CSE251

Assignment — 01

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Section — 18

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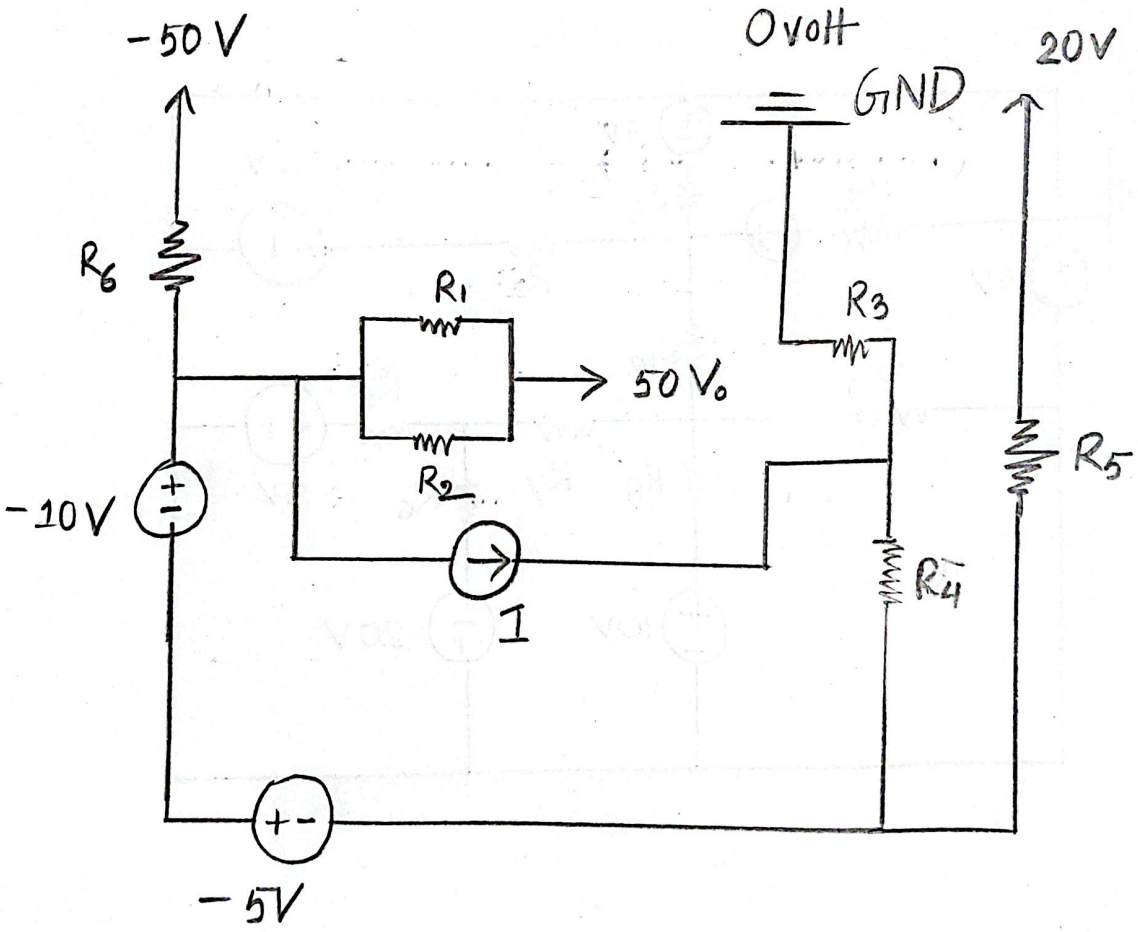
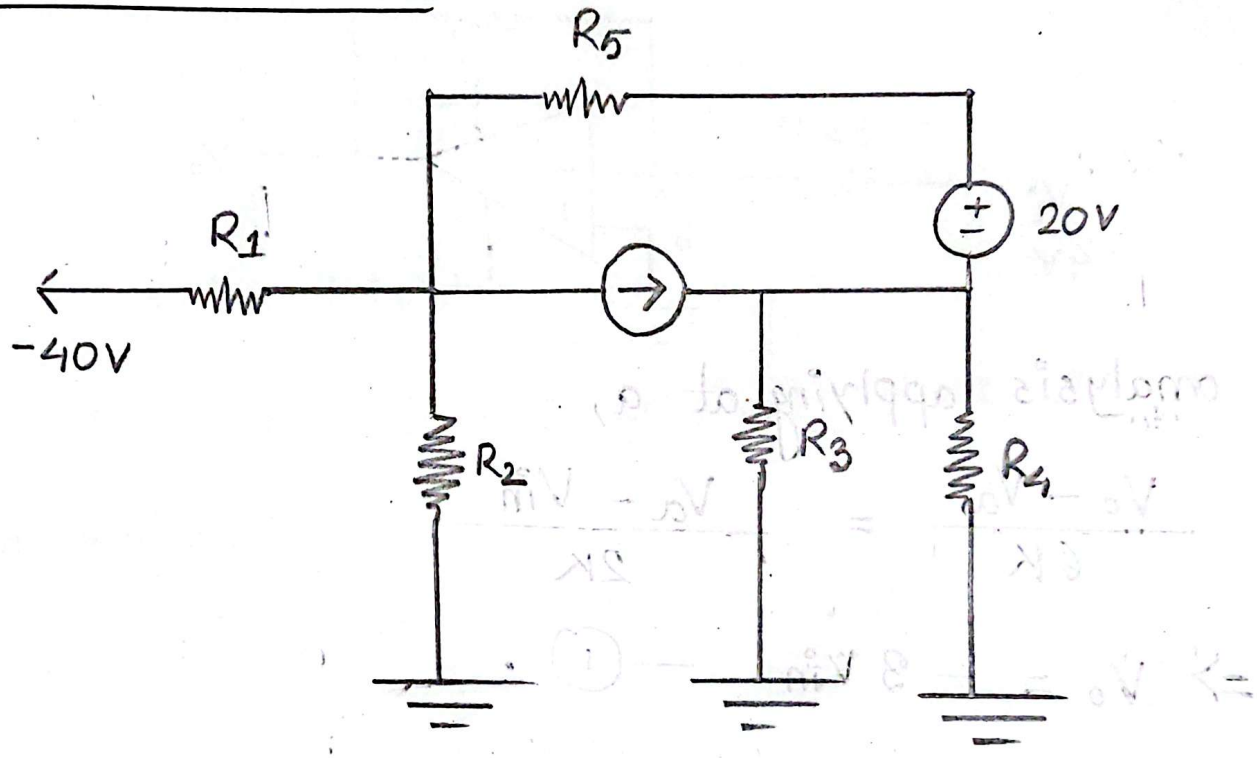
Answer to the Question NO – 1(a)

alternate representation :-



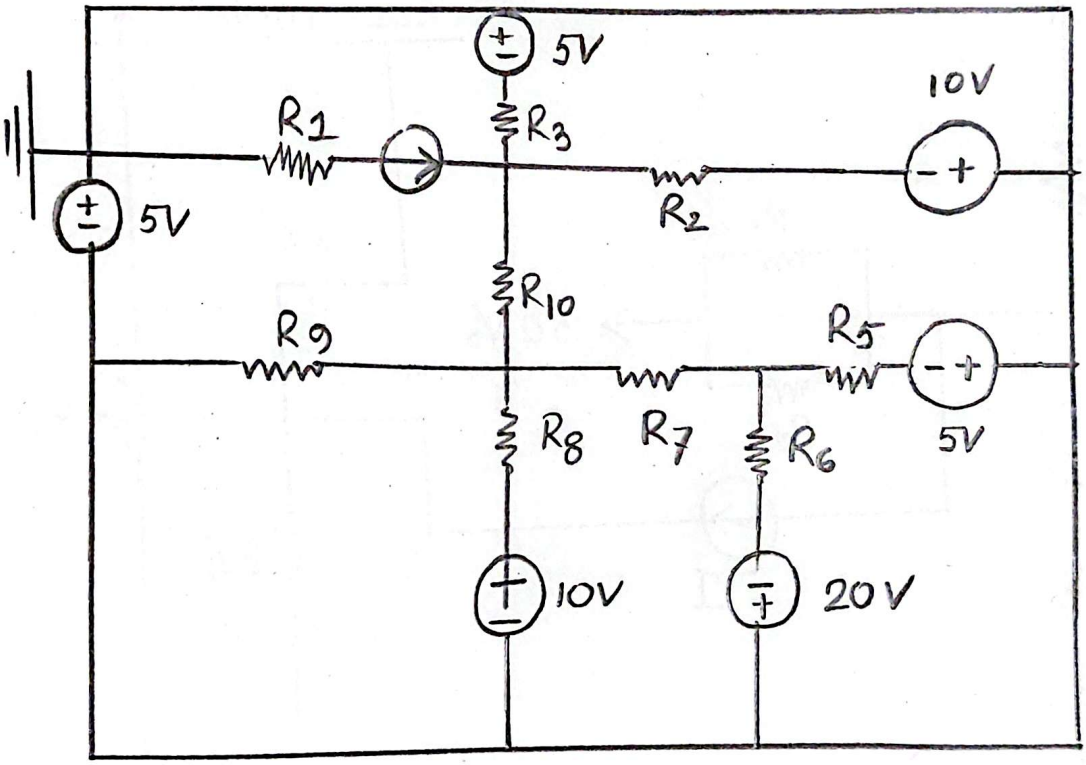
Answer to the Question NO - 1(B)

Alternate representation :-

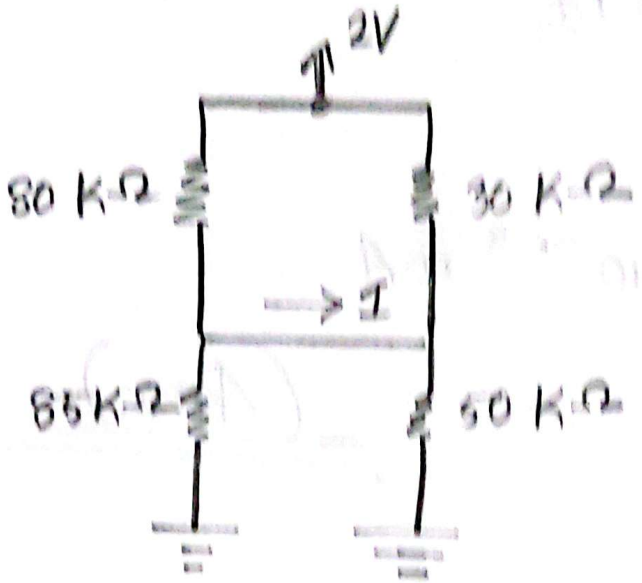


Answere to the Question NO - 02

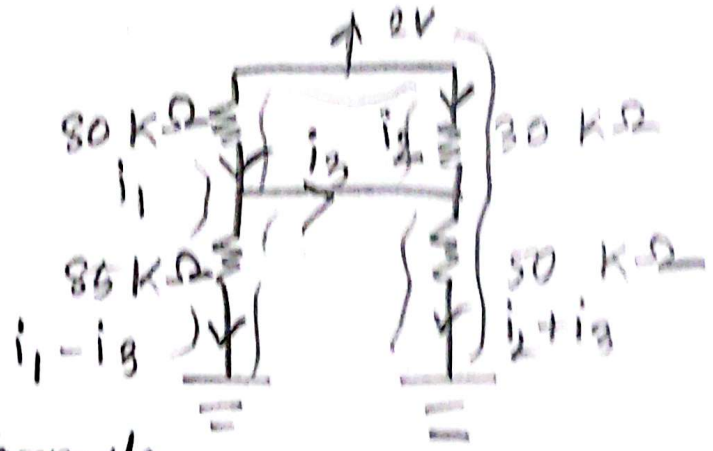
Full form representation of the given circuit:-



Answer to the Q. NO- 03 (A)



Answer to the Q. NO - 3 (B)



Applying Formula,

$80\, i_1 + 85\, i_1 - 85\, i_3 = 2$

$\Rightarrow 165\, i_1 - 85\, i_3 = 2$ — (I)

Again, $50\, i_2 + 50\, i_3 + 80\, i_1 = 2$ — (II)

And, $30\, i_2 + 50\, i_2 + 50\, i_3 = 2$ — (III)

∴ Sol.

[B.T.U.]

$i_1 = 0.01 \text{ mA} = i_1$

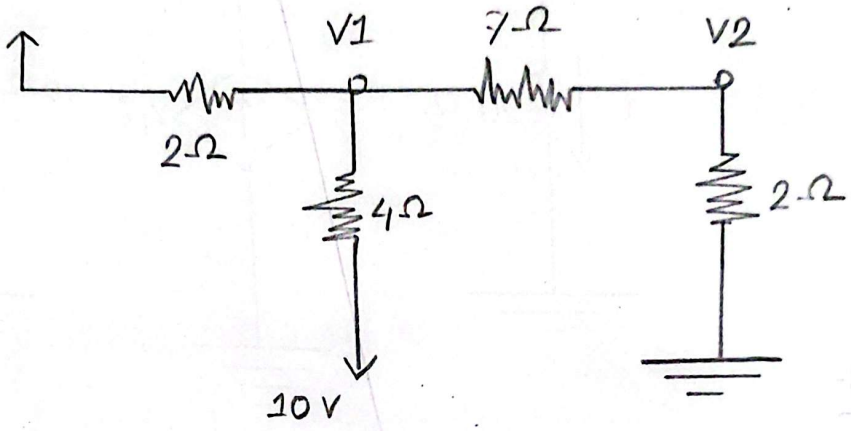
$i_2 = 0.03 \text{ mA}$

$i_3 = -3.7 \times 10^{-3} \text{ mA}$

(Ans:)

Answer to the Question NO - 04

Given circuit,



In node-1 :-

$$V_1\left(\frac{1}{2}+\frac{1}{4}+\frac{1}{7}\right)-\frac{10}{2}-\frac{10}{4}-\frac{V_2}{7}=0$$

$$\Rightarrow V_1\left(\frac{1}{2}+\frac{1}{4}+\frac{1}{7}\right)=\frac{10}{2}+\frac{10}{4}+\frac{V_2}{7}$$

$$\Rightarrow V_1\left(\frac{1}{2}+\frac{1}{4}+\frac{1}{7}\right)-\frac{V_2}{7}=\frac{15}{2} \quad \text{——— (I)}$$

In node-2 :-

$$V_2\left(\frac{1}{7}+\frac{1}{2}\right)-\frac{V_1}{7}=0 \quad \text{——— (II)}$$

By solving (I) and (II) $\Rightarrow$

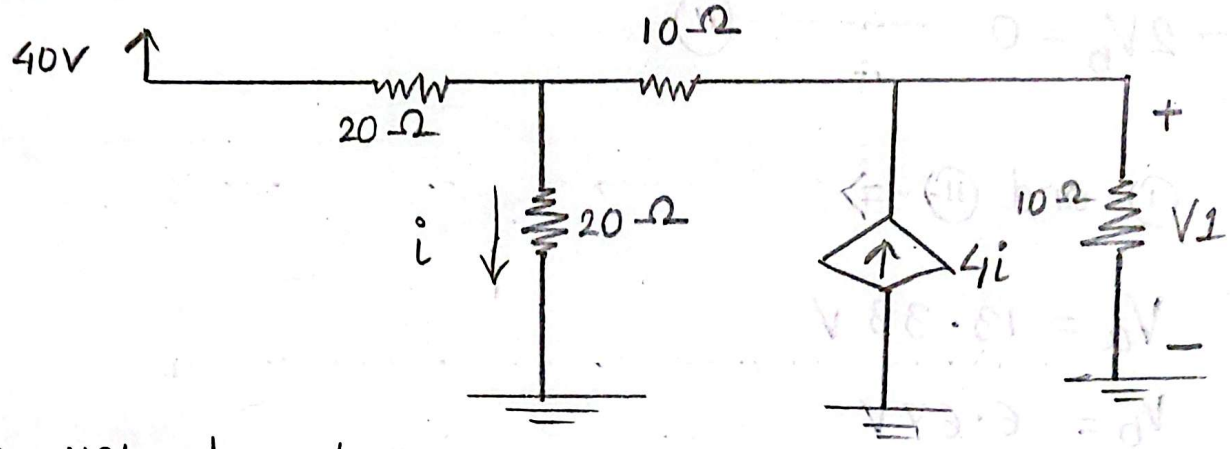
$$V_1 = 8.70 \text{ V}$$

$$V_2 = 1.94 \text{ V}$$

(Ans:)

Answer to the Question JNU - 05

Given circuit,



Applying KCL at node Va,

$$V_a\left(\frac{1}{20}+\frac{1}{20}+\frac{1}{10}\right)-\frac{40}{20}-\frac{0}{20}-\frac{V_b}{10}=0$$

$$\Rightarrow V_a\left(\frac{1+1+2}{20}\right)-2-\frac{V_b}{10}=0$$

$$\Rightarrow V_a\left(\frac{5}{20}\right)-2-\frac{V_b}{10}=0$$

$$\Rightarrow V_a\left(\frac{1}{5}\right)-\frac{V_b}{10}=2$$

$$\Rightarrow \frac{2V_a-V_b}{10}=20 \quad \text{— (1)}$$

Applying KCL at Vb node,

$$V_b\left(\frac{1}{10}+\frac{1}{10}\right)-\frac{V_a}{10}-\frac{0}{10}-4i=0$$

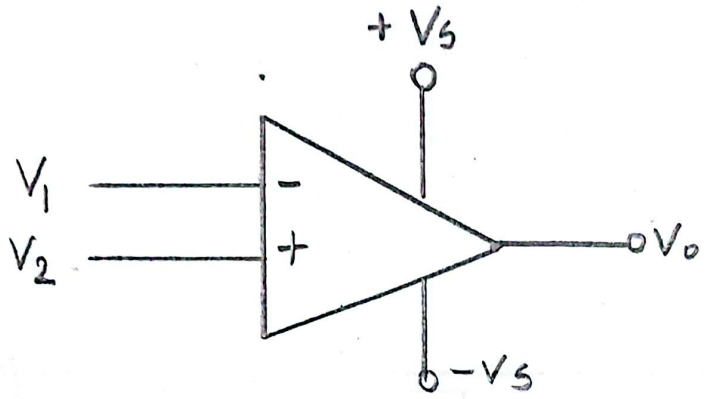
$$\Rightarrow V_b\left(\frac{2}{10}\right)-\frac{V_a}{10}=4i$$

$$\Rightarrow \frac{2V_b-V_a}{10}=4\times\frac{V_a}{20}$$

[P.T.O.]

Answer to the Question NO - 06

Given,



Here,
$V_1 = 2V$
V_2 is a sin wave with an amplitude of 4V

Now,
we will plot the graphs according to the question.

[P.T.O.]

V_1 and V_2 vs t in the same graph :-

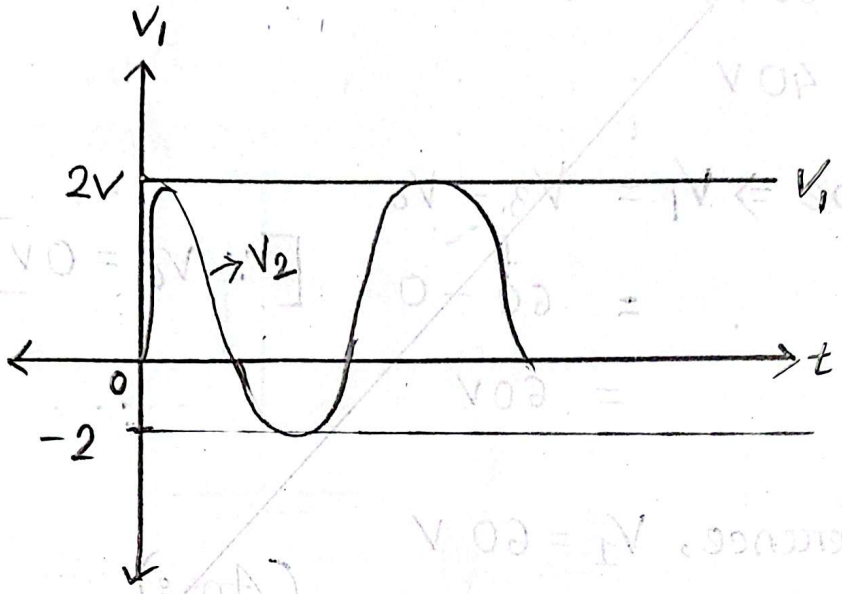


Fig: V_1 and V_2 vs t in the same graph

V_o vs t graph :-

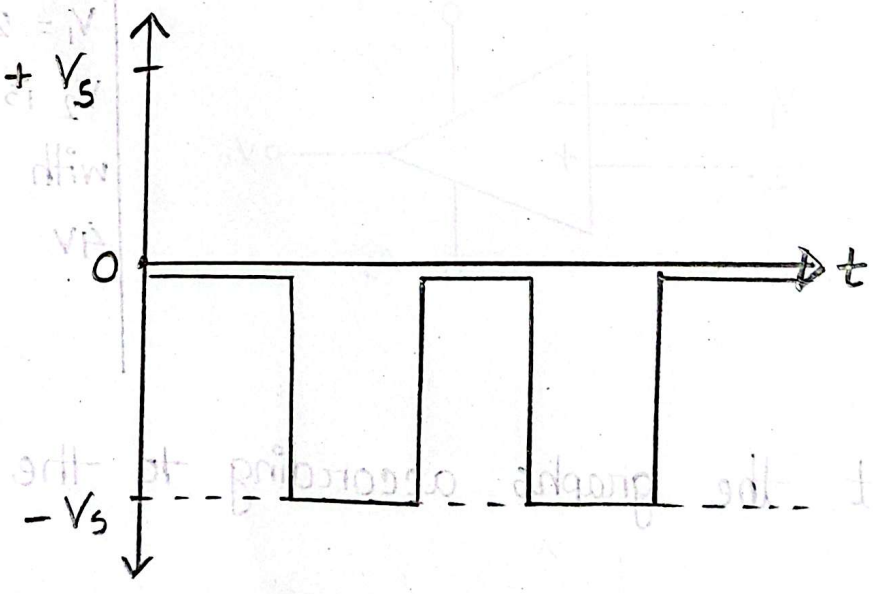
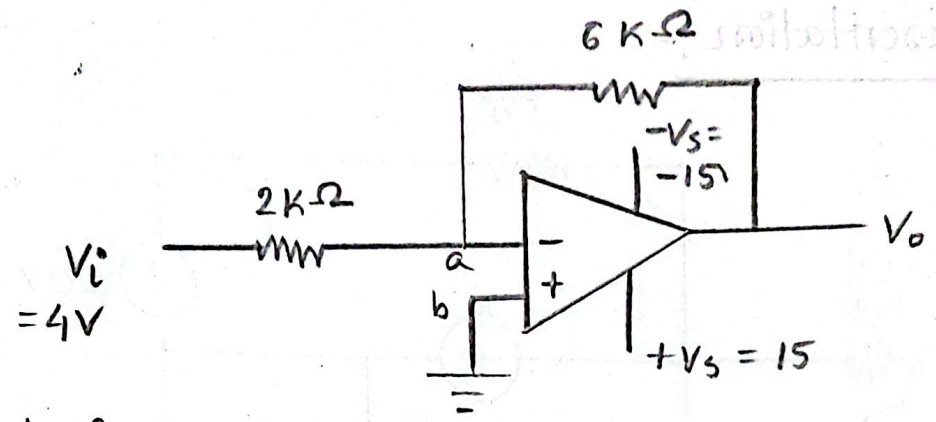


Fig: V_D vs t graph

Answere to the Q. NO - 7



modal analysis applying at a,

$$\frac{V_o - V_a}{6K} = \frac{V_a - V_{in}}{2K}$$

$$\Rightarrow V_o = -3V_{in} \quad \text{—(1)}.$$

Now,

if V_{in} = +ve,

$-3V_{in} = -15$

$\Rightarrow V_{in} = 5$

$\therefore V_o = -15V$

And, if V_{in} = -ve

$\therefore -3V_{in} = 15$

$\Rightarrow V_{in} = -15V$

$\therefore V_o = 15V$

Now, given, $V_i = 4V$

$\therefore V_o = -3 \times V_{in}$

$= -3 \times 4$

$= -12V$

(Ans:)

Given,

$$V_{in} = 6 \sin(t)$$

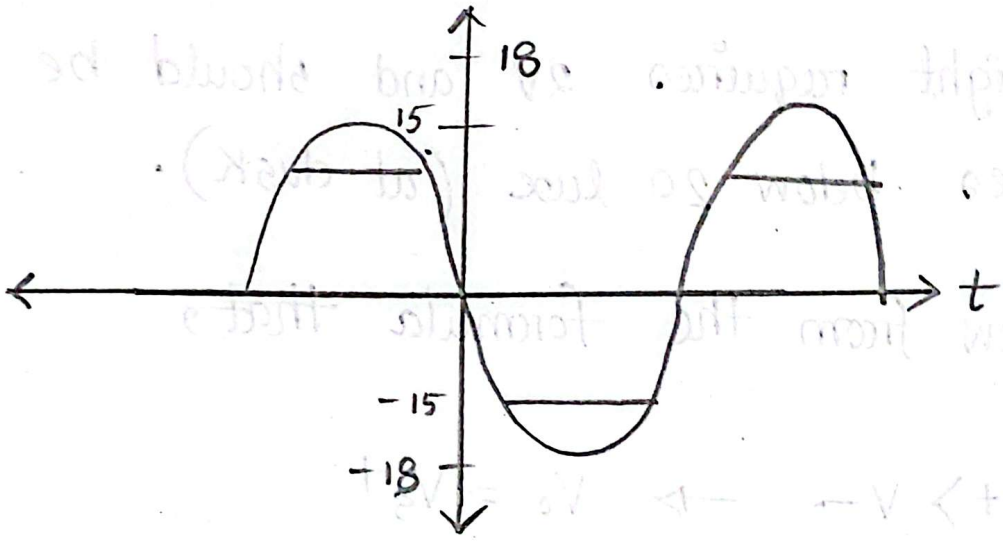
$\therefore V_o = -3 \times V_{in}$

$= -3 \times 6 \sin(t)$

$= -18 \sin(t)$.

$\therefore$ the value of V_o is greater than ± 15 V.

$\therefore$ graph will be,



(Ans:)

Answere to the Q. NO-08

Here,
also given,

V_{night} = 0 lux → 1V

V_{dusk} = 20 lux → 2V

V_{dawn} = 80 lux → 3V

Given,
supply voltage
= 20V

As per the Question,

the light requires 2V and should be ON if the light goes below 20 lux (at dusk).

we know from the formula that,

$V+ > V-$ → $V_o = V_S+$

$V- > V+$ → $V_o = V_S-$

∴ circuit will be:-