SCOTTISH QUALIFICATIONS AUTHORITY

National Unit Specification: general information

UNIT Electronics (Access 3)

NUMBER D378 09

CLUSTER Physics (Access 3)

SUMMARY

The unit seeks to develop the candidate's knowledge and understanding of simple concepts and facts related to electronics. It also provides an opportunity for developing the ability to apply this knowledge and understanding in the handling of information and analysis of simple problems related to electronics.

OUTCOMES

1. Handle information related to electronics.
2. Use a systems approach to produce a practical solution to a simple, real-life problem.

RECOMMENDED ENTRY

While entry is at the discretion of the centre, candidates will normally be expected to have attained appropriate Access 2 units.

CREDIT VALUE

0.5 credit at Access 3.

CORE SKILLS

Core skills for this qualification remain subject to confirmation and details will be available at a later date.

Additional information about core skills is published in the *Catalogue of Core Skills in National Qualifications* (SQA, 2001).

Administrative Information

Superclass: RC

Publication date: June 2002

Source: Scottish Qualifications Authority

Version: 03

National Unit Specification: statement of standards

UNIT Electronics (Access 3)

Acceptable performance in this unit will be the satisfactory achievement of the standards set out in this part of the unit specification. All sections of the statement of standards are mandatory and cannot be altered without reference to the Scottish Qualifications Authority.

OUTCOME 1

Handle information related to electronics.

Performance criteria

(a) Facts are used correctly in relation to electronics.
(b) Symbols are described correctly in relation to electronics.
(c) Relevant information is selected and presented appropriately.
(d) Conclusions drawn are valid, and explanations given are supported by evidence.

Evidence requirements

Evidence of an appropriate level of achievement must be generated from a closed book test with items covering all the above performance criteria. The test must sample the Content Statements in each of the following areas:

- Input, process and output
- Digital logic gates.

OUTCOME 2

Use a systems approach to produce a practical solution to a simple, real-life problem.

Performance criteria

(a) Selected subsystems are appropriate for a specific function.
(b) Justification for choice of each subsystem is correctly made.
(c) Subsystems are correctly assembled.
(d) System provides a solution to the problem.

Evidence requirements

One report, based on a given structure, of a practical solution to a real-life problem related to electronics and covering the above performance criteria is required. The teacher/lecturer responsible must attest that the report is the individual work of the candidate derived from active participation in problem solving activities involving the candidate in planning the activities; deciding how the activities are to be managed; selecting resources; carrying out the activities. The report must contain a block diagram of the system and a written justification of the choice of subsystems. An explanation of how the system functions in terms of the subsystems selected must also be included.

National Unit Specification: support notes

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This part of the unit specification is offered as guidance. The support notes are not mandatory.

While the time allocated to this unit is at the discretion of the centre, the notional design length is 20 hours.

GUIDANCE ON CONTENT AND CONTEXT FOR THIS UNIT

The content and suggested contexts, applications, illustrations and activities for this unit are given on the following pages. The subheadings in the tables correspond to the areas mentioned in the evidence requirements for Outcome 1. The practical activities chosen for Outcome 2 must relate to the content of the unit and must allow opportunity for all the performance criteria for this outcome to be demonstrated within any single report.

GUIDANCE ON LEARNING AND TEACHING APPROACHES FOR THIS UNIT

The learning and teaching of this unit are most effective when the concepts, principles and theories are set in a relevant context, eg by making reference to applications of physics and to real-world situations. The use of the suggested contexts, applications, illustrations and activities is recommended. It is suggested that emphasis is given to practical activities and the associated knowledge and understanding are developed during these activities. Practical activities also provide opportunities to develop a wide range of skills associated with scientific enquiry.

GUIDANCE ON APPROACHES TO ASSESSMENT FOR THIS UNIT

Outcome 1

This outcome is assessed by an end of unit test with questions covering all of the associated performance criteria. Each question can assess achievement of a number of performance criteria. Assessment items are available from the National Assessment Bank.

Outcome 2

The teacher/lecturer should ensure that the activities undertaken in connection with the assessment of Outcome 2 present a practical real-life problem. The activities must relate to the unit content and be at an appropriate level of demand. Candidates should be provided with an outline structure of a report.

In relation to PC (c) the teacher/lecturer should check by observation that the system is assembled correctly.

In relation to PCs (a), (b) and (d), the following provides an indication of what may be included in a candidate's report.

National Unit Specification: support notes (cont)

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PC (a)
Comments should be provided on the selected subsystems with

- a description of the problem to be solved.
- a statement of the name of the input device
- a statement of the name of the output device
- a statement of the name of the processor.

PC (b)
The choice of each subsystem should be justified by:

- a clear sentence indicating why the input device was chosen
- a clear sentence indicating why the output device was chosen
- a clear sentence indicating why the processor was chosen.

PC (d)
A few concise sentences describing how the system works should be provided.

The references under each performance criterion give an indication of what should be provided as evidence in order to achieve the criterion. These references are intended to assist the teacher/lecturer in making a judgement of the candidate's achievement against the performance criteria. It is appropriate to support candidates in producing their reports. Re-drafting of reports after necessary supportive criticism is to be encouraged, both as part of the learning and teaching process and to produce evidence for assessment.

SPECIAL NEEDS

This unit specification is intended to ensure that there are no artificial barriers to learning or assessment. Special needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments or considering alternative outcomes for units. For information on these, please refer to the SQA document *Guidance on Special Assessment Arrangements* (SQA, 2001).

National Unit Specification: support notes (cont)

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The Content Statements given in the left-hand column of the table below describe in detail what the candidate should be able to do in demonstrating knowledge and understanding associated with Electronics.

The right-hand column gives suggested contexts, applications, illustrations and activities associated with the Content Statements.

CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
6.1 Input, process and output	
1 State that an electronic system consists of three parts: input, process and output.	Discuss practical systems in terms of input, process and output.
2 Identify from a block diagram the input, process and output subsystems of an electronic system.	
3 Draw a block diagram showing the input, process and output subsystems of an electronic system.	
4 State that the microphone, thermistor, LDR and switch are examples of input devices.	Carry out experiments to investigate the behaviour of the input devices listed.
5 State that a microphone changes sound energy to electrical energy.	
6 State that the resistance of a thermistor changes with temperature.	Use ohmmeter to measure resistance of thermistor at different temperatures.
7 State that the resistance of an LDR decreases as the light gets brighter.	Use ohmmeter to measure resistance of LDR at different light intensities.
8 Identify from a list an appropriate input device for a given application.	Examine uses of input devices.
9 State that an output device changes electrical energy into another form of energy.	
10 State that the loudspeaker, buzzer, lamp, LED and electric motor are examples of output devices.	Examine a range of output devices.
11 State the energy transformations involved for a given output device.	
12 Identify from a list an appropriate output device for a given application.	Examine uses of output devices.

National Unit Specification: support notes (cont)

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CONTENT STATEMENTS	CONTEXTS, APPLICATIONS, ILLUSTRATIONS AND ACTIVITIES
6.2 Digital logic gates	
1 Draw and identify the symbols for two input AND and OR gates, and a NOT gate.	
2 State that: high voltage = logic 1; and low voltage = logic 0.	Use oscilloscope to examine digital signals.
3 State that for a NOT gate the output is the opposite of the input.	Investigate the truth for a NOT gate and two input AND and OR gates using an LED as detector.
4 State that for an AND gate both inputs must be high for the output to be high.	
5 State that for an OR gate either input must be high for the output to be high.	
6 Explain how to use combinations of digital logic gates for control in simple situations.	Examine simple applications of NOT, AND and OR gates using digital inputs in solving electronic problems, eg alarms, warning devices, etc.