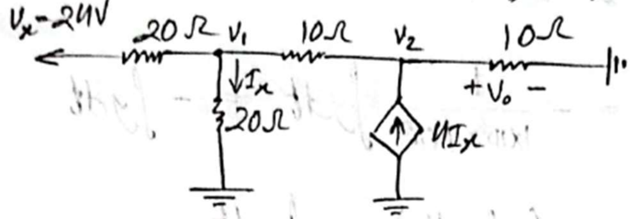
1.

Ans no: 1



Here,

$V_o = V_2 - 0 \Rightarrow V_o = V_2$

And, $I_x = \frac{V_1 - 0}{20} \Rightarrow I_x = \frac{V_1}{20}$

node-$V_1 \Rightarrow V_1\left(\frac{1}{20}+\frac{1}{20}+\frac{1}{10}\right) - \frac{24}{20} - \frac{0}{20} - \frac{V_2}{10} = 0$

$\Rightarrow 0.2V_1 - 0.1V_2 = 1.2$ —— (i)

node-$V_2 \Rightarrow V_2\left(\frac{1}{10}+\frac{1}{10}\right) - \frac{V_1}{10} - \frac{0}{10} - 4I_x = 0$

$\Rightarrow V_2\left(\frac{1}{10}+\frac{1}{10}\right) - \frac{V_1}{10} - 4\times\frac{V_1}{20} = 0$

$\Rightarrow -0.3V_1 + 0.2V_2 = 0$ —— (ii)

from (i) & (ii) $\Rightarrow$

$V_1 = 24V \quad ; \quad V_2 = 36V$

So,

$V_o = V_2 \Rightarrow V_o = 36V$

And, $I_x = \frac{V_1}{20} \Rightarrow I_x = 1.2A$

(Ans.)

2.

Ans no: 2

Here,

$$v_{I_1} = -\frac{1}{RC}\int y\,dt = -\frac{1}{1\times10^6\times1\times10^{-6}}\int y\,dt = -\int y\,dt$$

$$v_{I_2} = -\frac{2\times10^3}{2\times10^3}\,v_{I_1} = -\left(-\int y\,dt\right) = \int y\,dt$$

$$v_{I_3} = -RC\frac{dx}{dt} = -1\times10^6\times10\times10^{-6}\cdot\frac{dx}{dt} = -\frac{dx}{dt}$$

So,

$$f = -\left(\frac{2\times10^3}{2\times10^3}\cdot v_{I_2} + \frac{2\times10^3}{2\times10^3}\,v_{I_3}\right)$$

$$\Rightarrow f = -\left(v_{I_2} + v_{I_3}\right)$$

$$\Rightarrow f = -\left(\int y\,dt - \frac{dx}{dt}\right)$$

$$\Rightarrow f = -\int y\,dt + \frac{dx}{dt}$$

for $x = \sin 5t$ & $y = 2^t + 2\cos 2t \Rightarrow$ at $t =$

$$f = -\int_0^t (2^t + 2\cos 2t)\,dt + \frac{d}{dx}(\sin 5t)$$

$$\Rightarrow f = 5\cos 5t - \left[\frac{2^t}{\ln 2} + 2\cdot\frac{\sin 2t}{2}\right]_0^t$$

$$\Rightarrow f = 5\cos 5t - \frac{2^t}{\ln 2} - \sin 2t$$

$$\Rightarrow f = 5\cos(5\times0.2) - \frac{2^{0.2}}{\ln 2} - \sin(2\times0.2)$$

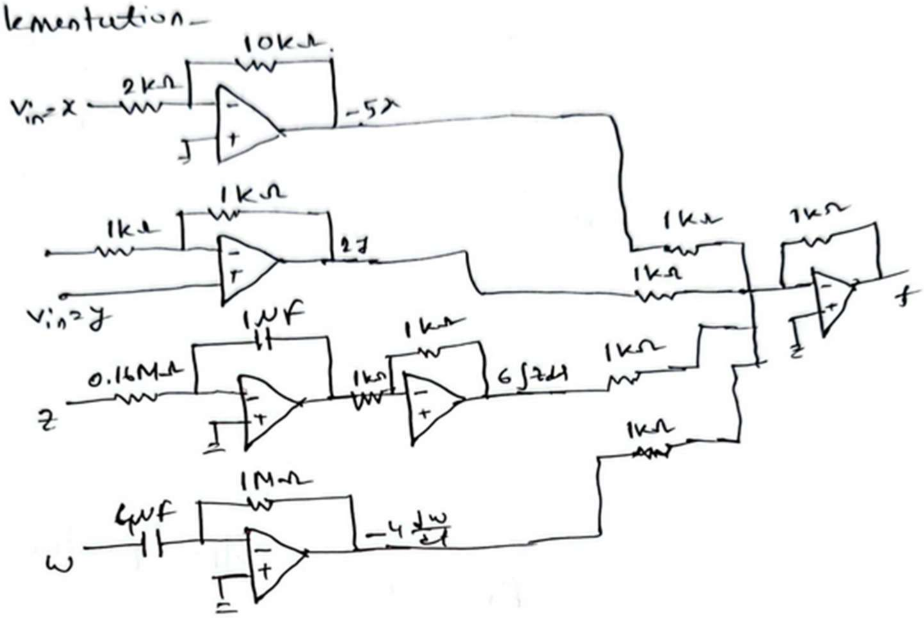
$$\Rightarrow f = 0.65487\ V$$

(Ans.)

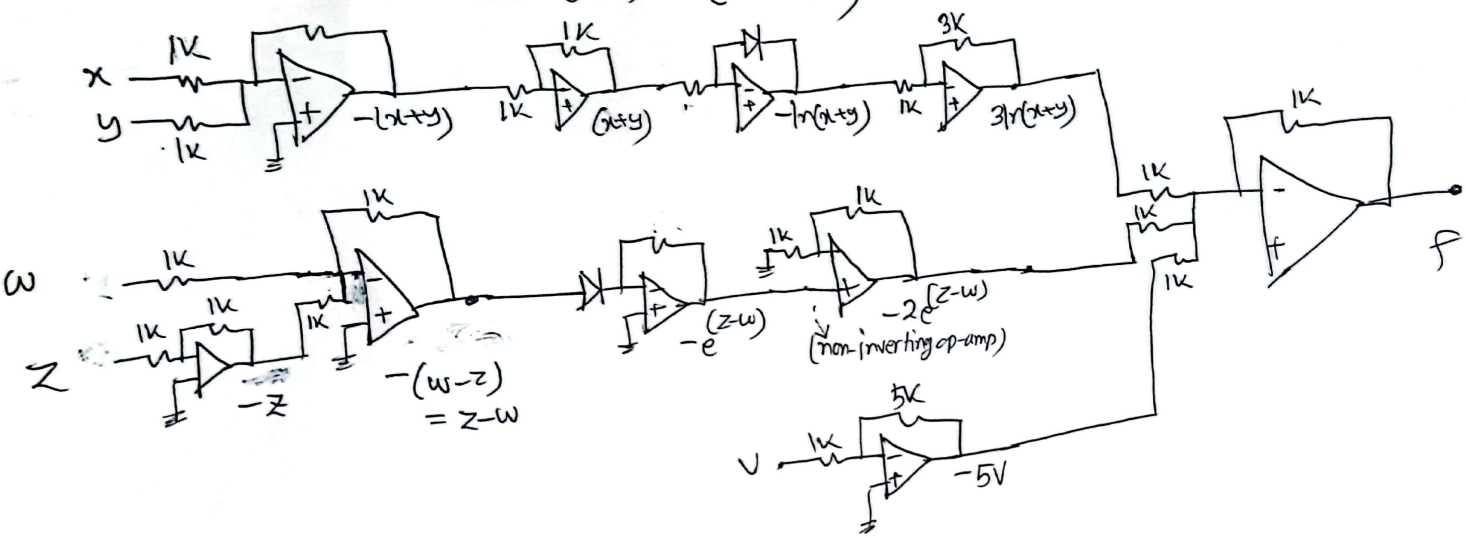
3.

a) $f = -(-5x + 2y + 6\int z\,dt - 4\frac{dw}{dt})$

Implementation-

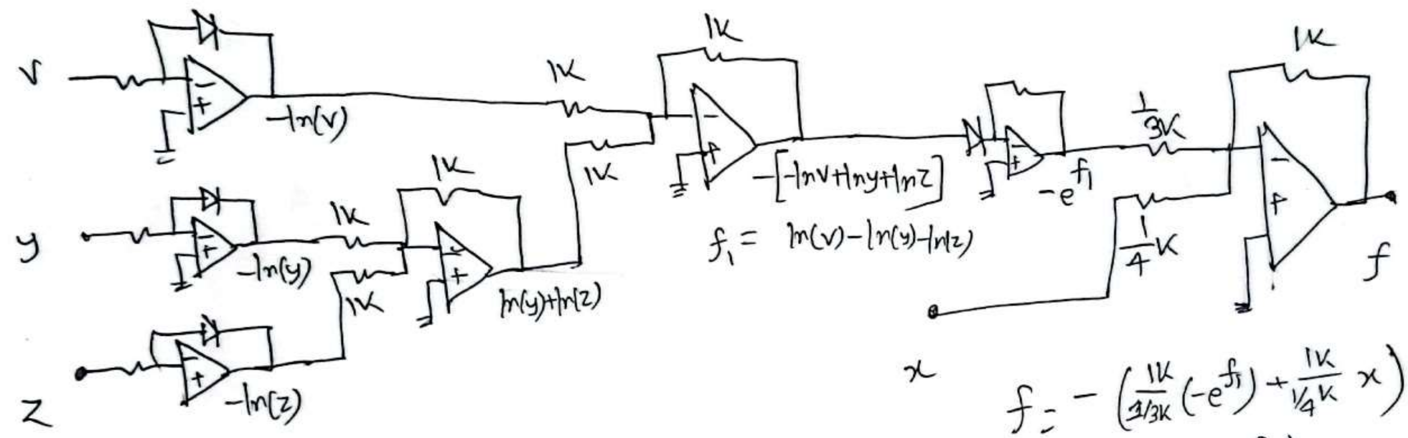


b) $f = -(3\ln(x+y) - 2e^{z-w} - 5v)$



c)

$$f = -4x + \frac{3v}{yz} = -\left(4x - \frac{3v}{yz}\right) \qquad \text{now, } \frac{v}{yz} = e^{\ln\left(\frac{v}{yz}\right)} = e^{\ln(v)-\ln(y)-\ln(z)}$$



$$f = -\left(\frac{1K}{1/3K}\left(-e^{f_1}\right) + \frac{1K}{1/4K}\,x\right)$$

$$= -\left(4x - 3e^{f_1}\right)$$

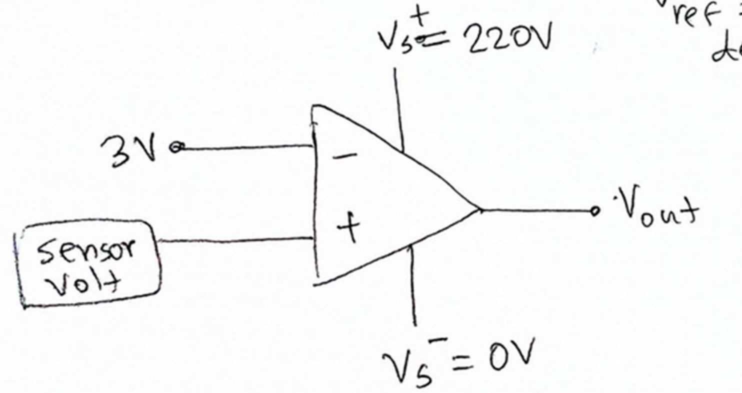
$$= -\left(4x - 3e^{\ln(v)-\ln(y)+\ln(z)}\right)$$

$$= -\left(4x - 3\frac{v}{yz}\right)$$

4.

Ans:- to the Q: No:-4

$V_{ref} = 3V$ as desired is 22°C



5.

Answer to the question no. 05

All signal –