

3b)

$$\alpha = \frac{R}{Z} \sqrt{\frac{C}{L}} + \frac{G}{Z} \sqrt{\frac{L}{C}}$$

So

$$\alpha = 1 \sqrt{\frac{0.23 \times 10^{-12}}{8 \times 10^{-9}}} + \frac{0.5 \times 10^{-3}}{Z} \sqrt{\frac{8 \times 10^{-9}}{0.23 \times 10^{-12}}}$$

$$\alpha = 1 \sqrt{0.02875 \times 10^{-3}} + 0.25 \times 10^{-3} \sqrt{34.783}$$

$$\alpha = 5.362 \times 10^{-3} + 2.5 \times 10^{-4} \times 5.898$$

$$\alpha = 5.362 \times 10^{-3} + 1.4745 \times 10^{-3}$$

$$\alpha = 0.0068365 \text{ or } 0.0069 \text{ to 2.d.p}$$

$$\alpha = 0.0069 \text{ nepers per meter}$$