Title
Demonstrate knowledge of the principles of electronic logic gates in computing

Level
4

Credits
9

Purpose
People credited with this unit standard are able to: perform Boolean logic algebra operations; demonstrate knowledge of logic gates, numerical representations, the general principles of logic devices, and how electronic logic and logic devices are used in integrated circuits.

Classification
Computing > Generic Computing

Available grade
Achieved

Explanatory notes
1 Definitions
Central Processing Unit (CPU) for the purposes of this unit standard is a simple integrated circuit that is capable of performing basic mathematical operations. Industry conventions refer to conventions used and recommended by an organisation involved in the computer industry.

2 Legislation relevant to this unit standard includes but is not limited to the:
Copyright Act 1994;
Copyright (New Technologies) Amendment Act 2008;
Health and Safety at Work Act 2015;
and their subsequent amendments.

3 An assessment resource to support computing unit standards (levels 1 to 4) can be found on the NZQA website at http://www.nzqa.govt.nz/for-providers/resources/index.html.

Outcomes and evidence requirements

Outcome 1
Perform Boolean logic algebra operations.

Evidence requirements
1.1 Algebraic laws are demonstrated using Boolean algebra.

Range commutative, associative, distributive, tautology.
1.2 Boolean expressions are translated to logic gate diagrams and vice versa.

1.3 Truth tables are translated using Boolean expression.

1.4 The outputs of a truth table and logic gate diagrams are described for a given series of inputs.

1.5 A logic gate diagram is described for a given simple truth table and simple written statement.

**Outcome 2**

Demonstrate knowledge of logic gates.

**Evidence requirements**

2.1 The symbol, truth table, and equivalent Boolean expression are stated for logic gates.

Range AND, OR, NOT, NAND, NOR, XOR.

2.2 Logic gates are combined to perform the functions of the XOR gate.

**Outcome 3**

Demonstrate knowledge of numerical representation.

**Evidence requirements**

3.1 Numbers are converted between combinations of decimal, binary, and hexadecimal.

Range positive integers

3.2 Representation of integers using two’s complement is described in terms of the calculation used and the binary value of the integer.

Range a minimum of ten representations of eight bits.

3.3 Floating point numbers are described in terms of errors, accuracy, overflows and underflows.

**Outcome 4**

Demonstrate knowledge of the general principles of logic devices.

Range devices – multivibrators, bistables, shift registers, counters.

**Evidence requirements**

4.1 Symbols for logic devices are drawn according to industry conventions.
4.2 Logic devices are described in terms of their operations.

Outcome 5

Demonstrate knowledge of how electronic logic and logic devices are used in integrated circuits.

Evidence requirements

5.1 Integrated circuits (ICs) that implement gates are named for computer system in use.

5.2 Memory chips are explained in terms of the electronic logic used.

5.3 Central processing unit (CPU) is explained in terms of electronic logic.

Replacement information

This unit standard replaced unit standard 219

Planned review date

31 December 2021

Status information and last date for assessment for superseded versions

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Consent and Moderation Requirements (CMR) reference

0226


Please note

Providers must be granted consent to assess against standards (accredited) by NZQA, before they can report credits from assessment against unit standards or deliver courses of study leading to that assessment.
Industry Training Organisations must be granted consent to assess against standards by NZQA before they can register credits from assessment against unit standards.

Providers and Industry Training Organisations, which have been granted consent and which are assessing against unit standards must engage with the moderation system that applies to those standards.

Requirements for consent to assess and an outline of the moderation system that applies to this standard are outlined in the Consent and Moderation Requirements (CMR). The CMR also includes useful information about special requirements for organisations wishing to develop education and training programmes, such as minimum qualifications for tutors and assessors, and special resource requirements.

**Comments on this unit standard**

Please contact NZQA National Qualifications Services nqs@nzqa.govt.nz if you wish to suggest changes to the content of this unit standard.