Answer on Question 47816, Physics, Electric Circuits

Question:

A current of 0.5A flowing through a wire produces 21J of heat in 1/2 min. The resistance of the wire is ---------- ohms to 1 place of decimal.

Solution:

As follows from the Joule's law of heating the amount of heat Q produced when current I flowing through a wire, is proportional to the square of the amount of current and to the resistance of the wire R and time t for which the current flow:

$$Q = I^2 \times R \times t\ ;$$

Therefore, from this formula we can obtain the resistance of the wire R :

$$R = \frac{Q}{I^2 \times t} = \frac{21\,\frac{kg \times m^2}{s^2}}{(0.5A)^2 \times 30s} = \frac{21}{7.5}\frac{kg \times m^2}{A^2 \times s^3} = 2.8 \text{ ohms}$$

Answer:

The resistance of the wire is 2.8 ohms.