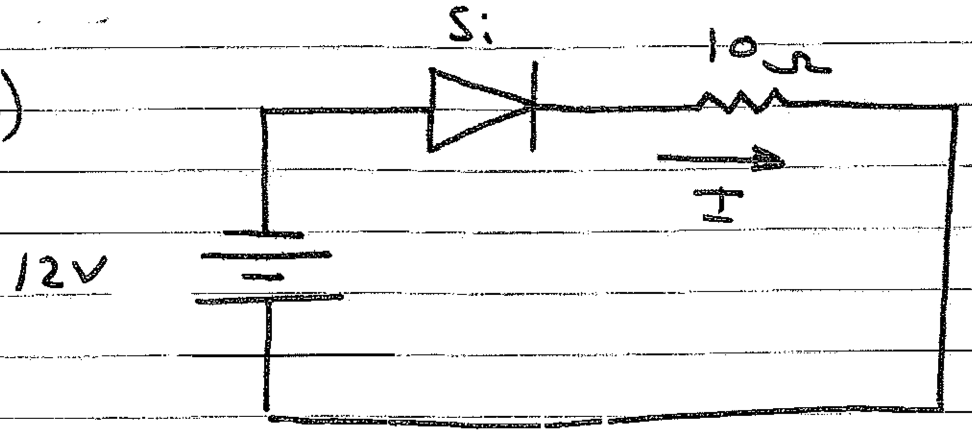
5:

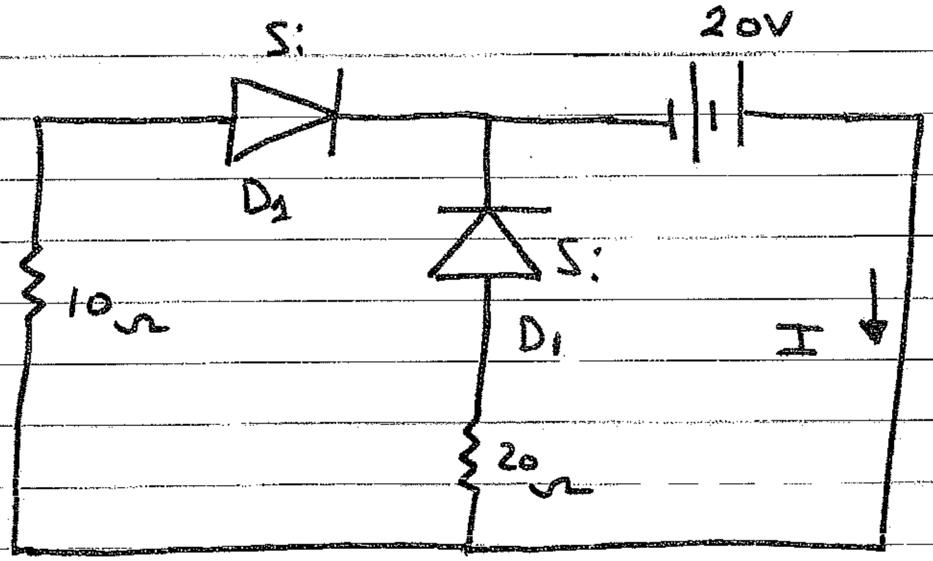
a)



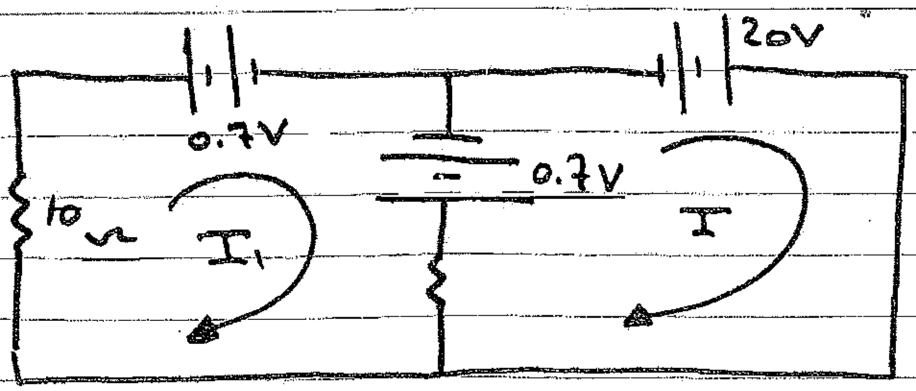
The diode is reversed bias

$\therefore\ I = 0$

b)



let assume D_1 and D_2 are on



KVL in mesh ①

$$0 = 30 I_1 - 20 I$$

KVL in mesh ②

$$19.3 = 20 I - 20 I_1$$

Solving for I and I_1, we get

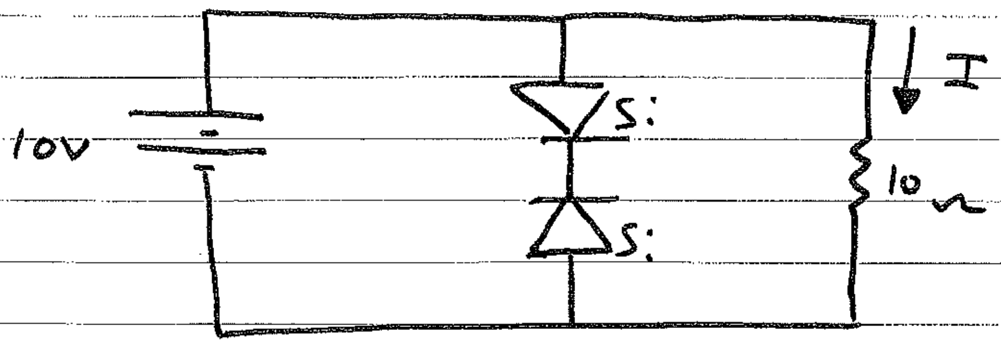
$$I = 2.895 A$$

$$I_1 = 1.93 A$$

$$I_{D2} = I_1 = 1.93 A > 0$$

$$I_{D1} = I - I_1 = 0.965 A > 0$$

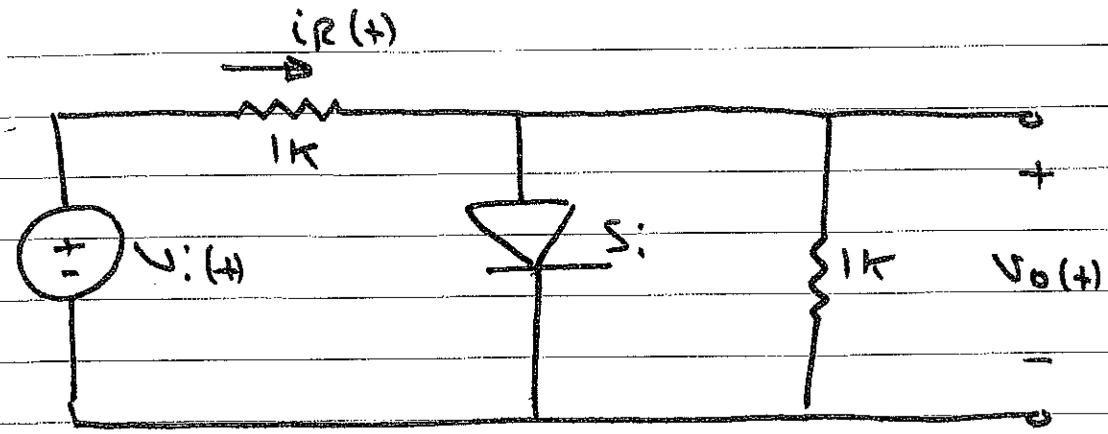
c)



Both diodes are OFF, replace them with open circuit

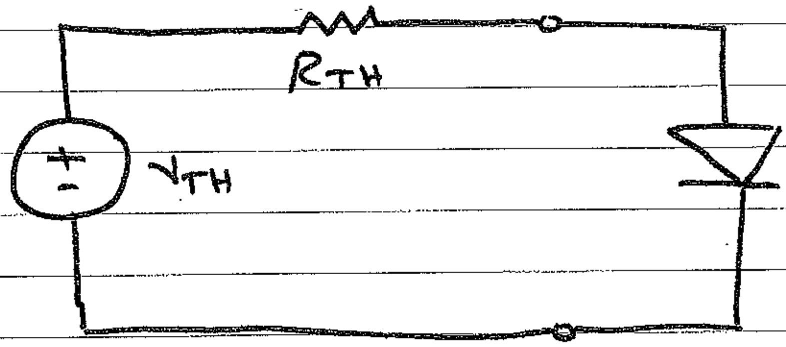
$$I = \frac{10V}{10\Omega} = 1A$$

26:



$v_i(t) = 10 \sin \omega t$ V.

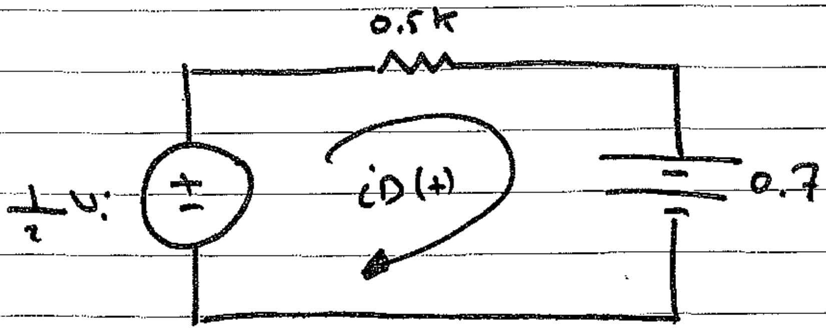
using thevenin's theorem



$R_{TH} = 1k \| 1k = 0.5k$

$$V_{TH} = \frac{1k}{1k + 1k} V_i(t) = \frac{1}{2} V_i(t)$$

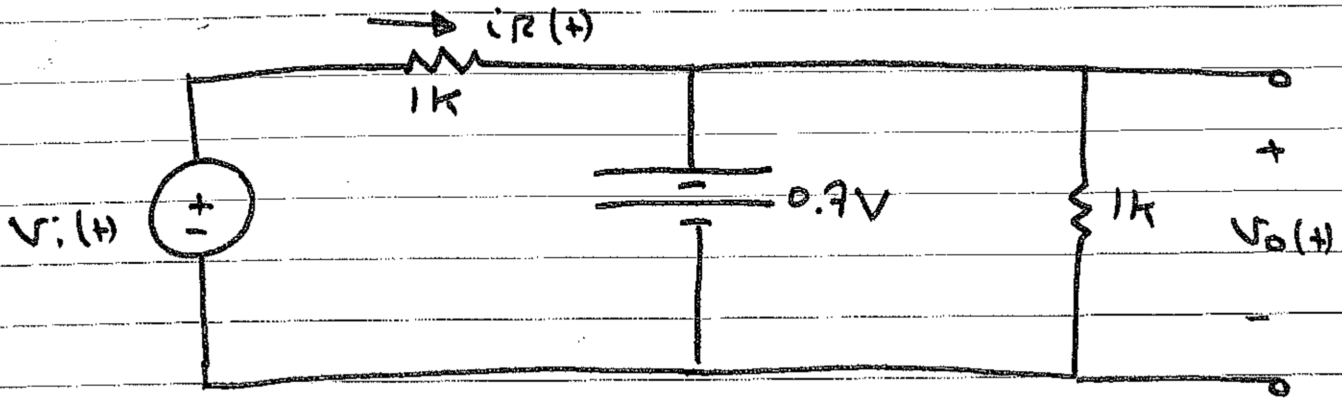
assume the diode is on



$$i_D(t) = \frac{\frac{1}{2} V_i(t) - 0.7}{0.5k} > 0$$

$\therefore \; V_i(t) > 1.4$ V

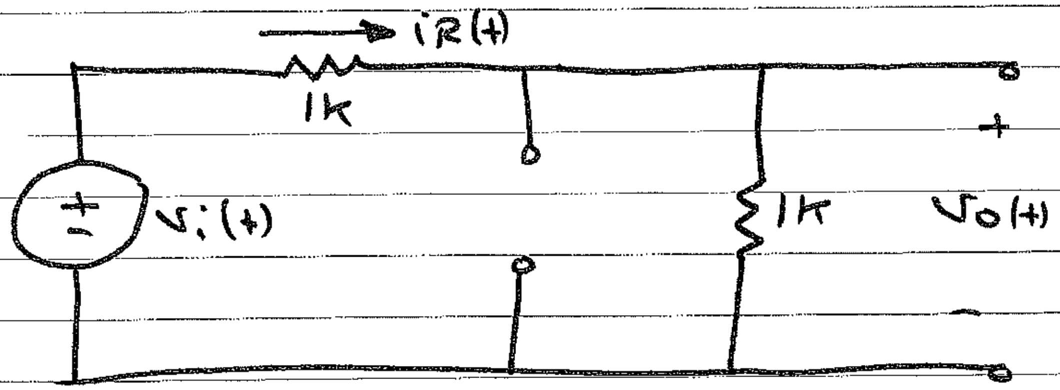
∴ When $v_i(t) > 1.4\,V$, Diode is on



$$v_o(t) = 0.7\,V$$

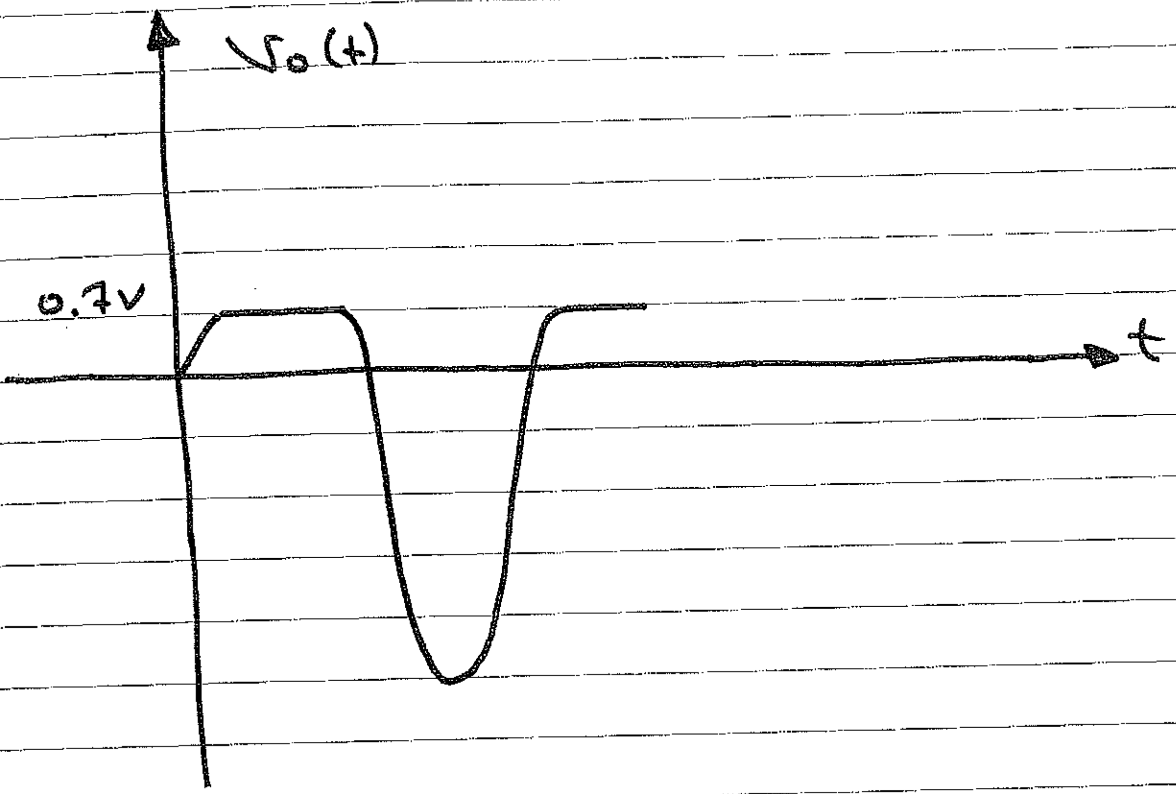
$$i_R(t) = \frac{v_i(t) - 0.7V}{1k}$$

When $v_i(t) < 1.4\,V$, Diode is off

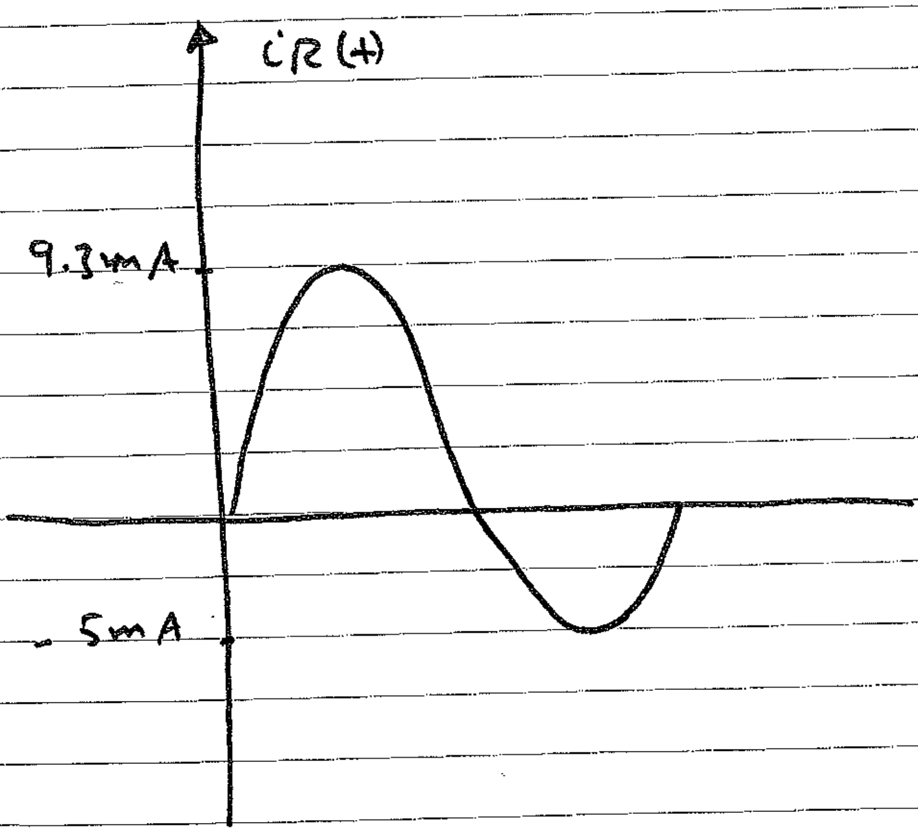


$$v_o(t) = \frac{1}{2} v_i(t)$$

$$i_R(t) = \frac{v_i(t)}{2k}$$

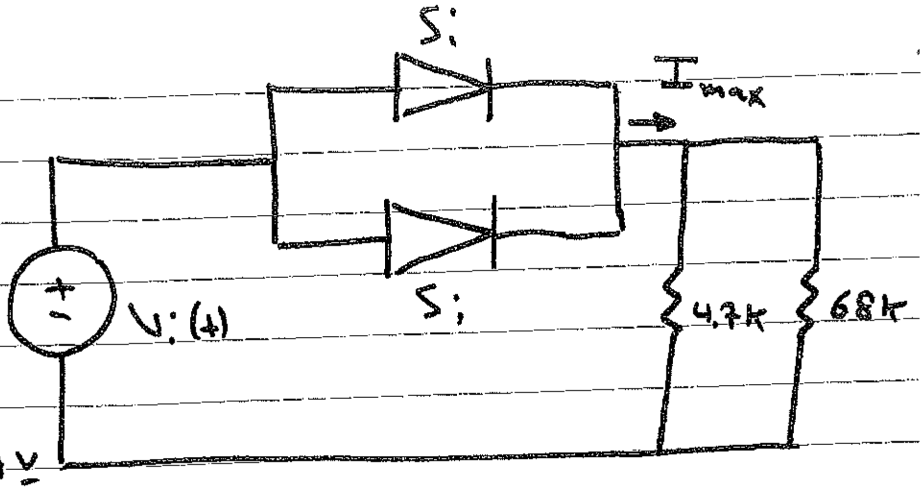


$V_o(t)$
0.7V
t



$i_R(t)$
9.3mA
-5mA

27 :



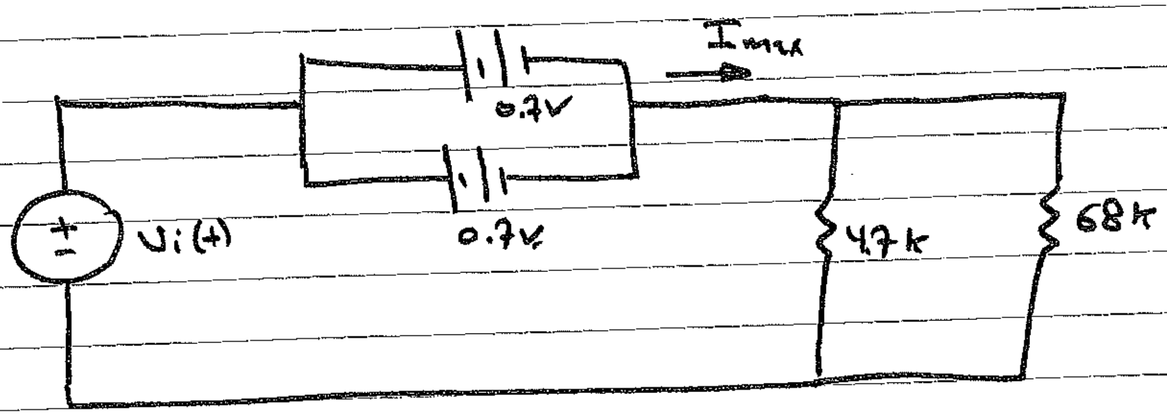
$V_i(t) = 160 \sin \omega t \, V$

$$P_{max} = 0.7 \, I_{D,max} = 14 \, mW$$

a) $\therefore I_{D,max} = 20 \, mA$

b) $I_{max} = 2 \, I_{D,max} = 40 \, mA$

c) when $V_i(t) = 160 \, V$, both diodes are on



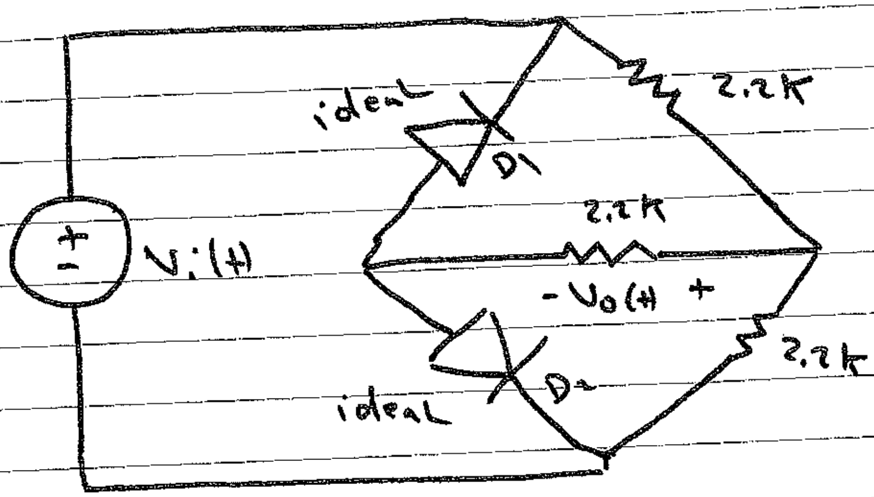
$$I_{max} = \frac{160 - 0.7}{4.7k \parallel 68k} = 36.2 \, mA$$

$$I_D = \frac{I_{max}}{2} = 18.1 \, mA$$

d) $I_D = 36.2 \, mA > 20 \, mA$

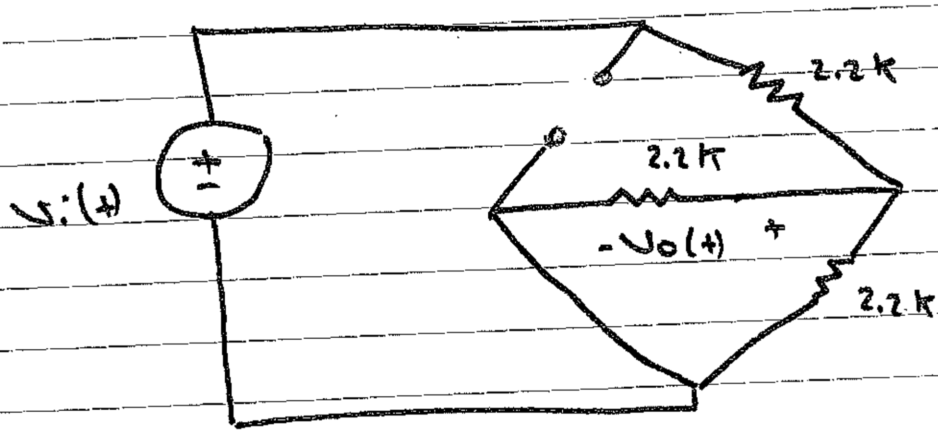
$\therefore$ The diode will be damaged

31 :



$V_i(t) = 170 \sin\omega t$ V

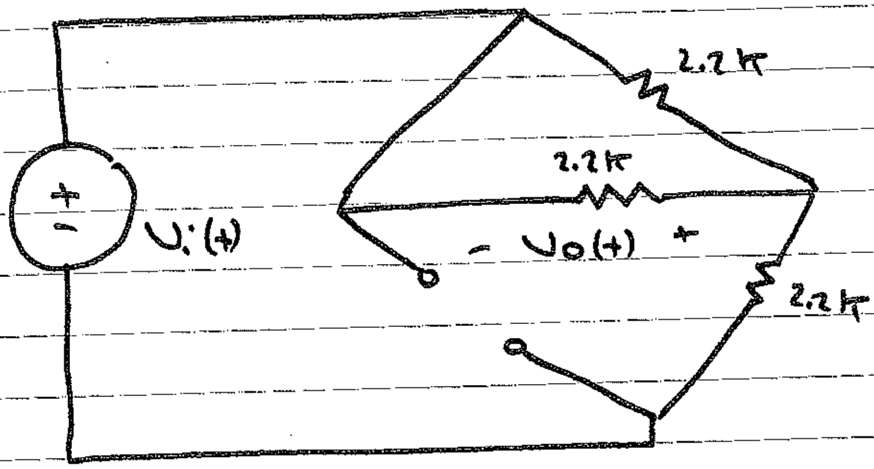
When $V_i(t) > 0$, D_1 is off and D_2 is on



$$V_o(t) = \frac{2.2k \| 2.2k}{2.2k \| 2.2k + 2.2k} V_i(t)$$

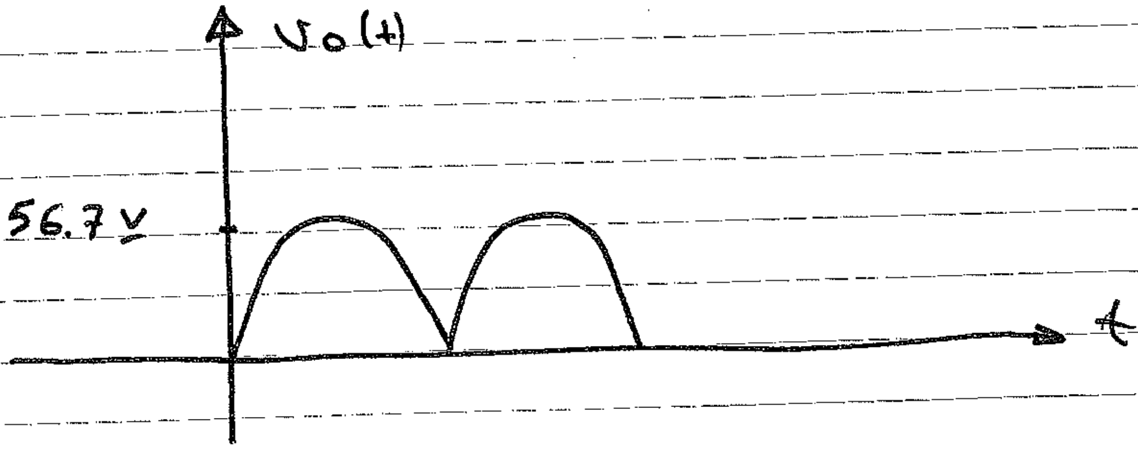
$V_o(t) = + 0.333 \; V_i(t)$

When $v_i(t) < 0$, D_1 is on, and D_2 is off



$$v_o(t) = -\frac{2.2k \| 2.2k}{2.2k \| 2.2k + 2.2k} v_i(t)$$

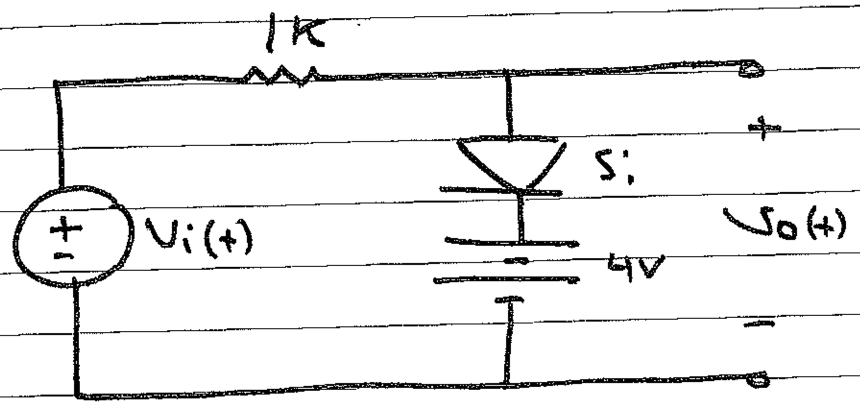
$$v_o(t) = -0.333\, v_i(t)$$



$$V_{o,dc} = \frac{2V_m}{\pi} \simeq 36\ \text{V}$$

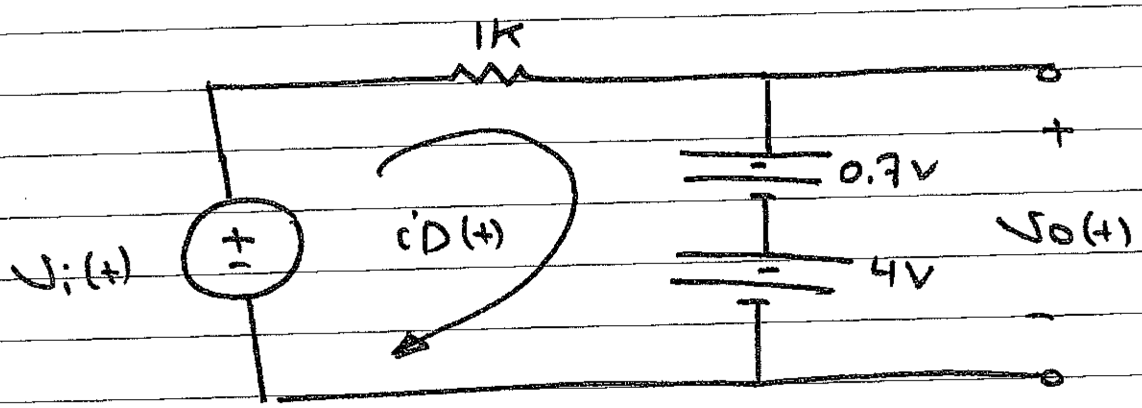
35 :

a)



$V_i(t) = 8 \sin \omega t$ V

assume the diode is on



$$i_D(t) = \frac{V_i(t) - 4.7}{1k} > 0$$

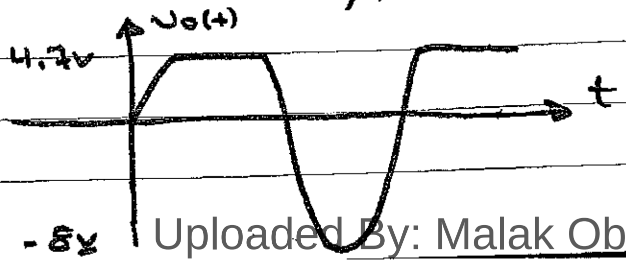
$\therefore$ $V_i(t) > 4.7$ V

$\therefore$ When $V_i(t) > 4.7$V , Diode is on

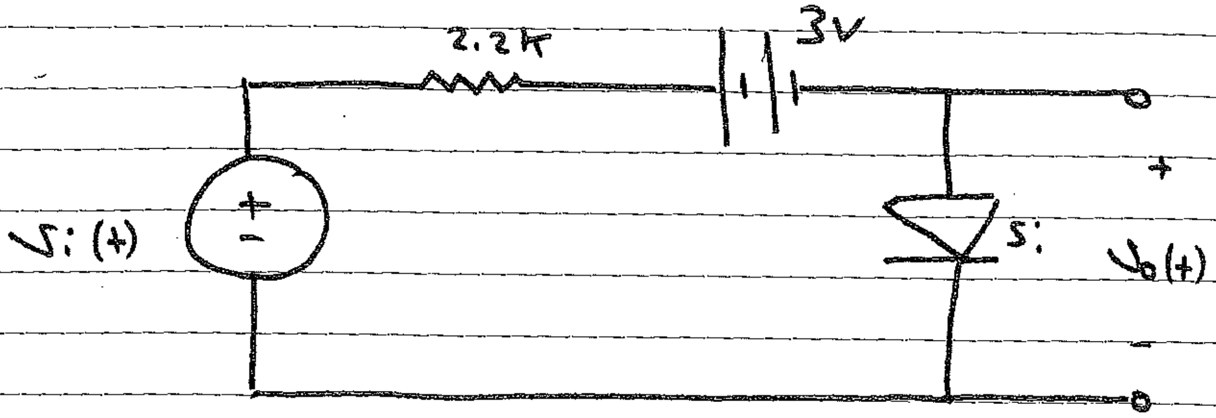
and $V_o(t) = 4.7$ V

$\therefore$ When $V_i(t) < 4.7$V , Diode is off

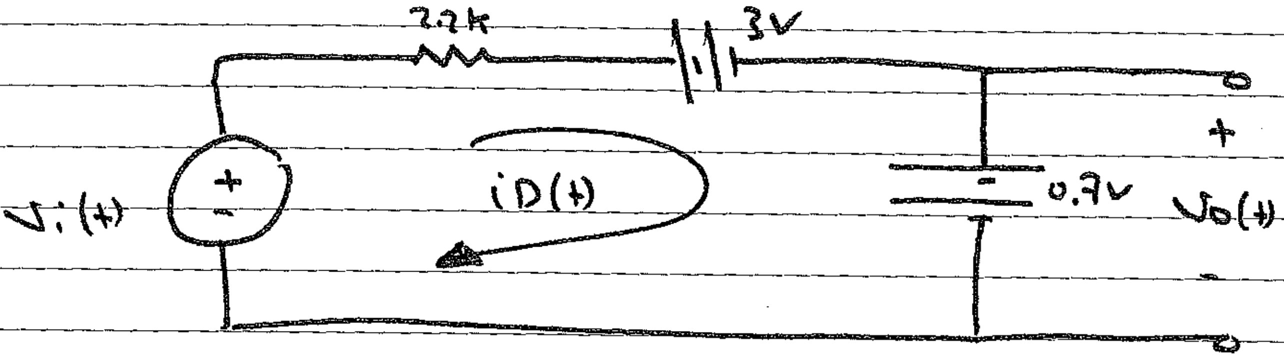
$V_o(t) = V_i(t)$



b)



assume the diode is on

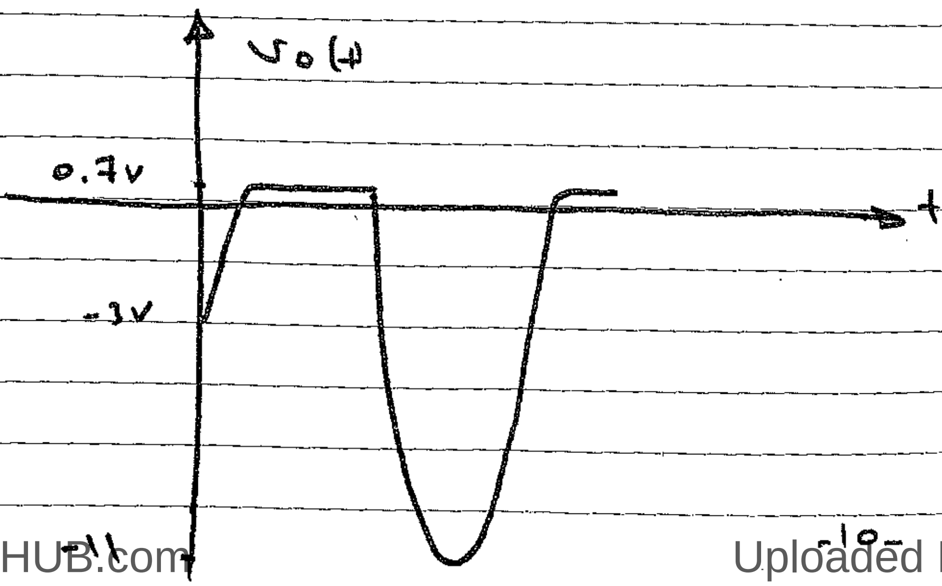


$$iD(t) = \frac{Vi(t) - 3.7}{2.2k} > 0$$

$\therefore$ $Vi(t) > 3.7\ V$

$\therefore$ when $Vi(t) > 3.7\ V$, $Vo(t) = 0.7\ V$

$\therefore$ when $Vi(t) < 3.7\ V$, $Vo(t) = Vi(t) - 3$



40 :