Australian Government

Department of Education, Employment and Workplace Relations

MEM23085A Apply scientific principles and techniques in avionic engineering situations

Release: 1

MEM23085A Apply scientific principles and techniques in avionic engineering situations

Modification History

Not applicable.

Unit Descriptor

This unit of competency covers applying advanced scientific principles to avionic engineering situations.

Application of the Unit

This unit applies to selecting and applying advanced aeronautical scientific principles and techniques. Computer techniques, graphical methods and mathematical calculations should complement scientific princip unit analysis, appropriate precision and accuracy, and use conservative estimations.

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

MEA272A	Apply basic scientific principles and techniques in avionic engineering situations
MEM23001A	Apply advanced mathematical techniques in a manufacturing engineering or related environment
MEM23002A	Apply calculus in engineering situations

Employability Skills Information

This unit contains employability skills

Elements and Performance Criteria Pre-Content

Not applicable.

Elements and Performance Criteria

1	Identify the range of avionic scientific principles and techniques relevant to avionic engineering	1.1	Research and report on avionic scientific principles rel engineering using appropriate sources of information
		1.2	Research and report on avionic techniques and associat software and hardware associated with implementing p avionic engineering applications using appropriate sou
2	Select scientific principles and techniques relevant to avionic engineering applications	2.1	Select the relevant scientific principles for particular av situations
		2.2	Select the relevant avionic techniques and associated te and hardware for particular avionic engineering situatio
3	Apply the relevant scientific principles and techniques appropriately	3.1	Apply the scientific principles in a consistent and appro obtain any required solution
		3.2	Use appropriate calculations and correct units to establ
		3.3	Use coherent units in equations in a systematic manner solutions
		3.4	Use significant figures in engineering calculations
		3.5	Apply the techniques and associated technologies, softw consistent and appropriate manner to obtain required so
4	Quote the results of the application of the aeronautical scientific principles and techniques correctly	4.1	Quote solutions for applications involving engineering appropriate style
		4.2	Quote solutions for applications not involving engineer appropriate style

Required Skills and Knowledge

Required knowledge includes:

- physics:
  - linear kinematics
  - planar kinematics
  - Newton’s Laws of Motion
  - friction
  - momentum and center 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:
  - clocked sequential circuits
  - registers
  - oscillators
  - timers
  - interfacing circuits
  - program logic array
  - state machines
- data communications:
  - selection of data transmission methods
  - universal asynchronous receiver transmitter construction
  - multiplexers and demultiplexers

- data encryption/decryption theory
- aerodynamics:
  - drag and speed
  - power/thrust available and power/thrust required
  - manoeuvring flight
  - stability and control
- strength of materials:
  - 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/programming:
  - high level languages
  - algorithm design and testing
  - Pascal and Turbo-Pascal programming
- limitations of avionic techniques and associated technologies, software and hardware
- the procedure for ensuring coherent units for meaningful solutions to equations
- the concept of significant figures
- the uncertainty of computations based on experimental data
- procedures for determining the significance of figures in calculations
- procedures for estimating errors in derived quantities
- the method of application of the avionic techniques and associated technologies, software and hardware
- the significance of the calculation solution style in relation to the original task
- the significance of the non calculation solution style in relation to the original task

Required skills include:

- applying advanced scientific principles relevant to avionic engineering
- analysing the given situation to determine what is required in the manner of a solution
- analysing the given situation to determine which avionic scientific principles are selected
- selecting appropriate avionic techniques and associated technologies, software and hardware to suit the ap
- applying appropriate avionic principles in determining the required solution
- applying and manipulating formulas and calculations for engineering applications
- using the correct units to solve engineering calculations
- checking the validity of equations using a systematic method for ensuring coherent units
- applying avionic techniques and associated technologies, software and hardware in a manner appropriate identified scientific principles
- referring solutions to the original aim of the application
- quoting solutions in appropriate units and using appropriate significant figures

- presenting solutions referring to the original aim of the application

Evidence Guide

Overview of assessment	A person who demonstrates competency in this unit must be able to apply scientific principles and techniques in avionic engineering situations. Competency in this unit cannot be claimed until all prerequisites have been satisfied.
Critical aspects for assessment and evidence required to demonstrate competency in this unit	Assessors must be satisfied that the candidate can competently and consistently perform all elements of the unit as specified by the criteria, including required knowledge, and be capable of applying the competency in new and different situations and contexts. Assessors should gather a range of evidence that is valid, sufficient, current and authentic. Evidence can be gathered through a variety of ways including direct observation, supervisor's reports, project work, samples and questioning. Questioning techniques should not require language, literacy and numeracy skills beyond those required in this unit of competency.
Context of and specific resources for assessment	This unit may be assessed on the job, off the job or a combination of both on and off the job. Where assessment occurs off the job, that is the candidate is not in productive work, then an appropriate simulation must be used where the range of conditions reflects realistic workplace situations. The competencies covered by this unit would be demonstrated by an individual working alone or as part of a team. The assessment environment should not disadvantage the candidate. The candidate must have access to all tools, equipment, materials and documentation required. The candidate must be permitted to refer to any relevant workplace procedures, product and manufacturing specifications, codes, standards, manuals and reference materials.
Method of assessment	This unit could be assessed in conjunction with any other units addressing the safety, quality, communication, materials handling, recording and reporting associated with applying scientific principles and techniques in avionic engineering situations or other units requiring the exercise of the skills and knowledge covered by this unit.
Guidance information for assessment	

Range Statement

Avionic engineering	Avionic engineering refers to: • 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
Sources of information	Sources of information includes: • reference texts • manufacturer catalogues and industrial magazines • websites • use of phone, email and fax information gathering

Avionic engineering applications	Avionic engineering applications refer to:
	• the description or definition of an objective or challenge within a real or simulated engineering environment or state 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 (power generation, distribution, control interfaces with hydraulic and pneumatic systems, and caution and warning systems)
	  • mechanical and electro-mechanical flight instruments and indication systems (quantity, pressure, temperature, position) and components
	  • electronic systems and components (communications, radio navigation, pulse, display, automatic flight control, flight management, and engine management)
	  • automatic test stations, adapters and software

Unit Sector(s)

Engineering science

Custom Content Section

Not applicable.