## Answer on Question \#46031 - Physics - Electromagnetism

## Question.

A battery has emf 13.2 V and internal resistance $24 \mathrm{~m} \Omega$. If the load current is 20.0 A , find the terminal voltage of the battery

Given:
$\varepsilon=13.2 \mathrm{~V}$
$r=24 m \Omega=0.024 \Omega$
$I=20 A$
Find:
$U=$ ?

## Solution.

Let use the Ohm's law for closed circuit with electromotive force:

$$
\frac{\varepsilon}{R+r}=I, \text { where }
$$

$\varepsilon$ is the electromotive force;
$I$ is the electric current;
$R$ is the external resistance;
$r$ is the internal resistance.

$$
\varepsilon=I R+I r=U+I r, \text { where }
$$

$U$ is the terminal voltage in circuit.
So,

$$
U=\varepsilon-I r
$$

Calculate:

$$
U=13.2-20 \cdot 0.024=13.2-0.48=12.72 \mathrm{~V}
$$

## Answer.

$U=\varepsilon-I r=12.72 \mathrm{~V}$

