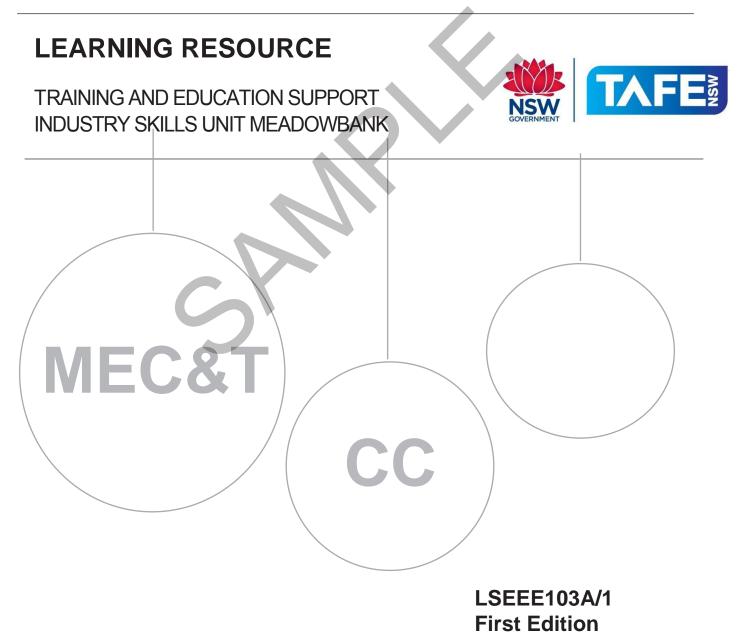
Applied Electrical Technology 1 (LSEE103A)



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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

$$I = 1 A$$

t = 1 h = 3600 s

Step 2. State equation and substitute data

$$Q = It$$
$$= I \times 3600$$
$$= 3600 C$$

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 kmh⁻¹

(ii) his velocity in 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		
10.	An atom that has gained or lost an electron is termed a/an:	
	(A) atom (B) mulaus	
	(B) nucleus	
	(C) ion (D) isotope	
	(D) isotope.	

