International General Certificate
of Secondary Education

Syllabus

INFORMATION AND COMMUNICATION TECHNOLOGY 0417

For examination in June and November 2010

Information and Communication Technology

Syllabus code: 0417

CONTENTS

Exclusions

This syllabus must not be offered in the same session with any of the following syllabuses:

0420 Computer Studies
7010 Computer Studies

INTRODUCTION

International General Certificate of Secondary Education (IGCSE) syllabuses are designed as two-year courses for examination at age 16-plus.

All IGCSE syllabuses follow a general pattern. The main sections are:

Aims

Assessment Objectives

Assessment

Curriculum Content

The IGCSE subjects have been categorised into groups, subjects within each group having similar Aims and Assessment Objectives.

Information and Communication Technology falls into Group V, Creative, Technical and Vocational, of the International Certificate of Education (ICE) subjects.

Information and Communication Technology is an applied subject and all candidates will require frequent access to computer and Internet facilities to develop their skills. The syllabus aims to give Centres the flexibility to cope with a wide variety of resources and ever-changing technology. The practical sections of this course can be accomplished using any software packages that will allow the candidates to demonstrate ALL of the skills listed in the relevant sections of this syllabus. For this reason CIE does not prescribe particular software packages or particular hardware. Students will learn to use particular packages, but they should be encouraged to realise that, with the aid of a manual, they can transfer their skills to other packages.

AIMS

The aims of the curriculum are the same for all candidates. These are set out below and describe the educational purposes of a course in Information and Communication Technology for the IGCSE examination. They are not listed in order of priority.

The aims are to:

1. help students to develop and consolidate their knowledge, skills and understanding in Information and Communication Technology;

2. encourage students to develop further as autonomous users of Information and Communication Technology;

3. encourage students to continue to develop their Information and Communication Technology skills in order to enhance their work in a variety of subject areas;

4. provide opportunities for students to analyse, design, implement, test and evaluate Information and Communication Technology systems;

5. encourage students to consider the impact of new technologies on methods of working in the outside world and on social, economic, ethical and moral issues;

6. help students to grow in their awareness of the ways in which Information and Communication Technology is used in practical and work-related situations.

ASSESSMENT OBJECTIVES

The two assessment objectives in Information and Communication Technology are:

A   Practical Skills

B   Knowledge and Understanding

A description of each assessment objective follows.

A   PRACTICAL SKILLS

Students should be able to efficiently:

1. use e-mail and the Internet to gather and communicate information;

2. use word processing facilities to prepare documents;

3. use database facilities to manipulate data to solve problems and represent data graphically;

4. integrate data from different sources into a single document or report;

5. produce output in a specified format;

6. use a spreadsheet to create and test a data model, extracting and summarising data;

7. represent data as information in a variety of chart formats;

8. create a structured website with style sheets, tables and hyperlinks;

9. create and control an interactive presentation.

B   KNOWLEDGE AND UNDERSTANDING

Students should be able to demonstrate knowledge and understanding in relation to:

1. the functions of the main hardware and software components of computer systems;

2. the networking of information-processing systems;

3. the ways in which information and communication technology is used and the effects of its use;

4. the stages and methods of system analysis and design;

5. computing terminology.

SPECIFICATION GRID

Assessment Objective	Weighting
A Practical Skills	60%
B Knowledge and Understanding	40%

ASSESSMENT

Scheme of assessment

All candidates will be entered for Papers 1, 2 and 3.

Paper 1 (2 hours)

A written paper of 100 marks assessing the skills in Assessment Objective B. The paper will contain mainly questions requiring a short response, a word, a phrase or one or two sentences, although there will be some questions requiring a more extended response. There will be no choice of questions. The questions will test sections 1–8 of the curriculum content.

Paper 2 (2 hours 30 minutes)

A practical test of 80 marks assessing skills in sections 9–16.

Paper 3 (2 hours 30 minutes)

A practical test of 80 marks assessing skills in sections 9–16.

Practical Tests

The two practical tests will each comprise a number of tasks to be taken under controlled conditions. The practical tests focus on the candidate's ability to carry out practical tasks rather than to explain the theory of how the tasks are completed. Candidates are assessed on their ability to complete these tasks.

The tests will be made available to Centres electronically. Centres intending to enter candidates will be contacted by CIE with instructions on how to download the tasks, at least a week before the start of the assessment period. **If Centres do not receive these instructions, they should contact CIE Customer Services.**

The documentation and printouts produced in the assessment will be externally marked by CIE. The criteria that will be used by the examiners are included in this syllabus booklet.

The procedures for conducting the practical tests are given in this syllabus booklet.

The tasks should be completed and sent to CIE as specified by the timetable.

Hardware and Software requirements

Assessment of the practical tests is software independent. Any hardware platform, operating system and applications packages can be used by candidates in the practical examinations, providing that they have the facilities to enable the candidates to fully demonstrate all of the skills, performance criteria and assessment objectives in sections 9 to 16.

It is recommended that for the website authoring section of the syllabus, that candidates have a working knowledge of html code. There is no requirement for them to complete all of the practical test requirements by writing new code. They may use suitable web editing software to assist them, but they may be required to edit the code generated by such a package.

Weighting of Papers

Paper	Weighting
1	40%
2	30%
3	30%

CURRICULUM CONTENT

The curriculum content is set out in eight interrelated sections. These sections should be read as an integrated whole and not as a progression. The sections are as follows:

1   Types and Components of Computer Systems

2   Input and Output Devices

3   Storage Devices and Media

4   Computer Networks

5   Data Types

6   The Effects of Using ICT

7   The ways in which ICT is used

8   Systems Analysis and Design

Candidates should be familiar not only with the types of software available and the range of Information and Communication Technology knowledge and skills detailed below, but also with their uses in practical contexts. Examples of such uses are given in each section of the subject content as a teaching guide.

No marks will be awarded for using brand names of software packages or hardware.

SECTION 1

Types and Components of Computer Systems

Candidates should be able to:

a)   define hardware, giving examples;

b)   define software, giving examples;

c)   describe the difference between hardware and software;

d)   identify the main components of a general-purpose computer: central processing unit, main/internal memory (including ROM and RAM), input devices, output devices and secondary/backing storage;

e)   identify operating systems, including Graphic User Interface, command line interface;

f)   identify different types of computer including Personal Computer or desktop, mainframe, laptop, palmtop and Personal Digital Assistant.

SECTION 2

Input and Output Devices

Candidates should be able to:

a)   identify the following input devices: keyboards, numeric keypads, pointing devices (including mouse, touch pad and tracker ball), remote controls, joysticks, touch screens magnetic stripe readers, chip readers, PIN pads, scanners, digital cameras, microphones, sensors, graphics tablet, MICR, OMR, OCR, barcode readers, video cameras, web cams, light pens;

b)   identify suitable uses of the input devices stating the advantages and disadvantages of each;

Device	Use
Keyboard	Entering text into a word processing document. Applications where text has to be created rather than copied.
Numeric keypad	Applications where only numeric data is to be entered. Inserting pin numbers for chip and pin credit/debit cards, or when using an ATM machine to withdraw money or check a bank balance.
Pointing devices – all	Applications which require selection from a graphics user interface. For example: the selection of data from a predefined list or menu.
Mouse	In most PCs.
Touchpad	On Laptop computers.
Trackerball	For use by people with limited motor skills e.g. young children or people with disabilities.
Remote control	Using remote control devices to operate TVs, video players/recorders, DVD players/recorders, satellite receivers, HiFi music systems, data or multimedia projectors.
Joystick	Used by a pilot to fly an aeroplane or flight simulator. Used in car driving simulators and for playing games.
Touch screen	Selecting from a limited list of options e.g. certain POS uses such as cafes, tourist information kiosks, public transport enquiries.
Magnetic stripe readers	At POS terminals, ATMs and in security applications.
Chip readers and PIN pads	At ATMs to obtain cash and in retail stores for bill payments.
Scanners	Entering hard copy images into a computer.

Digital cameras	Taking photographs for input to computers, for input to Photo printers.
Microphones	Recording of voices for presentation software.
Sensors (general)	In Control (see 7.1d) and measuring applications (see 7.1c).
Temperature sensor	Automatic washing machines, automatic cookers, air conditioning controllers, central heating controllers, computer-controlled greenhouses, scientific experiments and environmental monitoring.
Pressure sensor	Burglar alarms, automatic washing machines, robotics, production line control, scientific experiments and environmental monitoring.
Light sensor	Computer controlled greenhouses, burglar alarm systems, robotics, production line control, scientific experiments and environmental monitoring.
Graphics tablet	To input freehand drawings or retouch photographs
Optical Mark Reader	To input pencil marks on a form such as a school register, candidate exam answers, any application involving input of a choice of options.
Optical Character Reader	To input text to a computer ready for processing by another software package such as word processors, spreadsheets, databases etc. Processing of passports and identity cards.
Bar code Reader	To input code numbers from products at a POS terminal, library books and membership numbers.
Video camera	To input moving pictures, often pre-recorded, into a computer.
Web cam	To input moving pictures from a fixed position into a computer.
Light pen	Where desktop space is limited, it is used Instead of a mouse or for drawing applications where a graphics tablet might be too big. Also used in applications such as operating theatres where surgeons have little space but require an input device which can be guaranteed to be clean.

c)   identify the following output devices: monitors (CRT, TFT), projectors, printers (laser, ink jet and dot matrix), plotters, speakers, control devices – motors, buzzers, lights, heaters;

d)   identify suitable uses of the output devices stating the advantages and disadvantages of each.

Device	Use
CRT monitor	Applications where space is not a problem. Applications where more than one user may need to view screen simultaneously such as in design use, e.g. when several designers may need to offer suggestions on a prototype.
TFT monitor	Applications where space is limited such as small offices. Applications where only one person needs to view the screen such as individual workstations.
Multimedia Projector	Applications such as training presentations, advertising presentations and home cinema. It displays data from computers, pictures from televisions and video/DVD recorders.
Laser printer	Applications which require low noise and low chemical emissions, e.g. most networked systems. Applications which require rapid, high quality and high volumes of output, e.g. most offices and schools.

Inkjet printer	Applications which require portability and low volume output where changing cartridges is not an issue, e.g. small offices and stand alone systems. Applications which require very high quality output and where speed is not an issue, e.g. digital camera applications.
Dot matrix printer	Applications where noise is not an issue and copies have to made, e.g. industrial environments (multipart forms, continuous stationery, labels etc.), car sales and repair companies, manufacturing sites.
Graph plotter	CAD applications, particularly where large printouts are required such as A0.
Speakers	Any application which requires sound to be output such as multimedia presentations/web sites including encyclopaedias. Applications that require musical output such as playing of musical CDs and DVD films.
Control devices	In Control applications (see 7.1d).
Motors	Automatic washing machines, automatic cookers, air conditioning units, central heating controllers, computer-controlled greenhouses, microwave ovens, robotics, production line control.
Buzzers	Automatic cookers, microwave ovens.
Heaters	Automatic washing machines, automatic cookers, air conditioning units, central heating controllers, computer-controlled greenhouses.
Lights/lamps	Computer-controlled greenhouses.

SECTION 3

Storage Devices and Media

Candidates should be able to:

a) describe common backing storage media (including magnetic tapes, hard discs, all forms of CD and DVD, memory sticks, flash memory) and their associated devices;

b) identify typical uses of the storage media, including types of access (e.g. serial/sequential, direct/random) and access speeds;

Media	Use
Magnetic backing storage media	
Fixed hard discs	Used to store operating systems, software and working data. Any application which requires very fast access to data for both reading and writing to. Not for applications which need portability. Used for online and real time processes requiring direct access. Used in file servers for computer networks.
Portable hard discs	Used to store very large files which need transporting from one computer to another and price is not an issue. More expensive than other forms of removable media.
Magnetic tapes	Any application which requires extremely large storage capacity where speed of access is not an issue. Uses serial access for reading and writing. Used for backups of file servers for computer networks. Used in a variety of batch processing applications such as reading of bank cheques, payroll processing and general stock control.

Optical backing storage media such as CDs and DVDs	CDs tend to be used for large files (but smaller than 1Gb) which are too big for a floppy disc to hold such as music and general animation. DVDs are used to hold very large files (several Gb) such as movie films. Both CDs and DVDs are portable i.e. they can be transported from one computer to another. Both can be used to store computer data.
CD ROM/DVD ROM	Applications which require the prevention of deletion of data, accidental or otherwise. CDs used by software companies for distributing software programs and data; by Music companies for distributing music albums and by book publishers for distributing encyclopaedias, reference books etc. DVDs used by film distributors.
CD R/DVD R	Applications which require a single 'burning' of data, e.g. CDs – recording of music downloads from the Internet, recording of music from MP3 format, recording of data for archiving or backup purposes. DVDs – recording of film movies and television programs.
CD RW/DVD RW	Applications which require the updating of information and ability to record over old data. Not suitable for music recording but is very useful for keeping generations of files. DVDs have between five and ten times the capacity of CDs.
DVD RAM	Housed in a cartridge. Used in video recorders, camcorders and computer memory.
HD DVD	Used in video recorders and computer memory as well as games consoles – main rival to blu-ray.
Blu-ray	Used in video recorders and computer memory as well as games consoles. Largest storage capacity of optical media.
Solid state backing storage	Smallest form of memory, used as removable storage. More robust than other forms of storage. More expensive than other forms but can be easily written to and updated.
Memory sticks/Pen drives	Can store up to many Gb. Used to transport files and backup data from computer to computer.
Flash memory cards	Used in digital cameras, palmtops, mobile phones, MP3 players.

c) describe the comparative advantages and disadvantages of using different backing storage media;

d) define the term backup and describe the need for taking backups;

e) describe the difference between main/internal memory and backing storage, stating the relative benefits of each in terms of speed and permanence.

SECTION 4

Computer Networks

Candidates should be able to:

a)   describe a router and its purpose;

b)   describe the use of WIFI and Bluetooth in networks;

c)   describe how to set up a small network involving access to the Internet, understanding the need to set up the use of a browser, email and an ISP;

d)   identify the advantages and disadvantages of using common network environments such as the Internet;

e)   describe what is meant by the terms user id and password, stating their purpose and use;

f)   identify a variety of methods of communication such as fax, e-mail, and tele/video conferencing;

g)   define the terms Local Area Network (LAN), Wireless Local Area Network and Wide Area Network (WAN);

h)   describe the difference between LANs, WLANs and WANs, identifying their main characteristics;

i)   describe the characteristics and purpose of common network environments, such as intranets and the Internet;

j)   describe other common network devices (including hubs, bridges, switches and proxy servers);

k)   discuss the problems of confidentiality and security of data, including problems surrounding common network environments;

l)   identify the need for encryption, authentication techniques, including the use of User identification and passwords, when using common network environments such as the Internet.

SECTION 5

Data Types

Candidates should be able to:

a)   identify different data types: logical/Boolean, alphanumeric/text, numeric (real and integer) and date;

b)   select appropriate data types for a given set of data: logical/Boolean, alphanumeric/text, numeric and date;

c)   describe what is meant by the terms file, record, field and key field;

d)   describe different database structures such as flat files and relational tables including the use of relationships, primary keys and foreign keys;

e)   state the difference between analogue data and digital data;

f)   explain the need for conversion between analogue and digital data.

SECTION 6

The Effects of Using ICT

Candidates should be able to:

a)   explain what is meant by software copyright;

b)   describe what a computer virus is, what hacking is and explain the measures that must be taken in order to protect against hacking and viruses;

c)   describe the effects of information and communication technology on patterns of employment, including areas of work where there is increased unemployment;

d)   describe the effects of microprocessor-controlled devices in the home, including their effects on leisure time, social interaction and the need to leave the home;

e)   describe the capabilities and limitations of ICT;

f)   describe the use of Internet developments such as Web 2.0, blogs, wikis, digital media uploading websites, and new types of social networking websites;

g)   discuss issues relating to information found on the Internet, including unreliability, undesirability and the security of data transfer including phishing, pharming and SPAM;

h)   describe the potential health problems related to the prolonged use of ICT equipment, for example repetitive strain injury (RSI), back problems, eye problems and some simple strategies for preventing these problems;

i)   describe a range of safety issues related to using computers and measures for preventing accidents.

SECTION 7

The ways in which ICT is used

7.1 Candidates should have an understanding of a range of ICT applications in their everyday life and be aware of the impact of ICT in terms of:

a)   communication applications (such as newsletters, websites, multimedia presentations, music scores, cartoons, flyers and posters);

b)   interactive communication applications (such as blogs, wikis and social networking websites);

c)   data handling applications (such as surveys, address lists, tuck shop records, clubs and society records, school reports and school libraries);

d)   measurement applications (such as scientific experiments, electronic timing and environmental monitoring);

e)   control applications (such as turtle graphics, control of lights, buzzers and motors, automatic washing machines, automatic cookers, central heating controllers, burglar alarms, video recorders/players, microwave ovens and computer controlled greenhouse);

f)   modelling applications (such as 3D modelling, simulation (e.g. flight or driving) and use of spreadsheets for personal finance and tuck shop finances).

7.2 Candidates should understand the differences between batch processing, online processing and real-time processing. They should have an understanding of a wider range of work-related ICT applications and their effects, including:

a)   communication applications (such as the Internet, electronic mail, fax, electronic conferencing, mobile telephones and Internet telephony services);

b)   applications for publicity and corporate image publications (such as business cards, letterheads, flyers and brochures);

c)   applications in manufacturing industries (such as robotics in manufacture and production line control);

d)   applications for finance departments (such as billing systems, stock control and payroll);

e)   school management systems (including registration, records and reports);

f)   booking systems (such as those in the travel industry, the theatre and cinemas);

g)   applications in banking (including Electronic Funds Transfer (EFT), ATMs for cash withdrawals and bill paying, credit/debit cards, cheque clearing, phone banking, Internet banking);

h)   applications in medicine (including doctors' information systems, hospital and pharmacy records, monitoring, and expert systems for diagnosis);

i)   applications in libraries (such as records of books and borrowers and the issue of books);

j)   the use of expert systems (for example in mineral prospecting, car engine fault diagnosis, medical diagnosis, chess games);

k)   applications in the retail industry (stock control, POS, EFTPOS, internet shopping, automatic re-ordering).

SECTION 8

Systems Analysis and Design

8.1   Analysis

	Candidates should be able to:	Examples
a)	describe different methods of researching a situation;	observation, interviews, questionnaires and examination of existing documentation
b)	state the need for recording and analysing information about the current system;	identify inputs, outputs and processing of the current system
		identify, problems with the system
		identify the user and information requirements necessary to solve the identified problems
c)	state the need for identifying features of the existing system.	identify problems

8.2   Design

	Candidates should be able to:	Examples
a)	state the need for producing designs;	need for designing documents, files, forms/inputs, reports/outputs and validation
b)	produce designs to solve a given problem;	design data capture forms and screen layouts
		design reports layouts and screen displays
		design validation routines
		design the required data/file structures
c)	choose the method of verification.	visual comparison of data entered with data source
		entering data twice and comparing the two sets of data either by comparing them after data has been entered or by comparing them during data entry

8.3   Development and testing

	Candidates should be able to:	Examples
a)	understand that the system is created from the designs and then tested;	data/file structure created and tested
		validation routines created and tested
		input methods created and tested
		output formats created and tested
b)	describe testing strategies;	testing each module with normal/live data
		testing each module with abnormal and extreme data
		testing whole system
c)	understand that improvements could be needed as a result of testing.	data/file structures, validation routines, input methods, output formats may need to be amended/improved

8.4 Implementation

	Candidates should be able to:	Examples
a)	describe the different methods of system implementation;	direct changeover parallel running pilot running phased implementation
b)	identify suitable situations for the use of different methods of system implementation, giving advantages and disadvantages of each.	organisations or departments within organisations which need a quick changeover organisations or departments within organisations which cannot afford to lose data

8.5 Documentation

	Candidates should be able to:	Examples
a)	identify the components of technical documentation for an information system;	purpose of the system limitations of the system program coding program flowcharts system flowcharts hardware and software requirements file structures list of variables validation routines
b)	identify the components of user documentation for an information system.	purpose of the system limitations of the system hardware and software requirements how to use the system input and output formats sample runs error messages trouble-shooting guide frequently asked questions

8.6 Evaluation

	Candidates should be able to:	Examples
a)	explain the need for evaluating a new system;	in terms of the efficiency of the solution in terms of ease of use of the solution in terms of appropriateness of the solution
b)	state the need for a variety of evaluation strategies.	compare the solution with the original task requirements identify any limitations and necessary improvements to the system evaluate the users' responses to the results of testing the system

ASSESSMENT CRITERIA FOR PRACTICAL TESTS

The curriculum content for the practical tests is set out in eight sections. The sections are as follows:

9   Communication

10   Document Production

11   Data Manipulation

12   Integration

13   Output Data

14   Data Analysis

15   Website Authoring

16   Presentation Authoring

In the tables, each section is broken down into a series of more specific assessment objectives which candidates should be able to meet. For each specific objective, there are one or more performance criteria that will be used by the examiners to mark the candidate's work.

The majority of the listed performance criteria will be tested.

The tables below also detail some of the skills that may be required to satisfy each performance criterion.

Section 9

Communication

Students should be able to use e-mail and the Internet to gather and communicate information.

Using the Internet and email facilities, the candidate must demonstrate the ability to:

Assessment Objectives		Performance Criteria	Skills
9	**Communicate with other ICT users using e-mail and use the internet as an information source**		
9a	Receive and store a file using e-mail	Receive a file from another ICT user electronically	Open message, store e-mail messages using a suitable planned structure, save attached file, store files using a suitable planned structure
9b	Send a file using e-mail	Send a file to another ICT user electronically	New message, address, subject, reply, forward, carbon copy, blind carbon copy, attach file(s)
9c	Manage contact lists	Store, retrieve and structure contact lists	Save contact details, add a new contact, delete a contact, store contacts, using a planned structure, address book, groups
9d	Locate information from a website	Specified information from a given URL	Search string
9e	Search for information	Find specified information using a search engine	Simple search, advanced (refined) search
9f	Download information	Download and save information as specified	

Section 10

Document Production

Students should be able to use word processing facilities to prepare documents.

Using word processing facilities, the candidate must demonstrate the ability to:

Assessment Objectives		Performance Criteria		Skills
10.	**Enter, edit and format data from different sources and set text appearance and layout.**			
10a	Load data from an existing file		Load/open specified file	Locate file, identify file type, .csv, .txt, .rtf
10b	Key in and edit text		Enter text and edit text as specified with no errors	Enter text, enter numbers, highlight, delete, move, replace, cut, copy, paste, drag and drop
10c	Import image from external source	(i)	Place image as specified	Import clip art, import from a digital source, import from file, import from website
		(ii)	Manipulate image as specified	Move image, resize image, crop image, text wrap (around image, square, tight, above, below), maintain aspect ratio
10d	Include information downloaded from the Internet		Specified data only, positioned as required	Text, graphic image, table, chart
10e	Set up a page format	(i)	Page size and orientation as specified	A4, A5, Letter, portrait, landscape
		(ii)	Set margins as specified	Top margin, bottom margin, left margin, right margin, gutter
		(iii)	Create/edit headers and footers as specified	Headers, footers, automatic file information, automated page numbering, text, date, position, consistency of position, position left, right, centre, outside of pages, align with page margins
		(iv)	Set columns as specified	Number of columns, column width, spacing between columns
		(v)	Set breaks as specified	Page breaks, section breaks, column breaks, inserted, deleted, set breaks to avoid widows, set breaks to avoid orphans
10f	Format the text	(i)	Set fonts as specified	Font style, font type (serif, sans-serif), point size, increase, decrease, use an appropriate font for the task
		(ii)	Use text emphasis as specified	Select text, bold, underline, italic, highlight, specified item(s) only
		(iii)	Format a list as specified	Bulleted list, numbered list
		(iv)	Insert/edit table as specified	Specified number of rows and columns, insert row(s), delete row(s), insert column(s), delete column(s)
		(v)	Format a table as specified	Format cells/cell contents, show gridlines, hide gridlines, horizontal cell alignment (left, right, centre, fully justified), vertical cell alignment (top, centre, bottom), text wrapping around table, text wrapping within cells, shading/colouring cells

10g	Text alignment and spacing	(i)	Set alignment as specified	Left, centred, right, fully justified
		(ii)	Line spacing as specified	Single, 1.5 times, double, multiple, consistent, between lines, between paragraphs, before and after headings
		(iii)	Indent text as specified	Indent text, indent paragraph, hanging indent, specified portion only
10h	Proof read and correct errors	(i)	Use spell-check facilities	Spelling is checked and free from error
		(ii)	Proof-read and correct the document	Document is proof-read and corrected for accuracy, consistent line spacing, consistent character spacing, re-pagination, remove blank pages, check for widows/orphans, tables/lists split over pages, specified orientation

Section 11

Data Manipulation

Students should be able to use database and charting facilities to manipulate data to solve problems and represent data graphically.

Using database facilities, the candidate must demonstrate the ability to:

Assessment Objectives		Performance Criteria		Skills
11.		**Enter data from different sources, perform calculations, search for data, sort the data and produce reports from the data.**		
11a	Load data from existing files	(i)	Load specified file	Locate file, open file, import file, identify file type (.csv, .txt, .rtf)
		(ii)	Define a database record structure as specified	Assign the following field/data types: Text, numeric, (integer, decimal, currency, percentage, date/time), Boolean/logical (yes/no, true/false, 1/0)
				Use meaningful file names
		(iii)	Format fields as specified	Identify field sub-types and formatting (e.g. specify currency used, or number of decimal places)
11b	Enter data		Enter data as specified with no errors	Enter text, enter numbers, enter date/time values, enter Boolean data
11c	Enter formulae		Use arithmetic operations/numeric functions to perform calculations	Calculated field, run time calculation, addition, subtraction, multiplication, division, sum, average, maximum, minimum, count
11d	Sort data		Use one criterion as specified	Ascending, descending, alphanumeric, numeric, date
11e	Select subsets of data		Use several criteria as specified	Use numeric, text and Boolean operators: AND, OR, NOT, LIKE, >, <, =, >=, <=, Wildcards
11f	Produce a report	(i)	Display fields as specified	Data aligned as specified (left, centred, right) and displayed in specified format (percentage, currency (various), decimal, specified number of decimal places, integer), hide data and labels, show hidden fields, display calculations/formulae, display data/labels in full (with no truncation)
		(ii)	Enter text as specified	Report titles
		(iii)	Layout as specified	Header, footer, page layout, label production
		(iv)	Export a query or report as specified	Export data into a common text format .csv, .txt, .rtf format, export into graph/charting package

Section 12

Integration

Students should be able to integrate data from different sources into a single document or report.

Integrating data from many sources into a single document/report, the candidate must demonstrate the ability to:

Assessment Objectives	Performance Criteria		Skills
12. Integrate data from several sources			
12a Combine text, image(s) and numeric data	(i)	Combine text and image(s) as specified	Import text, import clip art, import from a digital source, import from a website, cut, copy, paste. Place as specified
	(ii)	Combine text and database extract as specified	Import text, import from a database, cut, copy, paste. Place as specified
	(iii)	Combine text and graph/chart as specified	Import text, import a graph/chart, cut, copy, paste. Place as specified

Section 13

Output Data

Students should be able to produce output in a specified format.

Producing output in the specified format from a variety of sources, the candidate must demonstrate the ability to:

Assessment Objectives	Performance Criteria		Skills
13. Output data			
13a Save and print data/document	(i)	Save and print the document as specified	Draft document, final copy, e-mail, file attachment, screen shots, save in different file formats, e.g. .txt, .rtf
	(ii)	Save and print the object/data as specified	Database report, data table, graph/chart, save and export in different file formats, e.g. .txt, .csv, .rtf

Section 14

Data Analysis

Students should be able to use a spreadsheet to create and test a data model, extracting and summarising data.

Using spreadsheet facilities, the candidate must demonstrate the ability to:

Assessment Objectives		Performance Criteria		Skills
14.	**Create a model, extract data, use display features and output data from the model.**			
14a	Create a data model	(i)	Enter layout of model as specified	Cut, copy, paste, drag and drop, fill
		(ii)	Enter text and numerical test data with 100% accuracy	Manually verify data entry
		(iii)	Enter formula(e) to meet the requirements	Add, subtract, multiply, divide, indices, relative reference, absolute reference, named cells, named ranges, nested formulae
		(iv)	Use function(s) to meet the requirements	Sum, average, maximum, minimum, integer, rounding, counting, if, lookup, nested functions
14b	Test the data model		Demonstrate that the model works	Test using appropriately selected test data
14c	Select subsets of data		Use several criteria as specified	Use numeric, text and Boolean operators: AND, OR, NOT, LIKE, >, <, =, >=, <=, Wildcards, string
14d	Sort the data model		Sort all or part of the data model on one criterion or two or more criteria	Ascending order, descending order
14e	Adjust display features	(i)	Display data/labels as specified	Select data, bold, underline, italic, highlight, specified row/column/item(s) only, integer, percentage, decimal, specified number of decimal places, currency (various)
		(ii)	Adjust row/column/cell sizes so that all data/labels/formulae are visible	Display formulae/data, adjust column width, row height, hide row/column
		(iii)	Adjust page orientation as specified	Portrait, landscape, fit to page
14f	Save and print data		Save and print data as specified	Formulae, values, extracts, test data, save as, different file formats, export
14g	Produce a group or chart	(i)	Select only the specified data series	Contiguous data, non-contiguous data, specified range(s)
		(ii)	Label graph/chart as specified	Title, legend, segment labels, segment values, percentages, category axis labels, value axis labels, scales set axis scale maximum, set axis scale minimum, add second axis
		(iii)	Format graph/chart	Graph/chart type, enhance chart (extract pie chart segment), change colour scheme/patterns

Section 15

Website Authoring

Students should be able to create a structured website with style sheets, tables and hyperlinks. Students should have a working knowledge of html.

Using website authoring facilities, the candidate must demonstrate the ability to:

Assessment Objectives		Performance Criteria		Skills
15	**Create webpage structures using external stylesheets, tables, images and output the webpage(s).**			
15a	Use stylesheets	(i)	Create an external stylesheet	`<link rel="stylesheet" type="text/css" href="stylesheetname.css">`
		(ii)	Create styles for common tags	h1, h2, h3, p, li
		(iii)	Specify font appearance	h1 { color: #FF0000; font-family: arial; text-align: center; font-size: 48pt; font-weight: bold; }
		(iv)	Apply tags	`<meta name="keywords" content ="text string, text string">`
15b	Create webpage(s)	(i)	Create webpage(s) as specified	Homepage, other pages, menu options, text hyperlink, graphics hyperlink, foreground colour, background colour, text colour
		(ii)	Apply menu options to pages as specified	Text hyperlink, graphics hyperlink
15c	Create links	(i)	Create links as specified	Links to the same page (e.g. top), anchors, links to other pages
				`<a href="page name">linkname</a>`, external links
				`<a href="page name" target="new windowname">linkname</a>`
				web addressing with correct URL
				`<a href="http://www.address"> linkname</a>`
				`<a href="localfilename"> linkname</a>`
				`<a href="mailto:user@emailaddress"> linkname</a>`
				Link from text, link from image
		(ii)	Open in a specified location	Same window, new window, named as specified
				`<a href="pagename" target="newwindowname"> textusedforlink</a>`

15d	Use tables	(i)	Insert table	Table, table header <th>, table row <tr>, table data <td>, cellspacing, cellpadding
				<table cellspacing="10" cellpadding-"6">
				Set width in terms of pixels or % values
				width="575"
				width="85%"
		(ii)	Specify borders	Use of tables with visible or invisible borders, set border thickness <table border ="4">
		(iii)	Merge cells	Use merged cells within rows <td colspan ="2">, use merged cells within columns <th rowspan = "3">
15e	Insert image	(i)	Insert image	Insert image <img src="image name" align="centre">
		(ii)	Place images relative to text	Use of tables to place images, align cell contents left, align cell contents right, align cell contents centre
15f	Alter image	(i)	Use tags to adjust image size and alignment	Resize and position on the page width="500" height="300" valign="top" align="left"
		(ii)	Use software to resize image/adjust colour depth	Resize/resample, .gif, .jpg, .png, screen shot evidence, maintain aspect ratio, distort as specified
15g	Save and print web pages		Save and print web pages as specified	In browser, in HTML format, screen shots

Section 16

Presentation Authoring

Students should be able to create and control an interactive presentation.

Using presentation graphics facilities, the candidate must demonstrate the ability to:

Assessment Objectives		Performance Criteria		Skills
16.	**Create, control and output information from a presentation**			
16a	Set up presentation		Create/edit master slide as specified	Master slide, placing images/text/logos, slide footers, automated slide numbering, font styles, heading styles, colour scheme
16b	Create presentation pages	(i)	Create the required number of presentation pages with information specified	Areas for headings, subheadings, bullets, images, charts; colours, text boxes, presenter notes, audience notes
		(ii)	Insert text as specified	Headings, subheading, bulleted list, font styles, font types (serif, sans-serif), point sizes, text colour (selected from presentation colour scheme), text alignment, enhancements (bold, italic, underscore)
		(iii)	Ensure consistency within the presentation	Consistently applied font styles, point sizes and colour schemes
16c	Use graphical information	(i)	Image inserted as required	Resize, position, crop, copy, contrast, brightness
		(ii)	Create or insert chart as required	Create within the package, import from spreadsheet, from contiguous or non contiguous data, title, legend, segment labels, segment values, percentages, category axis labels, value axis labels, scales
		(iii)	Insert other features as specified	Symbols, lines, arrows, call out boxes
16d	Use transitions		Automate the transition between pages as specified	Consistent between slides, range of features
16e	Use animation facilities		Add animation as specified	Text, images, consistent between objects
16f	Save and print presentation	(i)	Save and print the presentation as specified	File compression (zip files) floppy disk, presenter notes, audience notes (handouts)
		(ii)	Capture elements of the presentation as specified	Use screen shots to show features like animation/transition/builds

PROCEDURES FOR CONDUCTING PRACTICAL TESTS

Supervisor Instructions

Centres are sent a set of Supervisor instructions for practical tests when they request the practical papers from CIE. These give any additional instructions which are specific to the particular assessment activity and must be carefully followed. A suitably competent Supervisor, who may be the candidates' tutor, is responsible for the administration of the practical tests according to these instructions and procedures. The Supervisor is responsible for the preparation of the hardware and software for the test.

Timetabling

The practical tests will not be timetabled in the same way as most IGCSE and A/AS Level written papers. The IGCSE and AS/A Level timetable will specify a period within which the two practical tests must be taken by candidates. Within this period, Centres may conduct the practical tests at any convenient time or times. Each candidate must complete each practical test in a single session.

All candidates from a centre are not required to take the tests at the same time, and they do not need to be sequestered until other candidates have taken the test. Some Centres may therefore choose to conduct each test in several sessions over a number of days or weeks.

Centres should ensure that there is sufficient time between electronically receiving the assessments and scheduling examination dates to:

- set up the required ICT facilities;

- produce a Supervisor worked copy;

- allow for contingency planning (e.g. to reschedule examination times due to possible hardware failure).

Preparation for the Practical Tests

Before the candidates take a practical test, the Supervisor must work through the test at the Centre, using similar hardware and software to that which will be used by the candidates, in order to:

- ensure that the hardware and software at the Centre will enable the candidates to meet all the performance criteria;

- produce the Supervisor worked copy of the assessment, which must be included with the submission to CIE of candidates' work

- help the examiner understand the approach taken by the candidates

- ensure that all files and systems are set up appropriately.

Centres are responsible for ensuring that the hardware and software to be used by candidates is in full working order and will enable them to meet all the performance criteria as specified in the syllabus. Errors as a result of faulty software or hardware will not be taken into consideration in the marking of candidates' work.

Centres are responsible for candidates having access to the Internet. However, if the Centre only has limited or unreliable Internet access, then pages from the assessment website may be downloaded and placed on the Centre's network or intranet as required. Candidates will then need to be made clearly aware of alternative arrangements for sending email messages and searching for specified files required for the tasks before the start of the test.

Centres are responsible for ensuring that a spare computer/printer is available in case of equipment failure. If equipment failure occurs, candidates should be permitted to move to another machine if necessary, making sure that candidates do not have access to other candidates' work, e.g. by using secure areas on all machines or changing the default settings.

Centres should ensure that there are adequate printing facilities and that sufficient stocks of toner, paper etc. are provided.

There is no requirement for work to be printed in colour, unless otherwise instructed. No extra credit will be given to work printed in colour. It is, however, the candidate's responsibility to ensure that adequate differentiation is present on monochrome printouts (e.g. sectors of a pie chart are distinguishable). Where appropriate, candidates should be made aware of this in an announcement immediately before the start of the test.

Security Issues

The practical tests are a test of skills, not of knowledge or understanding. The performance criteria – that is, the skills which are to be included in the test – are published in the syllabus and are available to candidates. The majority of the performance criteria are assessed in each examination. Candidates can therefore gain no advantage by speaking to other candidates who have already taken the tests: they already know what skills they have had to acquire. The security issues associated with the practical tests are therefore different from those associated with conventional written papers.

There are, nevertheless, important security issues. For example, candidates must not gain sufficient knowledge of the tests to enable them to rote-learn the sequences of keystrokes or commands which form the answers. All assessment material must be treated as confidential. It should only be issued at the time of the test. Live CIE assessment material must not be used for practising skills.

All work stored on a network or hard disk must be kept secure. Centres are strongly advised to consider setting up passwords to control login procedures and to ensure that only authorised access to files is possible.

Centres must ensure that:

- candidates do not have access to test material or source files except during their test;

- at the end of each session all assessment material (including the CIE practical tests and candidates' completed work) is collected by the invigilator;

- all draft copies and rough work which is not to be submitted is destroyed.

After the test, all copies of the test papers must be collected by the invigilator and either destroyed or kept under secure conditions until the end of the examination session. Candidates are not permitted to retain a copy of the test, or of any printouts produced during the test, or of any electronic files which form part of the test or have been produced during the test. Candidates' work must be kept securely by the Centre between the end of the test and submission to CIE.

Submission of candidates work

The submission to CIE of candidates' work should include:

- The candidates' Assessment Record Folders (ARF) containing a printed copy of the student submission;

- Supervisor Report Folder (SRF) including:

  - The supervisor worked copy of the test;

  - The nature of any problems encountered, the candidates affected, and the actions taken;

  - Details of the software which candidates used to completed the test.

Invigilator instructions

Guide to invigilation

Each practical test is to be completed within the time specified under supervised conditions. The Centre should provide a quiet business-like atmosphere for the tests.

Invigilators should be familiar with the Checklist for Invigilators in the Handbook for Centres, which applies to invigilators of both written examinations and practical tests. They should also, ensure that they have access to a copy of the Supervisor Instructions sent with the test materials and are familiar with these documents.

At least two invigilators should be present for the test. It is essential that a suitably competent invigilator, preferably the Supervisor, is present in the test room to deal with any technical difficulties that may arise. If the Supervisor has been involved in the preparation of any of the candidates for the test, then another invigilator must be present at all times. It is left at the discretion of the Centre to appoint suitable personnel, but the availability of an extra technician in addition to the invigilators is encouraged.

Invigilators should move around the room and remove any unauthorised material. Should any breach of security occur (such as collusion between candidates, e.g. by accessing other candidates' files on the network or sharing solutions via the Internet), the Head of Centre should be informed and a detailed written report must be submitted to CIE.

It is essential that an invigilator gives the printouts to candidates and candidates do not collect the printouts themselves from the printer. One invigilator should be responsible for collecting the printout(s) from the printers and giving this to the candidate, only where the candidate's name, candidate number and centre number have been printed on each printout. If this information is not present on the printout then the printout will be removed and destroyed by the invigilator at the end of the test period.

If printers are in a different room an additional invigilator will be required in order to collect the printouts and distribute these to the candidates as they work during the test.

During the test:

- There must be no access to portable storage media (e.g. memory sticks, floppy disks, CDs, etc.).

- Candidates must NOT have access to their own electronic files or personal notes, pre-prepared templates, past papers or other files during the test.

- Candidates may use English or simple translation dictionaries, spell-checkers, the software's help facilities, and the manufacturer's manuals on the software packages during the practical test.

- Candidates may use software's wizards provided by the original software vendor.

- Candidates are NOT allowed to refer to textbooks or centre-prepared manuals during the test.

- Display material (e.g. maps, diagrams, wall charts) must be removed from the examination room.

- No other help may be given to the candidates during the test, unless there is an equipment failure. Any assistance given to an individual candidate which is beyond that given to the group as a whole must be recorded as part of a supervisor report which is submitted to CIE with the candidates' work.

- Candidates must not communicate with one another in any way (including the use of email, via the Internet or intranet) and security of the individual candidates' files must be ensured.

- To conform with safe working practices in using display screen equipment, it is recommended that candidates be allowed to take short approved breaks from working at their screens (5–10 minutes every hour), without leaving the examination room. Such breaks may naturally form part of the working pattern as candidates study the assessment material or collect printouts from the printer. The invigilators are responsible for maintaining security during these break periods.

At the end of the test:

- Candidates should present the invigilator with the printouts they wish to submit. Each printout should include the candidate's name, number and Centre number. This information should be printed, not hand-written. Any printouts with hand-written details or no candidate details will not be marked.

- All assessment material (including the CIE practical tests and candidates' completed work) should be collected.

- All draft copies and rough work not to be submitted should be destroyed.

- Candidates must send all work to the printer during the duration of the test. Collating printouts may be done after the test time specified under supervised conditions. Where specified, tasks such as highlighting parts of the printout can be done after the test time specified.

Equipment failure

In the event of a system crash, software failure, power cut or damage to equipment occurring during the test, any action taken must ensure the integrity of the test can be guaranteed.

If a candidate appears to be having problems with faulty equipment, the Supervisor should be informed, who will determine if the fault lies with the equipment or the candidate. If equipment failure occurs with individual computers, candidates should be permitted to move to another machine if necessary. Invigilators are advised to check that candidates do not have access to other candidates' work e.g. by using secure areas on all machines or changing the default settings. If equipment can be restored, extra time may be given to the candidates to compensate for time lost while the problem is resolved as long as the integrity of the test can be guaranteed. If equipment failure makes it impossible to continue with the test, (for example power has been lost indefinitely or all the candidate's work has been lost or corrupted), all the candidate's work must be destroyed and the candidate should be allowed a second attempt at the test on a different day. This should only be a last resort.

If there has been an equipment failure, the Supervisor must include a detailed report in the Supervisor Report Folder (SRF) to CIE examiners with the candidates' work. The report should state the nature of the problem, the candidates affected, and the actions taken.

Only in the event of a printer breakdown may the Centre use its discretion on extending the time specified for the test. This must be recorded as part of the Supervisor's report.

GRADE DESCRIPTIONS

A **Grade A** candidate is likely to:

- demonstrate a sound knowledge and understanding of the range and scope of information processing applications and of the techniques and systems needed to support them, some of which are outside their everyday experience;

- have a good grasp of terms and definitions and be able to contrast and compare related ideas;

- be able to apply general principles of information processing to given situations and to be able to abstract general principles from given examples.

- identify a range of needs and opportunities and analyse, design and evaluate the most appropriate ways of addressing these using information systems;

- be able to discuss methods of detecting the loss or corruption of electronic information and describe steps that minimise the likelihood of the abuse of personal information;

- be able to use competently a broad range of software packages to successfully complete a wide variety of practical work-related tasks.

A **Grade C** candidate is likely to:

- demonstrate knowledge and understanding of the range and scope of information processing applications and of the techniques and systems needed to support them;

- have a good grasp of basic terms and definitions and be able to contrast and compare related ideas;

- identify some needs and opportunities and analyse, design and evaluate appropriate ways of addressing these using information systems;

- be able to control Information and Communication Technology devices showing an awareness of efficiency and economy;

- demonstrate a clear sense of audience and purpose in their presentations;

- be able to use a range of software packages to complete a variety of practical work-related tasks.

A **Grade F** candidate is likely to:

- demonstrate a basic knowledge and understanding of familiar, simple information processing applications and of the techniques and systems needed to support them;

- have some knowledge of some of the basic terms and definitions;

- respond to needs and opportunities and evaluate ways of addressing these using information systems;

- manipulate and interrogate previously stored information;

- use Information and Communication Technology to present work and demonstrate how it contributes to the development of their ideas;

- be able to use software packages to complete some simple practical work-related tasks.

APPENDIX: ADDITIONAL INFORMATION

Spiritual, Ethical, Social, Legislative, Economic and Cultural Issues

The study of ICT supports the development of skills and attitudes that increase candidates' ability to address the social and ethical issues of technological advancements.

Many aspects of society have been influenced by the ICT revolution. ICT is having a profound impact on the world of work, affecting both the jobs that people do and how they do them. New media for communication and social networking are having a significant impact on the relationships that people form. Students and teachers are finding new ways to learn through the medium of technology.

To be fully-participating and responsible members of society, candidates must be aware of the ever-growing impact of ICT. Through sections 6 and 7 of the syllabus, candidates will be required to reflect critically on the role of ICT in society and to consider its effects both economically and culturally.

Sustainable Development, Health and Safety Considerations and International Developments

This syllabus offers opportunities to develop ideas on sustainable development and environmental issues, health and safety, and the international dimension of ICT use.

- Sustainable development and environmental issues
  Sections 6 and 7 of the syllabus provide candidates with an opportunity to explore the effects of a range of ICT applications. This includes the potential impact on energy use of the use of control technology, modelling applications and electronic communication media.

- Health and safety
  Section 6 of the syllabus requires candidates to be able to describe both the potential health problems and safety hazards associated with the use of ICT. Candidates are also expected to understand the measures that can be taken to minimise these risks.

- The International dimension of ICT use
  ICT continues to have a profound impact on the communication between people and businesses who are remote from each other. This is explored in section 7 of the syllabus.

  Sections 6 and 7 of the syllabus provide opportunities for candidates to explore the effect that ICT has on patterns of employment, including areas of work where there is increased unemployment.

  Candidates should appreciate the technological dependence of modern economies on ICT and the potential that this has for future economic, culture and social development.

Avoidance of Bias

CIE has taken great care in the preparation of this syllabus and assessment materials to avoid bias of any kind.

Language

This syllabus and the associated assessment materials are available in English only.

Resources

Copies of syllabuses, the most recent question papers and Principal Examiners' reports are available on the Syllabus and Support Materials CD-ROM, which is sent to all CIE Centres.

Resources are also listed on CIE's public website at www.cie.org.uk.

Access to teachers' email discussion groups and suggested schemes of work may be found on the CIE Teacher Support website at http://teachers.cie.org.uk. This website is available to teachers at registered CIE Centres.