

# Applied Electrical Technology 1 (LSEEE103A)

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## LEARNING RESOURCE

TRAINING AND EDUCATION SUPPORT  
INDUSTRY SKILLS UNIT MEADOWBANK



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## **FEEDBACK**

We value your opinion and welcome suggestions on how we could improve this learning resource. Keep in mind that the resource is intended to help students learn and is not a text book.

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# Section 1 - Basic Electrical Concepts

## Purpose

In this topic you will learn about the generation, transmission and distribution of electrical energy, the properties of matter and the mechanisms of electric current flow.

## Topics

- Electrotechnology industry
- Electricity (static and current)
- Power generation of electricity
- Transportation of electricity
- Utilisation of electricity
- Basic calculations

## Learning Objectives

At the end of this section you should be able to:

- a) Describe the electrotechnology industry.
- b) Describe the concepts of static and current electricity.
- c) Explain how electricity is produced by renewable and non renewable energy sources.
- d) Describe how electricity is transported from the source to the load via the transmission and distribution systems.
- e) Explain how electricity is utilized by the various loads.
- f) Perform basic calculations involving quantity of electricity, velocity and speed with relationship to the generation and transportation of electricity.

## References

You will find the information to undertake this topic in the following references. At least one reference text should be used.

- Jenneson, J.R., 2003 *Electrical Principles for the Electrical Trades*, 5th Ed., McGraw Hill Sydney. Chapter 1 & 2.
- Hampson, J., 2005, *Electrical Trade Principles - A Practical Approach*, Pearson Education, Sydney. Section 1.
- Phillips, P., 1996 *Electrical Principles 1*, Thomas Nelson, Melbourne, 1996. Chapters 1 & 2.
- Batty, I., *Electrical Principles 1*, Prentice Hall, 1996 Sydney. Chapter 1.
- Lowe J.F., *Electronics for the Electrical Trades 4th Ed.* McGraw Hill. Sydney. 1989. Appendix A.
- Boyle G, ARAC, 4th Edition, Volume 1, Chapter 11 Electrical Principles.

## Learner Exercises

A constant current of 1 ampere is maintained in a circuit for 1 hour. Determine the quantity of electricity used in coulombs.

Solution:

Step 1. List data and make sure it is in S.I. units

$$I = 1 \text{ A}$$

$$t = 1 \text{ h} = 3600 \text{ s}$$

Step 2. State equation and substitute data

$$Q = It$$

$$= I \times 3600$$

$$= \underline{3600 \text{ C}}$$

Step 3. Answer = 3600 C or 3600 coulombs

### Learner exercise 1.1

A cell supplies a current of 5 amperes continuously to a circuit for 48 minutes. Determine the quantity of electricity passed through the cell and delivered to the circuit.

### Learner exercise 1.2

An electro chemical separation bath requires 18 000 coulombs of electricity in 1 hour. What is the value of current? (Hint: you will need to transpose the equation to make I the new subject)

### Learner exercise 1.3

How many minutes would it take a steady current of 15 amperes to supply 1350 coulombs of electricity to a circuit? (Hint: you will need to transpose the equation to make time the new subject)

#### Learner exercise 1.4

A motor cyclist leaves home and travels 50 km East, 40 km North and 20 km West. If the journey takes two hours, calculate:

(i) his speed in  $\text{kmh}^{-1}$

(ii) his velocity in  $\text{ms}^{-1}$

#### Learner exercise 1.5

Draw and label a block diagram to outline the components of the electricity generation, transmission and distribution system in Australia.

## Review questions

*These questions will help you revise what you have learnt in this topic.*

1. The smallest possible part of an element that can exist in free state is \_\_\_\_\_.
2. A negative ion is one having \_\_\_\_\_ of electrons.
3. All electrons have a \_\_\_\_\_ electrical charge.
4. A \_\_\_\_\_ is the fundamental positively charged particle of an atom.
5. An atom with a deficiency of \_\_\_\_\_ is termed a positive ion.
6. The nucleus of an atom consists of neutrons, which have no resultant charge, and \_\_\_\_\_ which have a \_\_\_\_\_ charge.
7. The practical S.I. unit of velocity is the \_\_\_\_\_.
8. In the atomic structure of an element, a negative charge is exhibited by the:
  - (A) electron
  - (B) neutron
  - (C) proton
  - (D) atom.
9. In the atomic structure of an element, a positive charge is exhibited by the:
  - (A) electron
  - (B) neutron
  - (C) proton
  - (D) atom.
10. An atom that has gained or lost an electron is termed a/an:
  - (A) atom
  - (B) nucleus
  - (C) ion
  - (D) isotope.