Question #76576, Physics / Astronomy | Astrophysics

a dry cell of emf 15v and a internal resistance 0.5 is connected to a component of resistance 7 ohms , find the power input to the component, the power wasted within the cell , the power which would be wasted if the cell terminals were short circuited

Solution

$$I = \frac{E}{R + r}$$

The power input to the component

$$P_i = I^2 R = \left(\frac{E}{R + r}\right)^2 R = \left(\frac{15}{7 + 0.5}\right)^2 7 = 28\ W.$$

The power wasted within the cell

$$P_w = I^2 r = \left(\frac{E}{R + r}\right)^2 r = \left(\frac{15}{7 + 0.5}\right)^2 0.5 = 2\ W.$$

The power which would be wasted if the cell terminals were short circuited

$$P_{SC} = \frac{E^2}{r} = \frac{15^2}{0.5} = 450\ W.$$