



Australian Government

ICTTEN827 Produce engineering solutions

Release: 1

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Modification History

Release	Comments
Release 1	This version first released with ICT Information and Communications Technology Training Package Version 7.0.

Application

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

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

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

Unit Sector

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 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) 1.6 Solve mathematical equations using Laplace transforms 1.7 Solve mathematical problems using algorithmic control structures 1.8 Produce simulated calculations in required engineering solutions 1.9 Analyse results from simulated solutions and compare to derived

ELEMENT	PERFORMANCE CRITERIA
	solutions 1.10 Adjust variables in the calculation process required to improve engineering solutions
2. Design a simulation control system with queues	2.1 Design simple control systems using simulation software 2.2 Design queuing systems using simulation software 2.3 Design stochastic systems using simulation software 2.4 Document and present all numerical software simulations for the engineering problems

Foundation Skills

This section describes those language, literacy, numeracy and employment skills that are essential to performance but not explicit in the performance criteria.

SKILL	DESCRIPTION
Numeracy	Uses a range of advanced mathematical skills to perform a variety of complex engineering solutions and interpret complex measurement data
Writing	Prepares workplace documentation that incorporates technical language to communicate complex information clearly and effectively
Planning and organising	- Uses a mix of informal 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
Technology	Uses main features and functions of digital tools to complete work tasks

Unit Mapping Information

Supersedes and is equivalent to ICTTEN813 Produce engineering solutions using numerical computations and simulation.

Links

Companion Volume Implementation Guide is found on VETNet -

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

Assessment Requirements for ICTTEN827 Produce engineering solutions

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Performance Evidence

The candidate must demonstrate the ability to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including evidence of the ability to:

- resolve at least two specialised network problems.

In the course of the above, the candidate must:

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

Knowledge Evidence

The candidate must be able to demonstrate knowledge to complete the tasks outlined in the elements, performance criteria and foundation skills of this unit, including knowledge of:

- required legislation, codes, company work practices, regulations and standards, workplace health and safety (WHS) requirements for scoped work
- functions using symbolic and numerical software, including operations of entering and manipulating polynomials in suitable software and then substitution of values and graphing
- matrices and determinants, numerically with and without symbolic and numerical software
- methods to design and debug programs using algorithmic control structures and output results to the screen, a graph and a file
- methods to analyse and manipulate complex numbers numerically and with symbolic software
- methods to determine and manipulate equations using advanced calculus operations of differentiation and integration numerically and with symbolic software

- methods to determine and manipulate equations of the type called ordinary differential equations (ODE) met in network engineering applications numerically and with symbolic software
- methods to determine and manipulate Laplace transforms met in network engineering applications numerically and with symbolic software
- methods to design a simulation control system and simulate queues using software
- functions and features of required technical documentation.

Assessment Conditions

Skills in this unit must be demonstrated in a workplace or simulated environment where the conditions are typical of those in a working environment in this industry.

This includes access to:

- networked computers
- simulation software
- required 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.

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