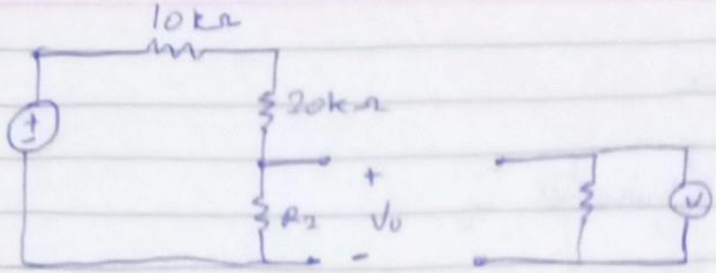
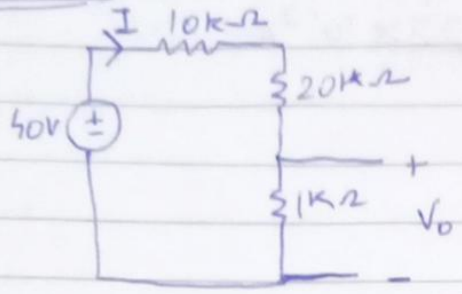
Q6




(a) $R_2 = 1k\Omega$

(i)



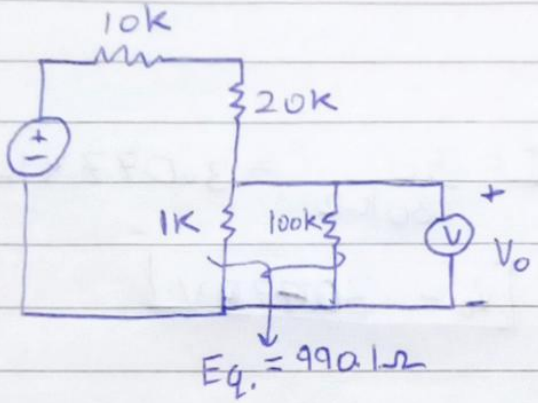

$$I = \frac{40}{31k\Omega}$$

$$= 1.29 \times 10^{-3} A$$

$$V_o = I \times 1k\Omega$$

$$\boxed{V_o = 1.29V}$$

(ii)




$$I = \frac{40}{30k + 990.1)\Omega}$$

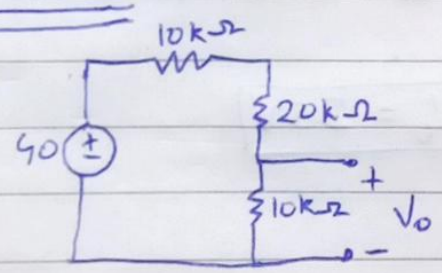
$$\Rightarrow I = 1.291 \times 10^{-3} A$$

$$\Rightarrow V_o = 990.1 \times I$$

$$\boxed{V_o = 1.278V}$$

b) $R_2 = 10k\Omega$

(i)

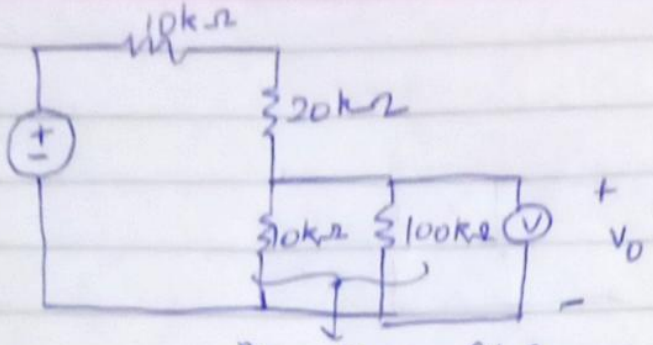



$$I = \frac{40}{40k\Omega} = 1 \times 10^{-3} A$$

$$V_o = 10 \times 10^3 \times 1 \times 10^{-3}$$

$$\boxed{V_o = 10V}$$

(ii)




$REq = 9090.91\Omega$

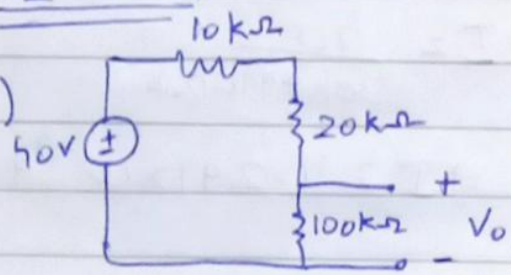
$$I = \frac{40}{(30k + 9090.91)\Omega} = 1.023 \times 10^{-3} A$$

$V_o = 9090.91 \times I$

$\boxed{V_o = 9.302V}$

c) $R_2 = 100K$

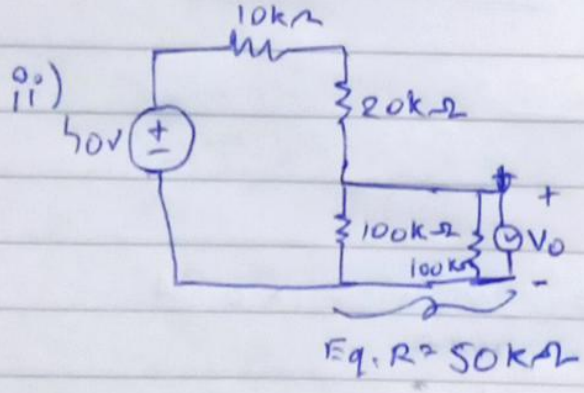
i)




$$I = \frac{40}{130k\Omega} = 3.077 \times 10^{-4} A$$

$\boxed{V_o = 30.770V}$

ii)




Eq. $R = 50k\Omega$

$$I = \frac{40}{80k\Omega}$$

$\Rightarrow I = 5 \times 10^{-4} A$

$\Rightarrow \boxed{V_o = 25V}$