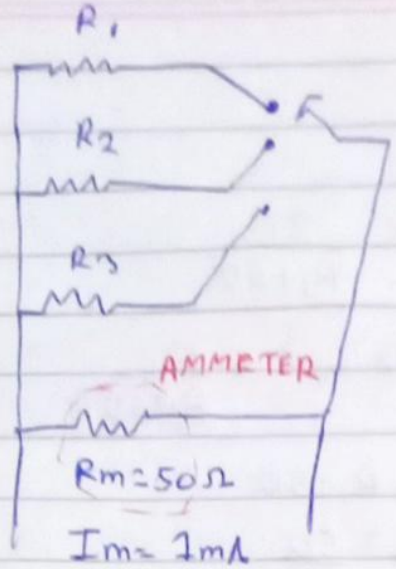
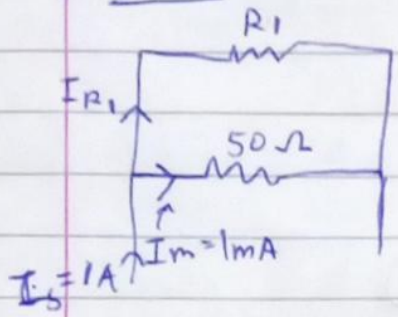
Q7



(i) 0-1A :



$I_m = I_S \times \frac{R_1}{R_1+50}$ (Current division Rule)

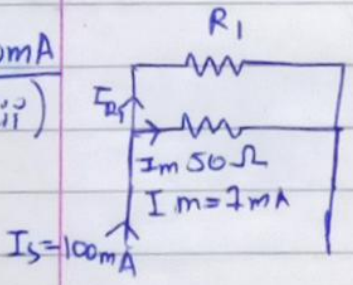
$10^{-3} = 1 \times \frac{R_1}{R_1+50}$

$\Rightarrow 10^{-3}R_1 + 50\times10^{-3} = R_1$

$\Rightarrow R_1(1-10^{-3}) = 0.05$

$\Rightarrow \boxed{R_1 = 0.050\,\Omega}$

0-100mA (ii)



$I_m = I_S \times \frac{R_1}{R_1+50}$

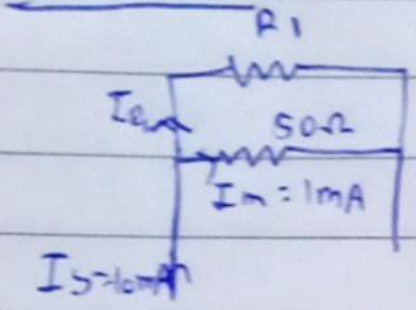
$10^{-3} = 100\times10^{-3} \times \frac{R_1}{R_1+50}$

$\Rightarrow R_1 = 10^{-2}R_1 + 50\times10^{-2}$

$R_1(1-10^{-2}) = 0.5$

$\Rightarrow \boxed{R_1 = 0.505\,\Omega}$

(iii) 0-100mA ;



$$I_m = I_s \times \frac{R_1}{R_1 + 50}$$

$$1 \times 10^{-3} = 10 \times 10^{-3} \times \frac{R_1}{R_1 + 50}$$

$$10R_1 = R_1 + 50$$

$$\Rightarrow R_1 = \frac{50}{9}$$

$$\Rightarrow \boxed{R_1 = 5.556\,\Omega}$$