

## O Level Physics

## Tutorial 14: Current of Electricity

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Syllabus :

(a) state that current is the rate of flow of charge and that it is measured in amperes

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1. State the definition and unit of electric current.

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(b) distinguish between conventional current and electron flow

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2. What is the difference between conventional current and electron flow.

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(c) recall and apply the relationship  $\text{charge} = \text{current} \times \text{time}$  to new situations or to solve related problems

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3. A current of 0.1 A flows past a point in a circuit. How much charge passes this point in 2 s.

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(d) state that the electromotive force (e.m.f.) of a source is the work done per unit charge by the source in driving charges around a complete circuit and that it is measured in volts

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4. A dry cell is labelled 1.5 V. This number is called the e.m.f. of the battery. State the definition of e.m.f.

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(e) calculate the total e.m.f. where several sources are arranged in series

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5. Three batteries each with e.m.f. 1.5 V are connected in series. What is the total e.m.f.?

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(f) state that the potential difference (p.d.) across a component in a circuit is the work done per unit charge in driving charges through the component and that it is measured in volts

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6. A cell is connected to a light bulb in a circuit. The potential difference (p.d.) across the bulb is 1.1 V. What does potential difference mean?

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(g) state that resistance = p.d. / current

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(h) apply the relationship  $R = V / I$  to new situations or to solve related problems

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7. In the question above, the current through the light bulb is 0.2 A. Find the resistance of the light bulb.

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(i) recall and apply the relationship of the proportionality between resistance and the length and cross sectional area of a wire to new situations or to solve related problems

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8. A wire 10 cm long with diameter 2 mm has a resistance of 2  $\Omega$ . Find the new resistance for each of the following cases:

(i) wire length increased to 20 cm,

(ii) wire diameter increased by two times/

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(j) describe the effect of temperature increase on the resistance of a metallic conductor

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9. What happens to the resistance of a conductor when its temperature is increased?

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(k) sketch and interpret the I-V characteristic graphs for a metallic conductor at constant temperature (ohmic conductor), for a filament lamp and for a semiconductor diode.

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10. Sketch and interpret the I-V characteristic graphs :

(i) for a metallic conductor at constant temperature (ohmic conductor),

(ii) for a filament lamp and

(iii) for a semiconductor diode.