2021 Sec 4 Physics Assignment 14
Current of Electricity - Answers

Reminders:

1. Use subscripts for similar quantities belonging to different components, e.g. R_1, R_2.
2. Write down the **basic formulae** before substitution.
3. Show all key mathematical steps clearly.
4. Evaluate your final answer!

AS 14

1 $I = Q / t$
Current in lightning = 120 C / 0.20 s = 600 A

2 (a) Current through Resistor A = 2 x 0.5 A = 1.0 A
Resistor A is connected in parallel to the path where point X lies. Point X lies along a path with 2 resistors. Therefore, the current through Resistor A will be twice that at X.

(b) Current through Resistor B = 0.5 A + 1.0 A = 1.5 A
Resistor B is in series with the battery, where the two paths (one with Resistor A and one with point X) converges.

3 $R = \rho L / A = \rho L / \pi r^2 = (7.0 \times 10^{-7} \times 600) / \pi (5.0 \times 10^{-4})^2$
$= 534.76\ \Omega$
$= 530\ \Omega$ (2 sf)

4 $R_y = 5.0\ \Omega$

5 $R_x : R_y = 16 : 1$
$= R_x / R_y = 16$

6 (a) Rheostat or variable resistor

(b) (i) 0.053 A

(ii) $R = V / I = 2.5 / 0.053 = 47\ \Omega$ (2 sf)

(iii) $I = V / R = 2.5 / 200 = 0.013$ A (2 sf)

(iv) $I = 0.053 + 0.0125 = 0.066$ A (3d.p)