Assignment - 3 [Solution]

1

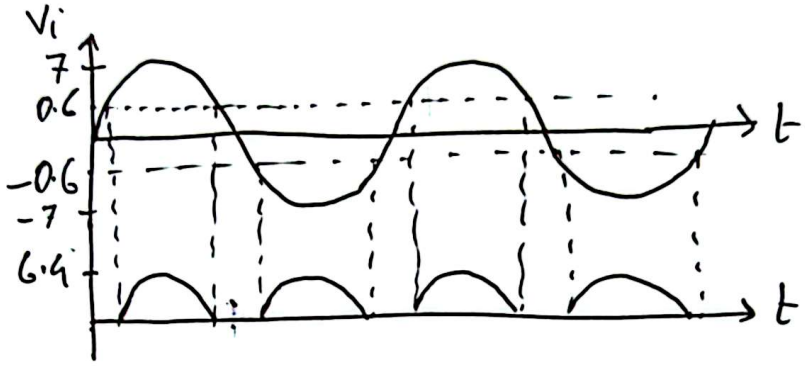
a) f_i $V_s(t) = 7\sin(400\pi t)$

$\therefore f_i = 200\ Hz$

$f_o = 2 \times f_i$ [Full wave Rectifier]

$= 400\ Hz$

b)



c) $V_{DC} = \frac{2V_m}{\pi} - 2V_{D_0}$ $\quad \therefore V_m = 7\ V$, $V_{D_0} = 0.3$

$= 3.86\ V$

d) $C = 100\mu F$, $R = 5K$ $\quad f_r = 2 \times 200\ Hz = 400\ Hz$, $V_{D_0} = 0.3$

$V_p = V_m - 2V_{D_0} = 6.4\ V$

$\therefore V_{r(p-p)} = \frac{V_p}{f_r R C}$

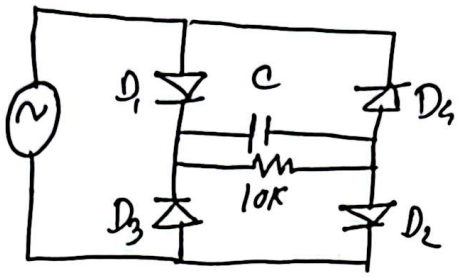
$= \frac{6.4}{400 \times 5 \times 10^3 \times 100 \times 10^{-6}} = 0.032 V$

e) $V_{DC} = V_p - \frac{V_{r(p-p)}}{2} = 6.4 - \frac{0.032}{2} = 6.384\ V$

CamScanner

2#

a)



b) $V_m = 10$, $V_{D0} = 0.8$

$V_p = V_p - 2V_{D0} = 8.4$

$V_{r(p-p)} = 3\% \times V_p = 8.4 \times \frac{3}{100}$

$= 0.252$

c) $V_{DC} = V_{Avg} = V_p - \frac{V_{r(p-p)}}{2}$

$= 8.4 - \frac{0.252}{2}$

$= 8.274$

d) $V_{r(p-p)} = \frac{V_p}{f_r R C}$

$\Rightarrow C = \frac{8.4}{100 \times 10 \times 10^3 \times 0.252}$

$= 33.33 \times 10^{-6} = 33.33\ \mu F$

$f_i = 50\ Hz$
$f_r = 100\ Hz$
$R = 10 \times 10^3$

3 b) $C = 8\,MF \quad R = 10K$

$F_R = 100H \quad \therefore F_i = \frac{F_R}{2} = 50Hz$

$V_{D_0} = 1V$

$I_{Avg} = 0.75mA \quad \therefore V_{Avg} = 0.75 \times 10$

$= 7.5V$

$V_{Avg} = V_p - \frac{V_{r(p-p)}}{2}$

$= V_p - \frac{V_p}{2f_r RC} = V_p\left(1 - \frac{1}{2f_r RC}\right)$

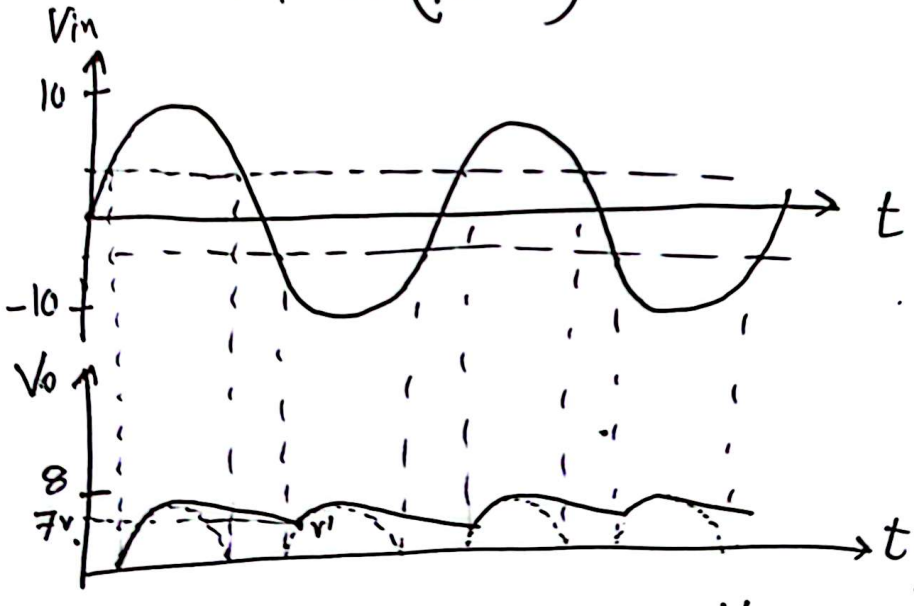
$\therefore V_p = \frac{V_{Avg}}{\left(1 - \frac{1}{2f_r RC}\right)}$

$= 8V$

$\therefore V_m = V_p + 2V_{D_0} = 10V$

$\therefore V_{in} = 10\sin(2\pi 50t)$

$= 10\sin(100\pi t)$



$V_{r(p-p)} = \frac{8}{100 \times 8 \times 10^{-6} \times 10 \times 10^3}$

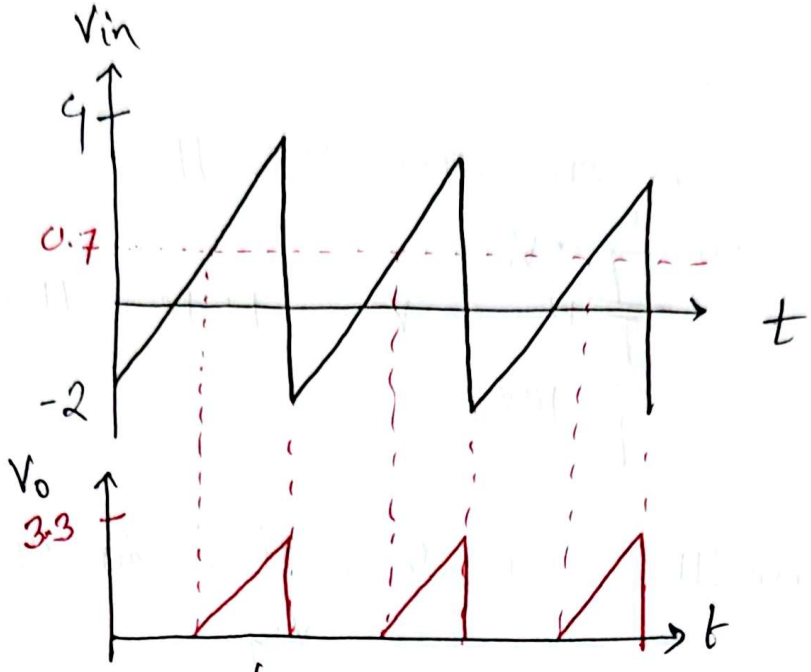
$= 1V$

$V_{r(p-p)} = V_p - V'$

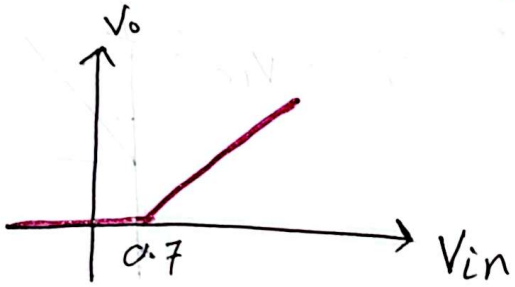
$\Rightarrow V' = 8 - 1 = 7V$

4#

a) i)

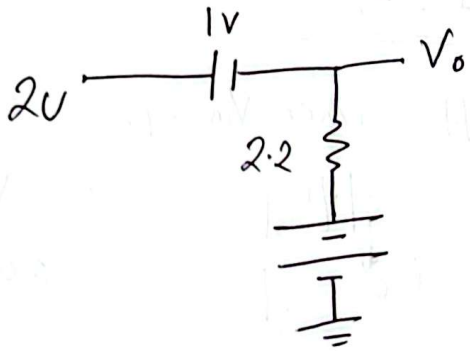


ii)



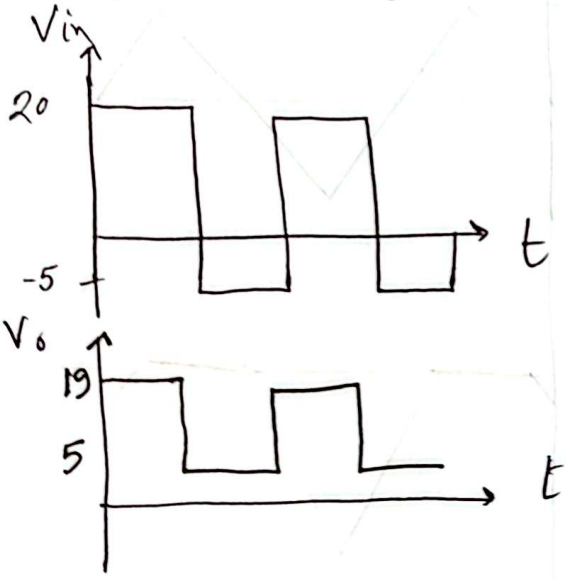
b)

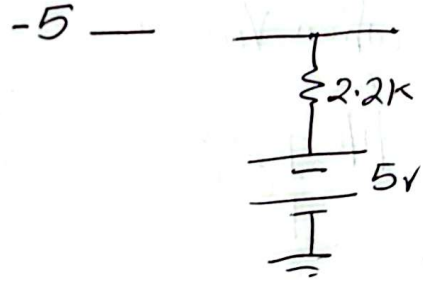
for, Vin = 20v



$V_o = 20 - 1$
$= 19$

for, Vin = −5v



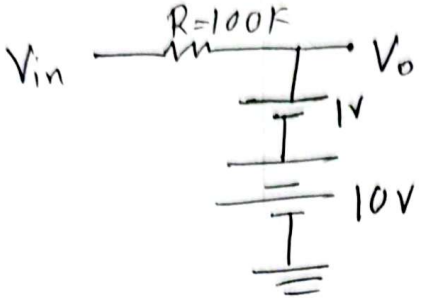


$V_o = 5$

5#

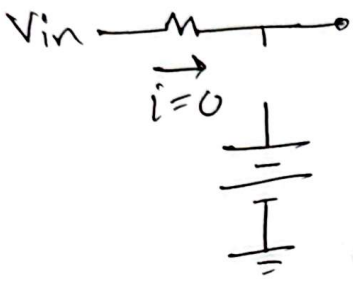
Circuit-2

Diode will be on when $V_{in} > 11V$

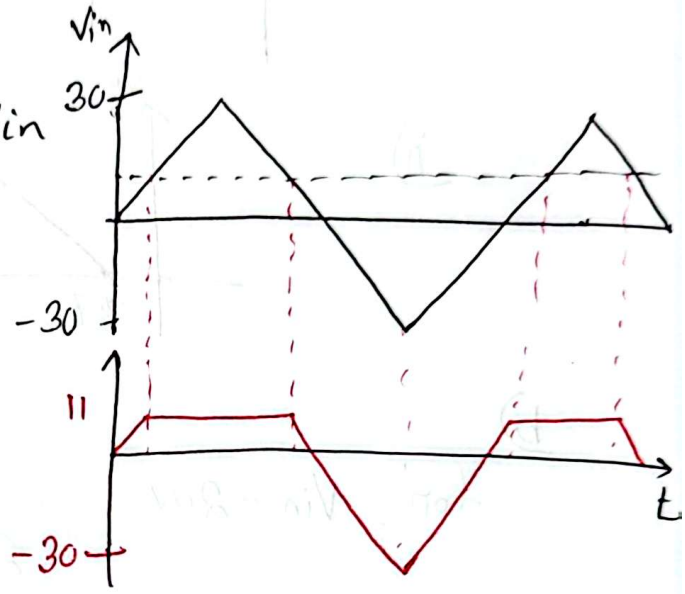


$V_o = 1 + 10 = 11\,V$

if $V_{in} < 11V$ Diode will remain off [R.B]



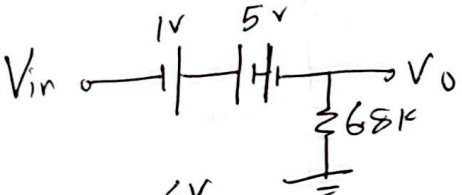
$V_o = V_{in}$

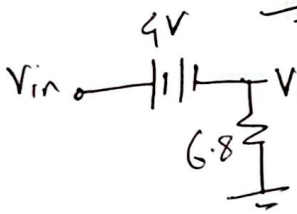


Circuit-3

D → off, when $V_{in} > 4V$

D → ON, when $V_{in} < 4$





$V_o = V_{in} - 4$