

## Answer on Question 59054, Physics, Electric Circuits

### Question:

A battery charger supplies  $10\text{ A}$  to charge a storage battery which has an open-circuit voltage of  $5.6\text{ V}$ . If the voltmeter connected across the charger reads  $6.8\text{ V}$ , what is the internal resistance of the battery at this time?

- a)  $1.3\ \Omega$
- b)  $0.52\ \Omega$
- c)  $0.12\ \Omega$
- d)  $2.1\ \Omega$

### Solution:

$$V_{ch} = \mathcal{E} + U_r,$$

here,  $V_{ch} = 6.8\text{ V}$  is the voltage across the charger,  $\mathcal{E} = 5.6\text{ V}$  is the open-circuit voltage of the battery,  $U_r$  is the voltage drop across the battery.

$$U_r = Ir,$$

here,  $I$  is the charging current that flows through the battery,  $r$  is the internal resistance of the battery.

$$V_{ch} = \mathcal{E} + Ir,$$

$$r = \frac{V_{ch} - \mathcal{E}}{I} = \frac{6.8\text{ V} - 5.6\text{ V}}{10\text{ A}} = \frac{1.2\text{ V}}{10\text{ A}} = 0.12\ \Omega.$$

**Answer:** c)  $0.12\ \Omega$