



## Higher National Graded Unit specification

### General information for centres

This Graded Unit has been validated as part of the HNC and HND Electronics. Centres are required to develop the assessment instrument in accordance with this validated specification. Centres wishing to use another type of Graded Unit or assessment instrument are required to submit proposals detailing the justification for change for validation.

**Graded Unit title:** Electronics: Graded Unit 1

**Graded Unit code:** DG2T 34

**Type of Graded Unit:** Examination

**Assessment Instrument:** Closed-book examination

**Credit value:** 1 HN credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

*\*SCQF credit points are used to allocate credit to qualifications in the Scottish Credit and Qualifications Framework (SCQF). Each qualification in the Framework is allocated a number of SCQF credit points at an SCQF level. There are 12 SCQF levels, ranging from Access 1 to Doctorates.*

**Purpose:** This Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the HNC and HND Electronics.

- ◆ Develop knowledge, understanding and skills in a range of core electrical, analogue electronics and digital electronics principles and technologies at Higher National level (these studies in core electronic and electrical principles are underpinned by a mandatory Unit in Mathematics).
- ◆ Develop candidates' ability to apply analysis and synthesis skills to the solution of electronic problems.
- ◆ Develop learning and transferable skills (including Core Skills).
- ◆ Develop a range of Communication knowledge and skills relevant to the needs of electronic incorporated engineers.

**Recommended prior knowledge and skills:** It is recommended that the candidate should have completed or be in the process of completing the following Units relating to these specific aims prior to undertaking this Graded Unit:

- ◆ Analogue Electronic Principles
- ◆ Combinational Logic
- ◆ Sequential Logic
- ◆ Single Phase A.C. Circuits
- ◆ Mathematics for Engineering 1: Electronics and Electrical
- ◆ Communication: Practical Skills

## **General information for centres (cont)**

**Core Skills:** There are no Core Skills embedded in this Graded Unit specification.

### **Context for delivery**

If this Unit is delivered as part of a Group Award, it is recommended that it should be taught and assessed within the subject area of the Group Award to which it contributes.

The Assessment Support Pack (ASP) for this unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable assessment. Centres wishing to develop their own assessments should refer to the ASP to ensure a comparable standard. A list of existing ASPs is available to download from SQA's website (<http://www.sqa.org.uk/sqa/46233.2769.html>).

**Assessment:** This examination-based Graded Unit is Electronics: Graded Unit 1. It will consist of a written examination of three hours.

## Administrative Information

**Graded Unit code:** DG2T 34  
**Graded Unit title:** Electronics: Graded Unit 1  
**Original date of publication:** June 2004  
**Version:** 03 (August 2009)

### History of changes:

Version	Description of change	Date
02	Minor amendments to take account of the technical content review of the mandatory Unit DG2X 34 <i>Analogue Electronic Principles</i>	10/5/07
03	Minor amendments to take account of changes requested by the Qualifications Support Team (QST).	28/08/09

**Source:** SQA

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

Additional copies of this Graded Unit specification (if sourced by the Scottish Qualifications Authority), can be purchased from the Scottish Qualifications Authority. Please contact the Customer Contact Centre for further details, telephone 0845 279 1000.

## Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates

### Graded Unit title: Electronics: Graded Unit 1

#### Conditions of assessment

The assessment is based on an examination paper consisting of six, 25 mark questions with candidates being allowed to answer any four out of the six questions. The written examination paper should last three hours.

The examination should be conducted under closed-book conditions.

The grade given will reflect the candidate's achievement on the first assessment event. A candidate may wish to retake the Graded Unit but this should be based on a significantly different examination.

The examination should be unseen and the assessment should be conducted in controlled and invigilated conditions.

#### Instructions for designing the assessment task:

The examination should be designed to assess the candidate's critical knowledge and understanding of the topics relating to the specific aims which this Graded Unit is designed to cover. The questions and corresponding marks should be designed in accordance with the ranges indicated in the table that follows. However, the overall total mark for the examination is 100.

Topic	Level of knowledge/ understanding	Weighting/ Mark Allocation
Analogue Electronic Principles	Describe applications of semiconductor diodes  Describe transistor applications  Describe linear operational amplifier applications	30%

**Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates (cont)**

<b>Topic</b>	<b>Level of knowledge/ understanding</b>	<b>Weighting/ Mark Allocation</b>
Combinational Logic	Draw truth tables for common logic gates and derive combinational logic expressions in various forms  Interpret TTL and CMOS data sheets and be able to use these devices in digital systems	30%
Sequential Logic	Describe the operation of sequential logic devices	
Single Phase A.C. Circuits	Solve single-phase ac circuit problems using complex notation	20%
Mathematics for Engineering 1: Electronics and Electrical	Apply algebraic techniques to manipulate expressions and solve equations commonly found in engineering  Carry out operations involving complex numbers  Analyse trigonometric functions and their graphs	10%
Communication: Practical Skills	Respond to written information on a complex vocational issue  Produce written information in a prescribed format on a complex vocational issue	10%

The structure of each question should normally conform to the following marking structure:

Knowledge and understanding	5 marks
Applications	10 marks
Analysis and synthesis	10 marks

The structure of the paper should follow the following format:

- ◆ two questions majoring on Analogue Electronics
- ◆ two questions majoring on Digital Electronics
- ◆ two questions majoring on Electrical Principles

## **Higher National Graded Unit specification: instructions for designing the assessment task and assessing candidates (cont)**

The examination will be marked out of 100. Assessors will aggregate the marks achieved by the candidate to arrive at an overall mark for the examination. Assessors will then assign a grade to the candidate for this Graded Unit based on the following grade boundaries:

- ◆ A = 70% – 100%
- ◆ B = 60% – 69%
- ◆ C = 50% – 59%

### **Guidance to centres**

Centres are encouraged to study this Electronics: Graded Unit 1 specification and any associated specimen paper carefully before embarking on the writing of any HNC Electronics Examination paper.

The main purpose of the Electronics: Graded Unit 1 specification is to assess candidates' abilities to solve problems which involve the integration of some knowledge and skills from the three main Electronics areas of Analogue Electronics, Digital Electronics and Electrical Principles. In addition, limited opportunities are also provided to assess some Communication and Mathematical skills, although any such assessment of these skills should be set within the context of Electronics.

Integration involves an ability to apply knowledge, understanding and skills. This does not mean that the Electronics: Graded Unit 1 Examination should not involve some recall of knowledge only that this should be limited to avoid duplication with what is being assessed in individual Units.

Experience shows that candidates often have great difficulty in transferring knowledge, understanding and skills from one subject area to solve problems in another area of study. Candidates tend to compartmentalise knowledge, understanding and skills into subject areas with considerable reluctance to transfer across subject boundaries. Yet, in the Electronics industry an ability to apply knowledge, understanding and skills from different subject areas to solve complex electronics problems is a vital skill. The Electronics: Graded Unit 1 provides opportunities to develop these critical transferability and problem solving skills. The Unit, as well as consisting of a 3-hour Examination, includes a notional study time of 37 hours to allow candidates to practice problem solving. Centres should use a range of formative assessments to support such skills development.

Centres are also strongly recommended not to limit opportunities for the transferability of knowledge, understanding and skills within Electronics to the Electronics: Graded Unit 1 only but to seek opportunities for the consolidation of these critical skills throughout the whole HNC and HND Electronic awards.

### **Disabled candidates and/or those with additional support needs**

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering whether any reasonable adjustments may be required. Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements)