



Australian Government

ICTTEN813 Produce engineering solutions using numerical computations and simulation

Release: 1

ICTTEN813 Produce engineering solutions using numerical computations and simulation

Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 2.0.

Application

This unit describes the skills and knowledge required to design and evaluate systems and networks to resolve specialised telecommunications network problems.

It applies to individuals who analyse, calculate and solve complex mathematical engineering problems for advanced telecommunication systems requiring numerical simulation.

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

Unit Sector

Telecommunications – Telecommunications Networks Engineering

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Use advanced engineering mathematics for a range of complex engineering solutions	1.1 Solve mathematical functions using complex trigonometric ratios 1.2 Solve mathematical functions using manipulation of matrices and determinants to perform standard calculations 1.3 Solve trigonometric functions using operations on complex numbers 1.4 Solve complex functions using integral and differential calculus 1.5 Solve mathematical functions using ordinary differential equations (ODE)

ELEMENT	PERFORMANCE CRITERIA
	1.6 Solve mathematical equations using Laplace transforms 1.7 Solve mathematical problems using algorithmic control structures 1.8 Use software simulations where possible to produce simulated calculations for a range of engineering solutions 1.9 Analyse results from the simulated solution and compare to the derived solutions to adjust any variables in the calculation process
2. Design a simulation control system with queues	2.1 Design a simple control system using simulation software 2.2 Design a queuing system using simulation software 2.3 Design a stochastic system using simulation software 2.4 Document and present all numerical software simulations for the engineering problems

Foundation Skills

This section describes language, literacy, numeracy and employment skills incorporated in the performance criteria that are required for competent performance.

Skill	Performance Criteria	Description
Writing	2.4	Prepares clear and concise workplace documentation that incorporates technical language to communicate complex information clearly and effectively
Numeracy	1.1-1.9	Uses a range of advanced mathematical skills to perform a variety of complex engineering solutions and interpret complex measurement data
Get the work done	1.8, 2.1-2.3	- Uses a mix of intuitive and formal processes to identify key information and issues, evaluate alternative strategies, anticipate consequences and consider implementation issues and contingencies - Takes responsibility for high-impact decisions in complex situations involving many variables and constraints - Uses main features and functions of digital tools to complete work tasks

Unit Mapping Information

Code and title current version	Code and title previous version	Comments	Equivalence status
ICTTEN813 Produce engineering solutions using numerical computations and simulation	ICTTEN8197A Produce engineering solutions using numerical computations and simulation	Updated to meet Standards for Training Packages.	Equivalent unit

Links

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=a53af4e4-b400-484e-b778-71c9e9d6aff2>

Assessment Requirements for ICTTEN813 Produce engineering solutions using numerical computations and simulation

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Performance Evidence

Evidence of ability to:

- solve a range of complex mathematical functions related to telecommunications engineering
- use software systems to produce simulations of mathematical solutions
- analyse results of software simulations
- design telecommunications systems using software simulations
- document and present software solutions for engineering problems.

Note: If a specific volume or frequency is not stated, then evidence must be provided at least once.

Knowledge Evidence

To complete the unit requirements safely and effectively, the individual must:

- analyse and manipulate functions using symbolic and numerical software, including operations of entering and manipulating polynomials in suitable software and then substitution of values and graphing
- analyse and manipulate matrices and determinants, numerically with and without symbolic and numerical software
- design and debug programs using algorithmic control structures and output results to the screen, a graph and a file
- analyse and manipulate complex numbers numerically and with symbolic software
- determine and manipulate equations using advanced calculus operations of differentiation and integration numerically and with symbolic software
- determine and manipulate equations of the type called ordinary differential equations (ODE) met in telecommunications engineering applications numerically and with symbolic software
- determine and manipulate Laplace transforms met in telecommunications engineering applications numerically and with symbolic software

- design a simulation control system and simulate queues using software.

Assessment Conditions

Gather evidence to demonstrate consistent performance in conditions that are safe and replicate the workplace. Noise levels, production flow, interruptions and time variances should be typical of those experienced in the telecommunications networks engineering field of work and include access to:

- networked computers
- simulation software
- relevant documentation
- a range of industry scenarios or workplace examples.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

Links

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