



Australian Government

MEM23086 Apply scientific principles and techniques in avionic engineering situations

Release: 1

MEM23086 Apply scientific principles and techniques in avionic engineering situations

Modification History

Release 1. Supersedes and is equivalent to MEM23086A Apply scientific principles and techniques in avionic engineering situations.

Application

This unit of competency defines the skills and knowledge required to apply advanced scientific principles and techniques to avionic engineering situations.

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

Within this unit, avionic engineering is defined as the engineering discipline concerned with the conceptual development, research, design, manufacture, implementation, installation, commissioning and maintenance of aerospace electrical, instrument, radio and electronic systems and components and related test equipment for civil and military applications.

Avionic engineering applications include the description or definition of an objective or challenge requiring a conceptual development, design, manufacture and/or implementation and/or installation, commissioning and maintenance response to affect a solution or improvement with regard to electrical systems and related wiring and components, mechanical and electro-mechanical flight instruments and indication systems, electronic systems and components or automatic test stations, adapters and software.

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

Pre-requisite Unit

MEA706 Apply basic scientific principles and techniques in avionic engineering situations

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. Identify scientific	1.1 Identify the scientific principles relating to avionic engineering

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
principles and techniques relevant to avionic engineering	1.2 Research and report on avionic scientific principles using appropriate sources of information 1.3 Identify the techniques and associated technologies, software and hardware associated with implementing scientific principles relating to avionic engineering applications 1.4 Research and report on avionic techniques
2. Select scientific principles and techniques	2.1 Select relevant scientific principles for specific avionic engineering situations 2.2 Select relevant avionic techniques and associated technologies, software and hardware for specific avionic engineering situations
3. Apply scientific principles and techniques	3.1 Apply applicable scientific principles to obtain required solutions 3.2 Calculate required quantities 3.3 Use coherent units in equations in a systematic manner to ensure meaningful solutions 3.4 Use significant figures in engineering calculations 3.5 Determine required solutions by applying chosen techniques and associated technologies, software and hardware in a consistent and appropriate manner
4. Document the results of the application of the avionic scientific principles and techniques	4.1 Document solutions involving engineering calculations in an appropriate style 4.2 Document solutions not involving engineering calculations in an appropriate style

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.

Sources of information include:	• reference texts • manufacturer catalogues and industrial magazines • internet search engines and websites • use of phone and email • airworthiness and design authority regulations and associated advisory material.
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Unit Mapping Information

Release 1. Supersedes and is equivalent to MEM23086A Apply scientific principles and techniques in avionic engineering situations.

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 MEM23086 Apply scientific principles and techniques in avionic engineering situations

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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:

- selecting and applying appropriate advanced scientific principles to avionic engineering situations on at least two occasions
- selecting appropriate avionic techniques and associated technologies, software and hardware to suit specified applications
- applying and manipulating appropriate formulae for applications involving engineering calculations
- checking the validity of equations using systematic methods and referring solutions to the original aim of the application
- documenting the solutions obtained through the application of chosen scientific principles in avionic engineering situations on at least two occasions
- presenting solutions referring to the original aim of the application.

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:

- sources of information
- avionic engineering and its applications
- physics - analysis and application of:
 - linear kinematics
 - planar kinematics
 - Newton's Laws of Motion
 - friction
 - momentum and centre of gravity
 - gravity
 - circular motion
 - orbital motion
 - rotational motion

- oscillation
- electronic fundamentals - determination of required values and characteristics for:
 - resistors (including light and voltage dependent resistors)
 - capacitors
 - inductors
 - transformers
 - diodes
 - transistors
 - power amplifiers
 - oscillators
 - silicon controlled rectifiers
 - thyristor power control circuits
 - opto-couplers
- selection of appropriate test equipment
- digital electronics - design, construction and testing of:
 - clocked sequential circuits
 - registers
 - oscillators
 - timers
 - interfacing circuits
 - program logic array
 - state machines
- data communications – analysis and application of:
 - selection of data transmission methods
 - universal asynchronous receiver transmitter construction
 - multiplexers and demultiplexers
 - data encryption and decryption theory
- electronic circuit analysis involving the application of:
 - Fourier transforms
 - Laplace transforms
- aerodynamics including application of:
 - drag and speed
 - power and thrust available and required
 - manoeuvring flight
 - stability and control
- strength of materials including application of:
 - bending and shear in beams
 - forces in trusses and frames
 - engineering concepts of stress and strain
 - properties of areas

- torsion
- mechanical properties of materials
- two-dimensional stress and strain, including elastic constants
- computer software and programming including application of:
 - high level languages
 - algorithm design and testing
 - Pascal and Turbo-Pascal programming
- limitations of avionic techniques and associated technologies, software and hardware
- procedure for ensuring coherent units for meaningful solutions to equations
- concept of significant figures
- uncertainty of computations based on experimental data
- procedures for determining the significance of figures in calculations
- procedures for estimating errors in derived quantities
- method of application of the avionic techniques and associated technologies, software and hardware
- application of the calculation solution style
- significance of the non-calculation solution style.

Assessment Conditions

- Assessors must:
 - have vocational competency in applying scientific principles and techniques in avionic engineering situations 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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