

The current voltage relation of diode is given by $I = (e^{1000V/T} - 1)$ mA, where the applied voltage V is in volts and the temperature T is in degree Kelvin. If a student makes an error measuring $\pm 0.01V$ while measuring the current of 5mA at 300 K, what will be the error in the value of current in mA?

A 0.5 mA

B 0.05 mA

C 0.2 mA

D 0.02 mA

Correct option is C)

$$5 = e^{1000 \frac{V}{T}} - 1$$

$$\Rightarrow e^{1000 \frac{V}{T}} = 6 \quad (1)$$

$$\text{Again, } I = e^{1000 \frac{V}{T}} - 1$$

$$\frac{dI}{dV} = e^{\frac{1000V}{T}} \frac{1000}{T}$$

$$dI = \frac{1000}{T} e^{\frac{1000}{T} V} dV$$

Using (1)

$$\Delta = \frac{1000}{T} \times 6 \times 0.01 = \frac{60}{300} = 0.2\text{mA}$$