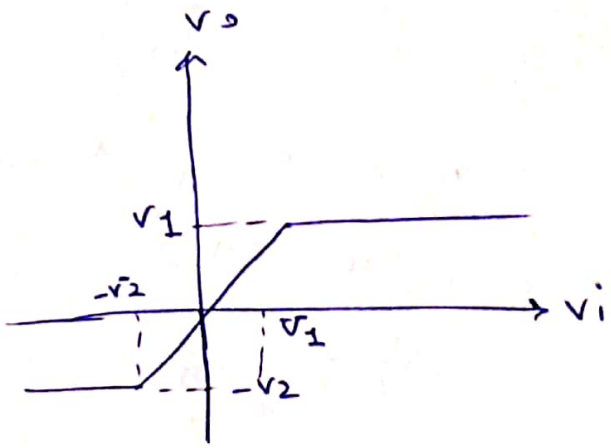


⑤

$v_i > V_1$ { D_1 : on, D_2 : off } $\rightarrow v_o = V_1$

$-V_2 < v_i < V_1$ { D_1 : off, D_2 : off } $\rightarrow v_o = v_i$

$v_i < -V_2$ { D_1 : off, D_2 : on } $\rightarrow v_o = V_2$



⑥

$i_{R_1} = \frac{3-1}{1k\Omega} = 2mA$

$i_{R_2} = \frac{3-2}{1k\Omega} = 1mA$

$i_{R_3} = 0$

* All diodes are on.

(7)

D_1 : off

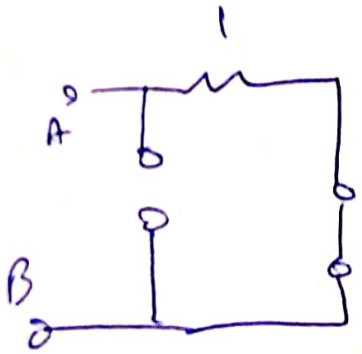
D_2 : on

KCL) $\frac{V_o - 2}{2k} + \frac{V_o - 5}{2k} = 0$

$V_o - 2 + V_o - 5 = 0$

$2V_o = 7 \rightarrow V_o = 7/2 = 3.5$ V

(8)



$R_{th} = 1\ \Omega$

(9)

D_5 : off

D_1 : off

D_2 : on $\Rightarrow$ $V_{out} = 0$

D_4 : on

D_3 : It's not important to consider "off" or "on"

(10)

$I = \frac{0 - (-10)}{10k} = \frac{10}{10k} = 1\ mA$