

## SQA Advanced Unit Specification

### General information for centres

This Graded Unit has been validated as part of the Year 1 in SQA Advanced Diploma in Electronics awards. 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:** Electronic Engineering: Graded Unit 1

**Graded Unit Code:** HP44 47

**Type of Graded Unit:** Examination

**Assessment Instrument:** Closed book examination

**Credit points and level:** 1 SQA 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 National 1 to Doctorates.*

**Purpose:** This Graded Unit is designed to provide evidence that the candidate has achieved the following principal aims of the SQA Advanced Diploma in Electronics.

- Develop knowledge, understanding and skills in a range of core electrical, analogue electronics and digital electronics principles and technologies at SQA Advanced 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 AC 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.

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

An exemplar instrument of assessment and marking guidelines have been produced to indicate the national standard of achievement required at SCQF Level 7.

## Administrative information

<b>Graded Unit Code:</b>	HP44 47
<b>Graded Unit Title:</b>	Electronic Engineering: Graded Unit 1
<b>Date of publication:</b>	August 2018
<b>Source:</b>	SQA

## Equality and inclusion

This unit specification has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on our website [www.sqa.org.uk/assessmentarrangements](http://www.sqa.org.uk/assessmentarrangements).

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SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of SQA Advanced Qualifications.

**FURTHER INFORMATION:** Call SQA's Customer Contact Centre on 44 (0) 141 500 5030 or 0345 279 1000.

## **Unit specification: statement of standards**

### **Graded Unit Title:** Electronic Engineering: 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 but with candidates being allowed access to a standard formula sheet and appropriate data sheets.

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

Reasonable assistance is the term used by SQA to describe the difference between providing candidates with some direction to generate the required evidence for assessment and providing too much support, which would compromise the integrity of the assessment. Reasonable assistance is part of all learning and teaching processes. In relation to the assessment of Advanced Certificate/Diploma examination-based Graded Units, assessors may provide advice and guidance on examination technique and clarification on the meaning of command words which may appear within an examination paper, prior to the formal examination.

Remediation is not allowed in Examination-based Graded Unit assessments.

Any candidate who has failed their Advanced Certificate/Diploma examination-based Graded Unit or wishes to upgrade their award must be given a re-assessment opportunity, or in exceptional circumstances, two re-assessment opportunities. This must be done by using a substantially different examination.

The final grading given must reflect the quality of the candidate's evidence at the time of the completion of the graded unit. Candidates must be awarded the highest grade achieved, whether through first sitting or through any re-assessment.

#### **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.

**Instructions for designing the assessment task (cont):**

<b>Topic</b>	<b>Level of knowledge/ understanding</b>	<b>Weighting/ Mark</b>
Analogue Electronic Principles	Describe applications of semiconductor diodes  Describe transistor applications  Describe linear operational amplifier applications  Describe Silicon Controlled Rectifier (SCR) applications  Describe applications of specialised analogue Integrated Circuits.	30%
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 AC 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:

- 2 questions majoring on Analogue with a little Principles
- 2 questions majoring on Digital with a little Analogue
- 2 questions majoring on Principles with a little Analogue or even Digital

### **Instructions for designing the assessment task (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 the associated specimen paper carefully before embarking on the writing of any Year 1 SQA Advanced Diploma in 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 one of the three main Electronics areas of Analogue Electronics, Digital Electronics and Electrical Principles into another of these areas. 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 obtained in one subject area to another area. For example, it is well known that good knowledge and skills in Electrical Principles is essential when solving many problems in Analogue Electronics. Likewise, a knowledge and understanding of Analogue Electronics is very important when delivering and assessing Digital Electronics. 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 solving problems which involve the transfer of knowledge, understanding and skills in Electrical Principles to Analogue and/or Digital Electronics, or Analogue Electronics to Digital Electronics and/or Electrical Principles and so on. 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 SQA Advanced Diploma in Electronic awards.