

Title	Demonstrate and apply introductory knowledge of electrotechnology engineering mathematics		
Level	4	Credits	15

Purpose	<p>This unit standard covers general mathematical principles and the basic mathematical skills required for electrotechnology engineering.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> - demonstrate knowledge of, and graph, functions related to electrotechnology engineering; - interpret, manipulate, and solve electrotechnology engineering algebraic problems; - demonstrate knowledge of and apply differentiation and integration techniques to electrotechnology engineering problems; - demonstrate and apply knowledge of complex numbers to solve electrotechnology engineering problems; and - interpret and convert logic expressions and numbers as applied in an electrotechnology engineering industry context.
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Classification	Electrical Engineering > Electrotechnology
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Available grade	Achieved
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Guidance Information

- 1 This unit standard is intended for use in engineering courses at diploma level.
- 2 This unit standard is one of two that cover knowledge of electrotechnology engineering mathematics, the other being Unit 22738, *Demonstrate and apply intermediate knowledge of electrotechnology engineering mathematics*. It is recommended that competency in this unit standard be achieved before assessment against unit standard 22738 is attempted.
- 3 Reference
Health and Safety in Employment Act 1992;
and all subsequent amendments and replacements.
- 4 Definitions
Introductory knowledge – means employing a broad knowledge of the subject matter, incorporating some theoretical concepts, to make an informed judgement.
RMS – root mean square.

- 5 All measurements are to be expressed in Système International (SI) units, and, where required, converted from Imperial units into SI units.
- 6 All activities must comply with: any policies, procedures, and requirements of the organisations involved; the standards of relevant professional bodies; and any relevant legislative and/or regulatory requirements.
- 7 **Range**
Performance in relation to the outcomes of this unit standard must comply with the Health and Safety in Employment Act 1992.

Outcomes and performance criteria

Outcome 1

Demonstrate knowledge of, and graph, functions related to electrotechnology engineering.

Performance criteria

- 1.1 The properties of basic functions and their graphs are described and related.

Range includes but is not limited to – quadratics, exponentials, logarithmic functions.

- 1.2 Periodic waves are described and analysed with the aid of graphs.

Range amplitude, angular frequency, frequency, period, phase displacement, time displacement.

Outcome 2

Interpret, manipulate, and solve electrotechnology engineering algebraic problems.

Performance criteria

- 2.1 The rules for simplifying, factorising, and solving algebraic equations are described and applied to algebraic problems.

- 2.2 Simultaneous and quadratic equations are used to solve common electrotechnology engineering problems.

- 2.3 Trigonometric formulae are interpreted and used to solve related engineering problems.

Outcome 3

Demonstrate knowledge of and apply differentiation and integration techniques to electrotechnology engineering problems.

Performance criteria

3.1 The process of differentiation and calculation of derivatives is explained and used to solve common electrotechnology engineering problems.

Range rate of change of time dependent variables, growth and decay of specified quantities, determination of minimum and maximum values, optimisation.

3.2 The process of integration and the calculation of indefinite and definite integrals is described and used to solve common electrotechnology engineering problems.

Range includes but is not limited to determination of – area under a curve, mean value, RMS value.

Outcome 4

Demonstrate and apply knowledge of complex numbers to solve electrotechnology engineering problems.

Performance criteria

4.1 Complex numbers are described and manipulated for practical electrotechnology engineering applications.

Range applications include – rectangular and polar conversion, solving quadratic equations with complex roots.

Outcome 5

Interpret and convert logic expressions and numbers as applied in an electrotechnology engineering industry context.

Performance criteria

5.1 Conversions between and operations on binary, hexadecimal, decimal and binary coded decimal numbers are performed to solve electrotechnology engineering problems.

Range maximum of eight figure binary and four figure hexadecimal numbers.

5.2 Boolean algebraic expressions are interpreted and used to represent logic functions in an electrotechnology engineering context.

Range functions include individual and combinational – NOT, AND, OR, XOR, NAND, NOR.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	18 December 2006	31 December 2024
Rollover and Revision	2	15 March 2012	31 December 2024
Revision	3	15 January 2014	31 December 2024
Review	4	2 March 2023	31 December 2024

Consent and Moderation Requirements (CMR) reference	0003
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This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.