Australian Government

Assessment Requirements for MEM23008 Apply advanced algebra and numerical methods to engineering tasks

Release: 1

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Modification History

Release 1. Supersedes and is equivalent to MEM23008A Apply advanced algebra and numerical methods to engineering tasks.

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:

- determining relevant algebra and numerical methods to apply to engineering applications
- solving engineering problems using advanced mathematics and numerical methods on at least two occasions
- using appropriate software and/or scientific calculators to generate solutions to algebra and numerical methods problems
- validating results of simple examples using advanced mathematics and numerical methods either analytically and/or graphically using appropriate software or scientific calculators
- assisting decision-making processes in industry by analysing data using advanced mathematics and numerical methods concepts and tools on at least two occasions
- communicating the results of advanced mathematics and numerical methods-based analysis.

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:

- vectors including:
  - vectors in 3D
  - i, j and k notation
  - magnitude of a vector
  - unit vectors and direction angles
  - scalar or 'dot' product of two vectors
  - vector or 'cross' product of two vectors
  - resolution of vectors
  - differentiation and integration of vectors
- dynamics including:
  - Newton's Laws of Motion
  - energy, work and power

- work-energy theorem
- moment of a force
- analytical geometry including:
  - equation of a plane
  - angle between two planes
  - distance from a point to a plane
  - lines in 3D space
- graphing techniques including:
  - coordinate geometry
  - graphs of exponential growth and decay
  - graphs with logarithmic scales
  - method of least squares
  - polar coordinates and polar graphs
  - graphs of functions of two variables
  - quadric surfaces
- complex numbers including:
  - introduction to complex numbers
  - Cartesian form
  - the Argand plane
  - trigonometric and polar form
- linear algebra including:
  - matrix algebra
  - transformations
  - determinants
- numerical solutions including finite difference techniques
- errors including:
  - computer arithmetic
  - propagation of errors
- interpolation and approximation including:
  - polynomial interpolation
  - Lagrange form
  - Newton's divide formula
  - error bound.
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Assessment Conditions

- Assessors must:
  - have vocational competency in applying advanced algebra and numerical methods to engineering tasks 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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Links

Companion Volume implementation guides are found in VETNet - https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=b7050d37-5fd0-4740-8f7d-3b7a49c10bb2