

Mathematics for Engineering 1: Electronics and Electrical

HIGHER NATIONAL DIPLOMA

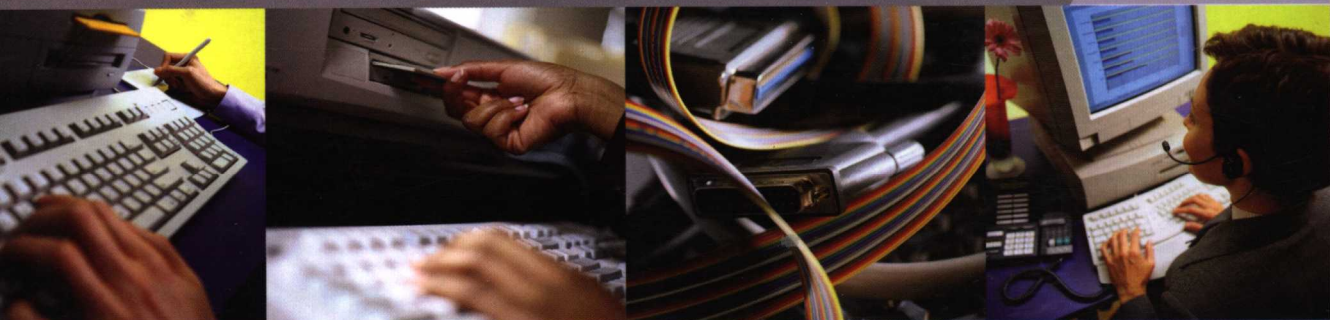
工程数学 I : 电力电子


【英】苏格兰学历管理委员会 (SQA)

Unit Student Guide

COMPUTING: Software Development

DG4H 33



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SCOTTISH
QUALIFICATIONS
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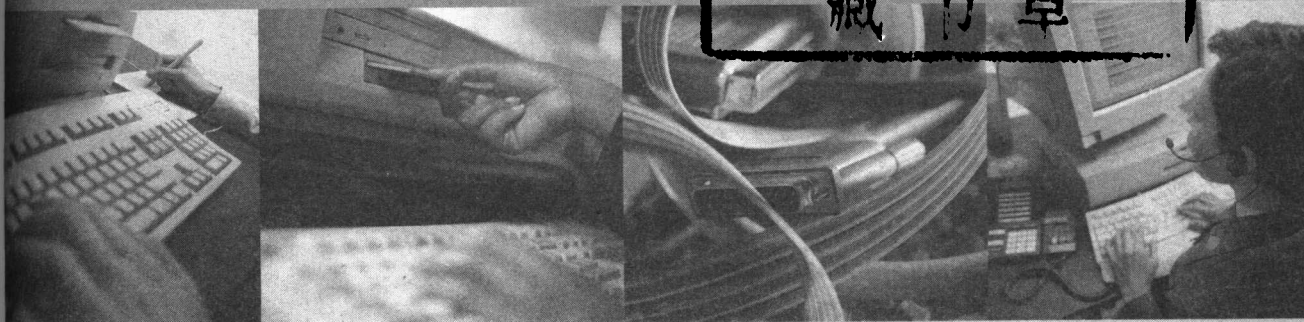
江苏工业学院图书馆
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图书在版编目 (CIP) 数据

工程数学. 1: 电力电子/苏格兰学历管理委员会著. -北京: 中国时代经济出版社, 2005.9

ISBN 7-80169-995-5

I.工… II.苏… III.工程教学-教材-英文 IV.TB11

中国版本图书馆CIP数据核字 (2005) 第107963号

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Mathematics for Engineering 1: Electronics and Electrical

工程数学 I : 电力电子

苏格兰学历管理委员会著

出 版 者	中国时代经济出版社
地 址	北京市东城区东四十条24号 青蓝大厦东办公区11层
邮政编码	100007
电 话	(010) 68320825 (发行部) (010) 88361317 (邮购)
传 真	(010) 68320634
发 行	各地新华书店
印 刷	北京市优美印刷有限责任公司
开 本	787×1092 1/16
版 次	2005年8月第1版
印 次	2005年8月第1次印刷
印 张	14.125
定 价	35.00元
书 号	ISBN 7-80169-995-5/G·352

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1

Introduction to the unit

1.1

What this unit is about

This unit is designed to enable candidates to know, understand and apply algebraic techniques to manipulate expressions and solve equations commonly found in engineering. It provides candidates with an opportunity to develop the knowledge and skills to carry out operations involving complex numbers. The unit also allows candidates the opportunity to develop the necessary knowledge and skills to analyse trigonometric functions and their graphs.

1.2

Outcomes

On completion of the unit candidates should be able to:

- 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.

1.3 Unit structure

This unit contains the following study sections:

Section number and title	Approx. study time
1. Application of algebraic techniques	16 hours
2. Operations involving complex numbers	12 hours
3. Analysis of trigonometric functions and graphs	12 hours

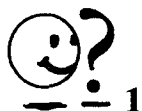
1.4 How to use these learning materials

You should work through each section at your own pace, testing your understanding of the topics covered by completing the activities and Self-assessed questions as you progress. Make sure you make use of your tutor. He/she is there to support you and to monitor your progress. At the end of each study section you should complete the tutor assessed assignment and send it in to your tutor, who can then make arrangements for summative assessment of the section.

1.5 Symbols used in this unit

These learning materials allow you to work on your own with tutor support. As you work through the course, you will encounter a series of symbols which indicate that something follows that you are expected to do. You will notice that as you work through the study sections you will be asked to undertake a series of Self-assessed questions, activities and tutor assignments. An explanation of the symbols used to identify these is given below.

Self-assessed question



This symbol is used to indicate a Self-assessed question (SAQ). Most commonly, SAQs are used to check your understanding of the material that has already been covered in the sections.

This type of assessment is self contained; everything is provided within the section to enable you to check your understanding of the materials.

The process is simple:

- you are set SAQs throughout the study section
- you respond to these by writing either in the space provided in the assessment itself or in your notebook
- on completion of the SAQs you turn to the back of the section to compare the model SAQs answers to your own
- if you are not satisfied after checking your responses, turn to the appropriate part of the study section and go over the topic again.

Remember—the answers to SAQs are contained within the study materials. You are not expected to guess at these answers.

Activity



This symbol indicates an activity, which is normally a task you will be asked to do which should improve or consolidate your understanding of the subject in general or a particular feature of it. The solutions to the activities are found at the end of each section.

Remember that the SAQs and activities contained within your package are intended to allow you to check your understanding and monitor your own progress throughout the course. It goes without saying that the answers to these should only be checked out after the SAQ or activity has been completed. If you refer to these answers before completing the activities, you cannot expect to get maximum benefit from your course.

Tutor assignment—formative assessment**Tutor
assignment**

This symbol means that a tutor assignment is to follow. These will be found at the end of each study section. The aim of the tutor assignment is to cover and/or incorporate the main topics of the section and prepare you for unit (summative) outcome assessment.

**1.6
Other
resources
required**

Pen, pencil, eraser, ruler.

Folder, loose-leaved blank paper, 1 mm squared paper.

Scientific calculator.

Access to telephone.

2

Assessment information

2.1 How you will be assessed

You may be assessed either on an outcome by outcome basis or by a single holistic assessment combining all three outcomes. Assessment will be carried out under supervised, controlled conditions.

2.2 When and where you will be assessed

Summative assessment will take place after you have successfully completed the tutor assessed assignment. Arrangements for the supervision of summative assessments should be made with your tutor.

2.3 What you have to achieve

You will need to demonstrate that you can achieve at least 60% of the marks available in the assessment.

2.4 Opportunities for reassessment

Normally, you will be given one attempt to pass an assessment with one reassessment opportunity.

Your centre will also have a policy covering 'exceptional' circumstances, for example, if you have been ill for an

extended period of time. Each case will be considered on an individual basis and is at your centre's discretion (usually via written application), and they will decide whether or not to allow a third attempt. Please contact your tutor for details regarding how to apply.

3

Section 1: Application of algebraic techniques

3.1

Introduction to this section

What this section is about

By the end of this section you will be able to apply algebraic techniques to manipulate expressions and solve equations commonly found in engineering that underpin so much of more advanced studies in mathematics.

Outcomes, aims and objectives

This section covers Outcome 1 of Mathematics for Engineering 1 and incorporates the following topics:

- numerical evaluation of expressions
- simplification of algebraic expressions
- changing the subject of formula
- solving equations
- using indices, and exponential and logarithmic functions

- using scientific/engineering notation.

Approximate study time

16 hours.

Other resources required

Pen, pencil, ruler.

Folder, loose-leaved paper, 1 mm square paper.

Scientific calculator.

Access to telephone.

SAQs

The answers to SAQs are provided at 6: Answers to SAQs and activities.

3.2

Assessment information for this section

How you will be assessed

Evidence for the knowledge and/or skills in this outcome will be provided by an examination taken at a single assessment event lasting 40 minutes and carried out under supervised controlled conditions.

When and where you will be assessed

Your summative assessment will take place after you have successfully completed the tutor assessed assignment. Arrangements for the supervision of summative assessment for Section 1 should be made with your tutor.

What you have to achieve

You will need to demonstrate that you can achieve at least 60% of the marks available in the assessment.

Opportunities for reassessment

If you do not achieve a pass then your tutor will contact you to discuss arrangements for the reassessment of the specific elements of the section requiring attention.

3.3 Algebraic fractions

A fraction consists of a top number called the **numerator**, a division line and a bottom number called the **denominator**:

$$\begin{array}{c} \text{Numerator} \\ 3 \\ \hline 4 \\ \text{Denominator} \end{array}$$

We can add or subtract fractions when their denominators are equal: