



Australian Government

MEM23004 Apply technical mathematics

Release: 1

MEM23004 Apply technical mathematics

Modification History

Release 1. Supersedes and is equivalent to MEM23004A Apply technical mathematics.

Application

This unit of competency defines the skills and knowledge required to apply mathematical analysis, graphical and software techniques to engineering problems. It includes exponential and logarithmic functions, trigonometric equations involving single and double angles, sequences and series, two-dimensional vector analysis, complex numbers, determinants and matrices.

The unit applies to engineering or related activities requiring specific mathematical techniques and is suitable for people giving technical support to design, operations or maintenance activities and those pursuing technical qualifications and careers at paraprofessional or technician level.

No licensing, legislative or certification requirements apply to this unit at the time of publication.

Pre-requisite Unit

Nil

Competency Field

Engineering science

Elements and Performance Criteria

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Determine scope of technical mathematical techniques required for an engineering application	1.1 Analyse an engineering application for required technical mathematical tasks 1.2 Develop systematic methods for layout and solution checking 1.3 Determine mathematical software required for analytical and graphical solutions and validate software using traditional solutions to simple examples
2. Apply technical mathematical techniques to engineering	2.1 Use appropriate software for analytical and graphical solutions 2.2 Convert between different number systems

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
application	2.3 Use appropriate mathematical techniques required for analysis and solution 2.4 Use appropriate data representations to communicate the solution to others 2.5 Report results and document calculations, graphs and analysis

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance.

Foundation skills essential to performance are explicit in the performance criteria of this unit of competency.

Range of Conditions

This field allows for different work environments and conditions that may affect performance. Essential operating conditions that may be present (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) are included.

Engineering applications requiring mathematical techniques include:	• vector analysis of force systems on beams and bodies • trigonometric plots related to waveforms for amplitude, frequency and phase shift analysis • matrix and determinant solutions of vector systems or simultaneous equations • complex plane analysis of control systems for stability analysis.
Scope of technical mathematical techniques includes:	• standard mathematical software • decimal, binary and hexadecimal number systems • graph exponential and logarithmic functions required for the engineering application • trigonometric equations involving single and double angles • problems using simple binomials and polynomials • problems involving simple sequences and series in the engineering application • two-dimensional vectors • complex numbers and represent graphically • simple algebraic and vectorial problems using determinants and matrices

	• evaluate probability as a predictive tool in simple situations.
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Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23004A Apply technical mathematics

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2>

Assessment Requirements for MEM23004 Apply technical mathematics

Modification History

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Performance Evidence

Evidence required to demonstrate competence in this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include:

- solving mathematical problems using software
- validating software results of simple examples analytically and/or graphically
- manipulating values using decimal, binary and hexadecimal number systems on at least two occasions
- graphing and analysing exponential, logarithmic and trigonometric functions for solutions on at least two occasions
- using the techniques of sequences and series to solve simple mathematical problems on at least two occasions
- using the techniques of two-dimensional vectors to solve mathematic and applied problems on at least two occasions
- using determinant and matrix analysis to solve algebraic and vectorial problems on at least two occasions
- using probability to assess likely occurrences.

Note: Where a volume and/or frequency is not specified, demonstration must be provided at least once.

Knowledge Evidence

Evidence required to demonstrate the required knowledge for this unit must be relevant to and satisfy the requirements of the elements and performance criteria and include knowledge of:

- software for mathematical analysis and graphical representations
- technical mathematical techniques
- engineering applications requiring mathematical techniques:
 - vector analysis of force systems on beams and bodies
 - trigonometric plots related to waveforms for amplitude, frequency and phase shift analysis
 - matrix and determinant solutions of vector systems or simultaneous equations
- number systems:
 - decimal
 - binary
 - hexadecimal

- binomials and polynomials
- exponential and logarithmic functions required for the engineering application
- trigonometric equations
- sequences and series
- two-dimensional vectors
- determinant and matrices
- probability.
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Assessment Conditions

- Assessors must:
 - have vocational competency in applying technical mathematics to engineering problems at least to the level being assessed with relevant industry knowledge and experience
 - satisfy the assessor requirements in the Standards for Registered Training Organisations 2015 or its replacement and comply with the National Vocational Education and Training Regulator Act 2011, its replacement or equivalent legislation covering VET regulation in a non-referring state/territory as the case requires.
- Where possible assessment must occur in operational workplace situations. Where this is not possible or where personal safety or environmental damage are limiting factors, assessment must occur in a sufficiently rigorous simulated environment that reflects realistic operational workplace conditions that cover all aspects of workplace performance, including environment, task skills, task management skills, contingency management skills and job role environment skills.
- Conditions for assessment must include access to all tools, equipment, materials and documentation required including relevant workplace procedures, product and manufacturing specifications.
- Assessment processes and techniques must be appropriate to the language, literacy and numeracy requirements of the work being performed and the needs of the candidate.
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