General Certificate of Education (International) **Syllabus**
Advanced Level and Advanced Subsidiary Level

APPLIED INFORMATION AND COMMUNICATION TECHNOLOGY 9713

For examination in June and November 2010

Applied Information and Communication Technology

GCE Advanced Subsidiary Level and GCE Advanced Level 9713

CONTENTS

Exclusions

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

9691 Computing
9754 Computing (Singapore)

INTRODUCTION

Information and Communication Technology (ICT) 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. Candidates 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.

Centres and candidates may choose to:

- take all Advanced Level components in the same examination session leading to the full A Level.
- follow a staged assessment route to the Advanced Level by taking the Advanced Subsidiary (AS) qualification in an earlier examination session. Subject to satisfactory performance such candidates are then only required to take the final part of the assessment (referred to in this syllabus as A2) leading to the full A Level.
- take the Advanced Subsidiary (AS) qualification only.

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 Applied ICT for the Advanced Subsidiary GCE examination. They are not listed in order of priority.

The aims are to:

1. help develop a broad range of ICT skills and knowledge of the uses of ICT in vocational contexts, as a basis for progression into further learning in ICT-related fields, including progression from AS to A2;

2. develop an understanding of the constituent parts, uses and applications of ICT systems within a range of organisations, including the use of basic computer networks;

3. develop an understanding of the effect of these ICT systems on society in general;

4. develop an understanding of the main systems life cycle and apply this understanding to workplace scenarios.

In addition, the aims of the Advanced GCE curriculum in Applied ICT is to encourage candidates to:

5. apply their knowledge and understanding of ICT and use these skills in vocational contexts;

6. develop an understanding of the constituent parts, uses and applications of ICT systems within a wide range of organisations, including the use of a range of computer networks;

7. develop an understanding of project management skills and other problem solving skills.

ASSESSMENT OBJECTIVES

The two Assessment Objectives in Applied Information and Communication Technology are:

A Practical Skills

B Knowledge and understanding

A description of each assessment objective follows.

A PRACTICAL SKILLS

At AS level candidates should be able to:

1. select appropriate software for the task;
2. communicate effectively with other ICT users using e-mail and search for appropriate information using the internet;
3. prepare, create, amend and edit documents and interactive presentations;
4. create both flat-file and relational database structures, add data, check the data entry, perform searches, reorganise data by sorting and present calculated values based on the data;
5. create graphs and charts;
6. integrate data from several sources;
7. output data in different forms;
8. create and test a data model using a spreadsheet, extract and summarise data in a variety of forms.

B KNOWLEDGE AND UNDERSTANDING

At AS level candidates should be able to demonstrate knowledge and understanding in relation to:

1. the functions and uses of the main hardware and software components of ICT systems including portable communication systems;
2. the ways in which organisations use ICT;
3. the impact on society of the use of ICT in the home;
4. the stages of the systems life cycle and the methods used within each of these stages;
5. ICT and computing terminology.

A PRACTICAL SKILLS

At A2 level candidates should be able to fulfil all of the practical skills from AS level and:

1. create a mail merged document using a word processor and data handling package;
2. create an automated procedure which enables a user to select both the required document and the data to merge it with;

B KNOWLEDGE AND UNDERSTANDING

At A2 level candidates should be able to demonstrate all the knowledge and understanding from AS level and extend their knowledge and understanding in relation to:

1. the ways in which an extensive range of organisations use information and communication technology;
2. the impact on society of the use of a wide range of ICT online applications;
3. the networking of information-processing systems and the use of online services;

SCHEME OF ASSESSMENT

ADVANCED SUBSIDIARY LEVEL

Paper	Type	Duration	Maximum Mark	Weight
1	Written	1 hr 15 mins	80	20%
2	Practical Test	2 hrs 30 mins	120	30%

ADVANCED LEVEL

In addition to Papers 1 and 2

Paper	Type	Duration	Maximum Mark	Weight
3	Written	1 hr 15 mins	80	20%
4	Practical Test	2 hrs 30 mins	90	30%

Candidates start with AS and progress to A2 to do the full A Level.

AS LEVEL

All candidates will be entered for Papers 1 and 2.

Paper 1

A written paper assessing the knowledge and understanding in sections 1 to 4. This paper will consist of compulsory questions. Candidates will answer in the spaces provided on the question paper. The questions will generally test sections 1 to 4 of the curriculum content, although knowledge and understanding from sections 8 to 14 may also be assessed.

Paper 2

A practical test assessing selected skills from sections 8 to 14, and may assess some underpinning knowledge and understanding from sections 1 to 4.

A2 LEVEL

All candidates will be entered for Papers 3 and 4.

Paper 3

A written paper assessing the knowledge and understanding in sections 1 to 7. This paper will consist of compulsory questions. Candidates will answer in the spaces provided on the question paper. The questions will generally test sections 1 to 7 of the curriculum content, although knowledge and understanding from sections 8 to 17 may also be assessed.

Paper 4

A practical test assessing selected skills from sections 8 to 17, and may assess some underpinning knowledge and understanding from sections 1 to 7.

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 candidates' ability to carry out practical tasks and to show the appropriate knowledge and understanding to enable them to complete the tasks efficiently. Candidates are assessed on their ability to complete these tasks using the most appropriate software and with the most appropriate methods.

The tests will be made available to Centres electronically. Centres that have entered candidates by the entry deadline will be contacted by CIE with instructions on how to download the tasks. **If you do not receive these instructions, please contact CIE Customer Services not later than 21 February (for the June examination) and 16 August (for the November examination)**.

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 8 to 17.

CURRICULUM CONTENT

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

1. ICT systems including portable communication devices
2. How organisations use ICT
3. Impact of ICT on society
4. Computer Networks
5. Problem solving using ICT
6. Systems life cycle

The six areas are split into seven sections to enable a balance between AS level and A2 level. The seven sections are as follows:

At AS Level

1. ICT systems including portable communication devices
2. How organisations use ICT – Part 1
3. Impact of ICT on society – Part 1
4. Systems life cycle

At A2 Level

5. How organisations use ICT – Part 2
6. Impact of ICT on society – Part 2
7. Computer networks

Candidates should be familiar not only with the types of software available and the range of Information 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.

AS Level

Section 1

ICT systems including portable communication devices

Candidates should be able to:

(a) identify the following input devices: keyboards, pointing devices (including mouse, touchpad and tracker ball), video digitisers, remote controls, joysticks, magnetic stripes, scanners, digital cameras, microphones, sensors, MIDI instruments, graphics tablets, 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 graphical 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. May be used for handwriting recognition in a PDA or Tablet PC
Magnetic stripe readers	At POS terminals, ATMs and in security applications
Smart card	Payment cards, ID cards, door control systems, public transport tickets
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
Temperature sensor	Automatic washing machines, automatic cookers, 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

Device	Use
Graphics tablet	To input freehand drawings or retouch photographs
Magnet Ink Character Reader	To input magnetic characters, such as those found on bank cheques
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.
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

(c) identify the following output devices: monitors (CRT, TFT), 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
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
3D inkjet printer	CAD/CAM applications where 3D designs are actually made by layering of resin powder
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 music CDs and DVD films

Control Devices in Control Applications	
Device	**Use**
Motors	Automatic washing machines, automatic cookers, central heating controllers, computer-controlled greenhouses, microwave ovens, robotics, production line control
Buzzers	Automatic cookers, microwave ovens
Heaters	Automatic washing machines, automatic cookers, central heating controllers, computer-controlled greenhouses
Lights/lamps	Computer-controlled greenhouses

(e) describe common backing storage media (including magnetic tapes, CD ROMs, CD Rs, CD RWs, DVD ROMs, DVD Rs, DVD RWs, DVD-RAM, Blu-ray, HD DVD, minidisk, floppy discs and hard discs, memory sticks, flash memory) and their associated devices;

(f) identify suitable uses of the storage media and understand the types of access and access speeds required for each use (e.g. serial/sequential, direct/random). Describe the comparative advantages and disadvantages of using different backing storage media;

Magnetic Backing Storage Media	
Media	**Use**
Floppy discs	Any use where small files such as word processing, small spreadsheets and databases need to be moved from one computer to another. Useful to backup small data files
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 and 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 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

Media	**Use**
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 films 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
Solid state backing storage	Physically the 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
DVD-RAM	Same properties as DVD RW but quicker access and data can be overwritten more easily. Similar to floppies in nature but has 3000 – 6000 times more storage and uses optical technology
Blu-ray	Capacities of 25Gb, 50Gb and 100 Gb. Used for storing films (movies). 25Gb equates to 2 hrs HDTV, 13hrs standard definition TV. It is possible to playback video on a disc while simultaneously recording HD video. (Will be) used for storage of PC data
HD DVD	Capacities of 15Gb, 30Gb and 45 Gb. Less capacity than Blu ray. Used for storing films (movies). (May be) used for storage of PC data
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
Hybrid media	
Media	**Use**
Minidisk	Magneto optical method or writing data. Used for storing music. Can store up to 140Mb

(g) Identify the following portable communication devices: mobile phones, portable DVD players, portable hard disk players, portable media players (MP3 players), global positioning systems, satellite navigation systems, personal digital assistants, bluetooth devices and handheld computers;

(h) Identify suitable uses of the communication devices in (g) above, stating the advantages and disadvantages of each.

Section 2

How organisations use ICT – Part 1

Candidates should have an understanding of how organisations use ICT. They should be able to describe a number of uses, giving the hardware and software requirements together with the applications that these uses can be put to.

Assessment Objectives	Applications	Hardware requirements	Software requirements
2a Control systems	Maintaining constant physical conditions: Air conditioning systems Central heating systems Refrigeration Car manufacture: Industrial robots Medical applications: Intensive care Process control	Robot Temperature sensor Moisture sensor Pressure sensor Light sensor	Control software
2b Working practices	Home working: Managers of offices Sales staff etc. Remote working: Sales staff Site workers Office based working: Virtually all workers Through the use of: Video conferencing Phone conferencing Instant messaging Faxing	Laptop computer Desktop computer Mouse Keyboard Printers (laser and inkjet) Scanner Modem Fax machine Mobile telephone Web cams Microphones Telephones	Word processing DTP Spreadsheet Database Organising software Communications software Web browser
2c Use of ICT in Advertising	Product advertising Business advertising Service advertising All of these through: Websites Multimedia presentations Flyers Posters	Computers Mouse Keyboard Printer (laser and inkjet) Scanner Modem Microphone Speakers Video camera Digital camera	Web authoring packages Word-processing DTP Spreadsheet Database Communications software
2d Use of ICT in Teaching and learning	Schools, Universities, Colleges: CAL CBL Computer aided assessment Record keeping Examination boards: Computer aided assessment	Computer Mouse Keyboard Printers (laser and inkjet) Scanner (for OMR) Overlay keyboard Interactive whiteboard	Web browsing software Web authoring software Overlay software Database Spreadsheet Assessment software

Assessment Objectives	Applications	Hardware requirements	Software requirements
2e Use of ICT in Publishing	Printing: Books, Magazines Newspapers Record/CD/DVD labels and sleeves Posters All through: Computerised plate making Computerised typesetting Facsimile transmission	Web offset machines Computers Digital cameras	Photo image editing DTP
2f Use of ICT in Time management	Managers of offices: Organising meeting times Arranging workload Research and development projects Construction project management Identifying project progress Daily and weekly planning	Computers Laptops PDA	Time management Time tracking Project tracking
2g Data management	Sequential file systems: Batch processing e.g. payroll Indexed sequential & random access files Hybrid batch and interrogational processing, e.g. payroll and personnel records combined. Relational database systems Interrogational databases e.g. customer database linked to sales records	Magnetic Tape Magnetic Disc Magnetic Disc	
2h Use of data management	Hierarchical database management systems: Business reporting e.g. sales marketing management reporting business performance management (BPM) budgeting and forecasting Network database management systems: Large organisations spread over wide geographical area	Magnetic Disc Computer network	DBMS
2i Payroll applications	Producing payslips Financial reports	Computers	Payroll software
2j Technical and customer support	Utility companies Mail order catalogue firms Telephone call centres Customer support for computer hardware and software Online help lines	Computer networks Modems	Computer telephony integration software including third party control and first party control.
2k Art and design work	Producing designs for: Marketing/advertising CD, DVD and record labels and sleeves. Posters Books Magazines	Computers Digital cameras Scanners Mouse/trackerball Large memory Light pens	Design software Library of designs Clipart Photo galleries

Section 3

Impact of ICT on society – Part 1

Candidates should have an understanding of the use of home-based ICT applications including:

Assessment Objectives	Applications	Hardware requirements	Software requirements
3a Online services	Online shopping: Purchasing goods Selling goods Online transaction services Online banking: Opening and maintaining bank accounts	PC, Modem	Internet browser

Candidates should have an understanding of the effects of the use of online services on society including;

Assessment Objectives	Effect
3b Employment	General Staff unemployment, technical staff – employment opportunities
3c Increased leisure time	Staff may work for shorter periods
3d Working patterns	Job-sharing, part-time working, flexible working hours, working from home, compressed hours, ability to move from branch to branch
3e Security of, privacy of and access to personal/ confidential information/ data	Need to protect confidentiality of data, data protection legislation, social and ethical implications of access to personal information. Need for security
3f Health and safety	Increase in RSI, vision and posture problems. Need for increased safety measures against electrocution, fire etc.

Section 4

Systems life cycle

Candidates should have an understanding of the Systems life cycle and an understanding of applying it to workplace scenarios (such as introducing a new system or upgrading an existing system in a typical ICT application). They should be able to compare and contrast methods, including:

Assessment Objectives	Examples	Methodology
4a Analysis	Different methods of researching a situation	Observation, examination of documents, questionnaires, interviews
	Establishing the inputs, outputs and processing in the existing system	Identify the sources and volume of input data and collection methods. Identify the input documents currently in use. Determine frequency addition/deletion of records. Identify manual and computer procedures necessary to achieve the current output.
	Recording information about the current system	Data flow diagrams (Level 0 DFD – context diagram and Level 1 DFD – current system), system flowcharts
	Identifying problems with the current system	Observation, examination of documents, questionnaires, interviews
	Identifying suitable hardware and software for a new system	Analysing required outputs, storage and processing requirements
	Identifying the user and information requirements	Collating the interview transcripts, questionnaires and documents
4b Design	Specifying the required hardware and software	Volume of data will determine the choice of output devices. The order that data will be output will affect choice of storage devices.
	Designing data collection forms, screen layouts	These will depend on the user requirements as well as output required from system and file structures
	Designing report layouts and screen displays	The content and presentation of reports, layouts and screen displays will depend on the requirements of the users
	Designing validation routines	The form of input and file structures will determine these
	Designing the required data/file structures and programming specifications;	The data structures and programming will depend on the types of processing and input and output structures

Assessment Objectives	Examples	Methodology
4c Development and testing	Creating data structures, program modules	
	Testing strategies	Testing each module with normal/live data Testing each module with abnormal and extreme data Testing whole system
	Improvements that could be needed as a result of testing	Amend structures, program modules in the light of the results of testing
4d Implementation	Identifying the different methods of system implementation	Parallel running, direct changeover, phased implementation and pilot running
4e Documentation	Designing and developing elements of technical documentation	Developing systems documentation (results of systems analysis, what is expected of the system, overall design decisions, test plan and test data) Developing program documentation (description of the software, purpose of the software, input data formats, output, flowcharts, program listing, notes to assist future modifications)
	Designing and developing elements of user documentation	A guide to simple elements of use of the software and hardware making up the system
4f Evaluation	Evaluating a new system in terms of the efficiency, ease of use and appropriateness of the solution	Using test results to evaluate the solution. Obtaining feedback from the user. The results of this evaluation are used to identify limitations Using the identification of the limitations to make improvements

A2 Level

For A2 level the candidates must be able to meet all of the Assessment Objectives 1 to 4 for AS level as well as Objectives 5 to 7 for A2 level.

Section 5

How organisations use ICT – Part 2

Candidates should have an understanding of a range of work-related ICT applications (hardware/software requirements/expected knowledge/skills), including:

Assessment Objectives	Applications	Hardware requirements	Software requirements
5a Expert systems	Mineral prospecting: Interpretation – producing probabilities from given data Investment analysis Financial planning Insurance planning: All through prediction: Deducing future events from current data Car engine fault diagnosis Medical diagnosis Route scheduling for delivery vehicles Plant identification Animal identification All through diagnosis: producing possible solutions from given data	Computer Laser Printer	Knowledge base editor Inference engine
5b Monitoring and measurement	Use of sensors in: Medical applications Weather monitoring Climate monitoring Monitoring environment Scientific experiments to measure physical variables such as: temperature pressure humidity moisture light sound level blood pressure pH	Computers Speakers Printers Sensors Interface box	Spreadsheets Databases Measuring software Data logging software
5c Project management	Software development Building construction Business efficiency	PCs	PM Software Planning software Gantt chart software Timeline software

Assessment Objectives	Applications	Hardware requirements	Software requirements
5d Modelling	Economic Prototype Climate Simulations Profit forecasts Architecture Weather forecasting Air pilot training Car driver training Nuclear research Geology/predicting deposits	Computers Graph plotters Printers	Spreadsheets CAD, CAM Purpose built software
5e Market research	Research in: Advertising Media Public opinion Techniques: Personal interviewing Phone interviews Online data capture	PCs Mainframes Interactive hand held devices	Internet software Database management software
5f Research applications	Medicine: Developing new drugs Genetic Analysis Science: Space research Nuclear research Universities Education: ICT in education Teacher education	Super computers PC networks	Spreadsheets Databases Advanced programming
5g Online applications	Shopping: Purchasing goods Banking: Maintaining accounts Booking: Holidays Train tickets Plane tickets Cinema tickets Theatre tickets	PC networks Modems	Internet browsers Authoring packages Database
5h Stock control	Point of sale: Retail industry/supermarkets Manual: Manufacturing industry Wholesale/suppliers Just in time	POS terminals Bar code readers Electronic scales Numeric keypads PCs Memo pads	Databases Bar code reading software Purpose written software

Section 6

Impact of ICT on society – Part 2

Candidates should have an understanding of the use of interactive ICT applications including:

Assessment Objectives	Applications	Hardware requirements	Software requirements
6a Home entertainment	Television: Satellite Terrestrial Television programmes Films Music centres – Music Plays Radio programmes Audio books Interactive games consoles Video on demand systems	Satellite receiver, TV screen Speakers PC Portable media players (MP3 players), CD/DVD player/recorder Projector Satellite decoder FM tuner Games console	Internet browser MP3 software Projector control software
6b Auctions	Internet auctions Buying goods Selling goods Online transaction services	PC Modem	Internet browser
6c Booking	Travel agents Booking holidays Booking plane tickets Rail companies Booking train tickets Airlines Booking plane tickets Cinemas Theatres	PC terminals PC networks Modem	Booking software Databases
6d Information services	Trading Governments Academic institutions Stocks and shares Public interest Educational research	PC networks	Internet browser
6e Government (local, regional, central)	Inland Revenue - Income tax records Tax collection Tax payment Local government – Electoral register Local tax records Budget calculations Issuing of: Passports Identity cards, Driving licences Passports	PCs Mainframes PC networks	Database Budget Analysis Spreadsheets

Assessment Objectives	Applications	Hardware requirements	Software requirements
6f Use of ICT in Teaching and learning	Schools, Universities, Colleges – CAL CBL Computer aided assessment Record keeping Examination boards Computer aided assessment	Computer Scanner (for OMR) Overlay keyboard	Web browsing software Web authoring software Overlay software Database Spreadsheet Assessment software

Candidates should have an understanding of the effects of the use of online services on society including;

Assessment Objectives	Effect
6g The digital divide/information literacy	Individuals – Restricted access to: educational services health services employment opportunities Nations – restricted access to: Worldwide marketing opportunities
6h Catering for disabilities	Increased access for disabled people to: Shopping Banking Booking Systems Health services Employment
6i Legal system	Increased access to legal information Increased involvement in focus groups More able to influence political representatives Inexperienced people regarding themselves as 'legal eagles'
6j Computer fraud	Personal identities can be stolen (government records) Money taken from personal accounts (interception of bank details whilst using online booking) Tickets intercepted from online booking details Goods intercepted from online auction details
6k Antisocial use of ICT	Deleting/Amending/distributing personal data gained from Auction, booking and government records Spreading of viruses by email using the above sources of information

Section 7

Computer networks

Candidates should have an understanding of the following:

Computer networks (including the use of these networks);

Assessment Objectives	Applications	Hardware requirements	Software requirements/ protocols
7a Network type	LANs Intranets Local email Business networks WLAN Use of: Microwave Infrared Spread spectrum transmission Used for: Email Business networks WANs Internet Extranets Email Virtual private network Video conferencing Business networks Telephone call centres Booking systems Online shopping Online banking	PCs Hubs Switches Routers Dedicated cabling Servers Network cards Laptops Wireless access point Routers Wireless network cards PCs Modem Hubs Switches Routers Servers Proxy servers VPN	ftp http telnet SSH router software

The need for security and the measures taken to prevent a breach of security;

Assessment Objectives	Examples	Measures
7b Network security	Physical	Locked rooms Security guards
	Software	Firewalls Digital certification Encryption Anti Virus software User ID Passwords Anti-spam Anti pop up software Physical security Anti-spyware software Authentication techniques Wired equivalent privacy

The use of networks in electronic conferencing including the advantages and disadvantages;

Assessment Objectives	Applications	Hardware requirements	Software requirements
7c Electronic conferencing	Use of: Video conferencing Phone conferencing Instant messaging Used in: Business conferences Linking schools Research meetings For each include: Advantages Disadvantages	PCs Phones Webcams Microphones Speakers	Conference software VOIP software Instant messaging

ASSESSMENT CRITERIA FOR PRACTICAL TESTS

The criteria which will be used by the Examiners to mark the practical tests are based on the practical skills (with underlying knowledge and understanding) identified in the Assessment Objectives 8 to 14 for AS level and Assessment Objectives 8 to 17 for A2 level. The underlying knowledge and understanding may be drawn from any of the Assessment Objectives from 1 to 17. The tables in the sections below show the criteria which correspond to each part of the assessment objective.

In the tables, each part of each Assessment Objective is broken down into a series of more specific 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 candidates' work.

Any of the performance criteria may be tested on any examination paper.

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

AS Level

Section 8

Software selection

Candidates should be able to select the software which is most appropriate for any given task, using a critical evaluation of the task and of the scenario provided with the task.

Given a range of software packages, candidates should be able to:

Assessment Objectives	Performance Criteria	Skills
8. Select the most appropriate software for the task		
8a Select software	Select the most appropriate software for a task	Using the task and scenario given

Section 9

Communication

Candidates should be able to use e-mail and the Internet to gather and communicate information, using a critical evaluation of the material to identify the reliability of the sources and its fitness for purpose.

Using the Internet and e-mail facilities, candidates should be able to:

Assessment Objectives	Performance Criteria	Skills
9. Communicate effectively with other ICT users using e-mail and search for appropriate information using the Internet		
9a Use e-mail	(i) Read specified e-mail message, Send e-mail message as specified	Open message, new message, address, subject, reply, forward, carbon copy, blind carbon copy
	(ii) Send a file to another ICT user electronically, Receive a file from another ICT user electronically, compress a file, extract data from a compressed file	Attach file(s), file attachment(s), save attached file, zip file, extract from a zipped file
	(iii) Be able to identify potential viruses within e-mail attachments	Understand file types for attachments and those file types which provide likely sources of viruses
9b Use the Internet	(i) Locate specified information from a website	Locate from a given URL, hyperlinks, using search engines, search techniques including Boolean operators (AND, OR, NOT), downloading and saving
	(ii) Evaluate Internet sources	Identify validity of data, potential for mis-information, plagiarism (how to detect, how to avoid, identifying full references), appropriateness of information for the task, bias, reliability of the source (author/provider, bibliography), accuracy, currency

Section 10

Document and Presentation Production

Candidates should be able to use word processing, desktop publishing and presentation authoring facilities to prepare documents/slides for an audience.

Using word processing, desktop publishing and/or presentation authoring facilities, candidates should be able to:

Assessment Objectives		Performance Criteria		Skills
10. Prepare, create, amend and edit documents and presentations				
10a	Enter and edit data from different sources	(i)	Load/open data from a specified file	Locate file, identify file type, csv, txt, rtf
		(ii)	Key in text as specified with no errors	Enter text, enter numbers, enter date, use special characters, mathematical symbols, accents, superscript, subscript, auto-text, date and time
		(iii)	Edit text as specified	Highlight, delete, move, cut, copy, paste, drag and drop
10b	Import image or other object from an external source	(i)	Import and place an image or other object as specified from an external source	Import clip art, import from a digital source, import from file, import from website, text, graphic image, table, chart, program, media files (sound, video)
		(ii)	Manipulate image as specified	Move image, position with precision framing, copy, contrast, brightness, resize image, crop image, text wrap (around image, square, tight, above, below), maintain aspect ratio
10c	Include information downloaded from the Internet		Evaluate and select from the specified information that which is fit for the specified purpose, relevant information positioned as required	Text, graphic image, table, chart, media files (sound, video) Take into account bias, reliability of the source (author/provider, bibliography, alternative point of view), appropriateness, accuracy, currency (how up to date, date of production)
10d	Create an electronic document using a suitable package	(i)	Create a link from the document or slide	Hyperlink within a word processed document, link to a specified webpage, link to another document stored locally or globally. Link to other slides in a presentation. Link to a presentation. Visible links, hidden links
		(ii)	Control a document to be edited by multiple users	Protect document for editing Track changes (identify changes made to a working document, accept change(s), reject changes), bookmark, insert comment, remove comment, footnotes Understand the concept of multiple user editing to a single document, including ownership and the management of systematic version numbers Compare and merge documents

Assessment Objectives		Performance Criteria		Skills
10e	Set up a document/ page/slide format	(i)	Create and edit a master document/slide	Master document (document template), master slide, page setup (A4, A5, letter), page orientation (portrait, landscape), margins (top margin, bottom margin, left margin, right margin, gutter), columns (number of columns, column width, spacing between columns), colour schemes, logos, presenter notes, audience notes
		(ii)	Create styles to a given specification	Font (serif, sans-serif), point size, enhancements (bold, italic, underscore, highlighting), text alignment (left, centred, right, fully justified, indent text, indent paragraph, hanging indent,), line spacing (single, 1.5 times, double, multiple, consistent, between lines, between paragraphs, before and after headings), hyphenation, indentation, tabulation, heading style, subheading style, bulleted list.
		(iii)	Create/edit headers and footers as specified	Headers, footers, automatic file information, automated page numbering, text, date, position, consistency of position
		(iv)	Set breaks and amend document sections as specified	Page breaks, section breaks, column breaks, inserted, deleted, widows, orphans, split orientation, multiple headers and footers, amended margins
10f	Set text appearance and layout	(i)	Understand the need for corporate house styles	Understand the need for corporate house styles and the application of these styles to all documents, presentations and other forms of communication to customers/clients
		(ii)	Apply corporate house styles as specified	Apply styles including font style, paragraph style, text alignment, page layout, page formatting, bullets, numbering, colour schemes.
		(iii)	Create/edit table as specified	Specified number of rows and columns, insert row(s), delete row(s), insert column(s), delete column(s), format cells/cell contents
10g	Use manual methods and software tools to ensure error-free accuracy		Manually proof-read and correct all document(s)/slide(s). Use appropriate software tools to ensure the document(s)/slide(s) are error free	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. Use automated tools (spell-checker and grammar-checker) and check that they are correctly used to ensure text is suitable for its purpose.

Section 11

Data Handling 1 – Databases and Charts

Candidates should be able to use database and charting facilities to store, search and manipulate data, solve problems and to represent data graphically.

Using database facilities, candidates should be able to:

Assessment Objectives	Performance Criteria	Skills
11. Create a database structure, add data, check the data entry, perform searches, sorts, calculations and to produce output from the data.		
11a Create a database	(i) Create a database structure and add data to this structure, organising data using the most efficient and appropriate structure	Define a database record structure by assigning the following field/data types: Text, numeric, (integer, decimal, currency, date/time), Boolean/logical (yes/no, true/false). Use meaningful file and field names. Locate file, open file, import file, identify file type (.csv, .txt, .rtf). Key in data
	(ii) Link tables where appropriate	Set keys including primary keys and foreign keys. Understand the function and use of flat-file and relational databases
	(iii) Create and use relationships	One-to-many relationship, one-to-one relationship
	(iv) Check data entry	Validate data, verify data. Understand the purpose of validation and verification. Use input masks to restrict data entry.
11b Perform searches	Select subsets of data using one or more criteria as specified	Use numeric, text and Boolean operators: LIKE, AND, OR, NOT, >, <, =, >=, <=, <>, wildcards, data range, specified data items only
11c Sort data	Using one criterion or two criteria as specified	Ascending, descending, alphanumeric, numeric, date, time
11d Perform calculations on numeric data	Enter formula/e to calculate results	Calculated field, run time calculation, addition, subtraction, multiplication, division, sum, average, maximum, minimum, count
11e Output the selected data.	(i) Use the display features of the package to produce an electronic or printed report with selected data and fields only	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). Header, footer (including page header, section header, report header, page footer, section footer, report footer, calculations within a header or footer), page layout, label production
	(ii) Group data as specified	Group data in a grouped report, group header, group footer

	(iii) Summarise data	Cross-tab query (pivot table), count, sum, average, max, min, first
	(iv) Export the data into a format that can be used in a different package	Export data (table, query or report) into a format like common text (.csv, .txt, .rtf). Export into graph/charting package
	(v) Produce an appropriate type of graph or chart with suitable labels	Select the chart type (bar chart, pie chart, line graph, comparative bar chart, comparative line graph), data series and labels which must be appropriate for the application. Select only the specified data series (contiguous data, non-contiguous data, specified range(s)). Label graph/chart appropriately (title, legend, segment labels, segment values, percentages, category axis labels, series labels, value axis labels, scales, set axis scale maximum, set axis scale minimum). Place chart, move chart, resize chart. Ensure visibility of all labels

Section 12

Integration 1

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

Using a range of software packages, candidates should be able to:

Assessment Objectives	Performance Criteria	Skills
12. Integrate data from several sources		
12a Combine data from several sources into an integrated document/ presentation/ report	Combine text, image(s), graph/charts and numeric data	Import text, import from file, import clip art, import from a database, import from a digital source, import a graph/chart, import from a website, cut, copy, paste. Place as specified. Ensure consistency of display. Repaginate to ensure that page breaks are positioned appropriately (no widows, no orphans, no split lists, no split tables/images/ charts)

Section 13

Output Data

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

Using a range of software packages, candidates should be able to:

Assessment Objectives	Performance Criteria	Skills
13. Output data in different forms		
13a Save and print as specified	Save and print the document/ presentation/object/data	Draft document, final copy, e-mail, file attachment, screen shots, audience notes, slides, presenter notes, database report, data table, queries, database relationships, graph/chart, different file formats, print directories/folder structure, file details. Prepare colour documents in such a way that they can be printed on black/white printer without losing relevance using coloured patterns which will render as grey scale patterns

Section 14

Data Handling 2 – Spreadsheets

Candidates should be able to use a spreadsheet to create and test a data model, extracting and summarising data in a variety of forms.

Using spreadsheet facilities, candidates should be able to:

Assessment Objectives	Performance Criteria	Skills
14. Spreadsheets		
14a Create a spreadsheet model	(i) Create a data model as specified by keying data with 100% accuracy, importing data	Cut, copy, paste, drag and drop, fill, replication, multi-layered workbooks, import data into spreadsheet, import from another file into another open spreadsheet, use common file interchange formats. Understand the need for 100% data entry accuracy
	(ii) Check data entry	Validate data, verify data. Understand the purpose of validation and verification
	(iii) Manipulate rows and columns	Insert row, insert column, delete row, delete column, resize row/column, hide row/column, protect rows/columns
	(iv) Manipulate window(s)	Freeze panes, unfreeze panes, split windows, restore windows
	(v) Name cell(s) and/or range(s)	Named cell, named range
	(vi) Rearrange cells and/or manipulate their contents	Transpose cells, split strings, join strings, extract from strings (substring, left, right, mid, length), convert string values to numeric values, concatenate cells, protect cell(s), protect rows/columns
	(vii) Enter formula/e to meet the requirements	Add, subtract, multiply, divide, indices, relative reference, absolute reference, named cells, named ranges, nested formulae, manipulate date/time values, absolute values
	(viii) Enter function(s) to meet the requirements	Sum, average, maximum, minimum, integer, rounding, manipulating strings, total, subtotal, counting, conditional counting, if, lookup using horizontal or vertical referencing, nested functions, manipulate date/time values
	(ix) Test the data model	Demonstrate that the model works. Select appropriate test data to ensure that the spreadsheet model is fully tested (formulae, functions, named ranges, validation rules)

Assessment Objectives		Performance Criteria		Skills
14b	Adjusting page layout		Adjust the page layout	Page setup (A4, A5, letter), page orientation (portrait, landscape), fit to page, margins (top margin, bottom margin, left margin, right margin), display row/column headings, hide row/column headings, headers, footers, automated text (including page numbering). Understand the need for corporate house styles and apply these to all worksheets within a workbook
14c	Using display features	(i)	Format rows, columns and/or cells	Format cells (integer, decimal places, percentage, date (e.g. short date, long date), time (e.g. 12 hour clock, 24 hour clock), currency, fractions, numeric values as text), text orientation (horizontal, vertical), align cells (left, centre, right, top, middle, bottom, text wrap), conditional formatting
		(ii)	Enhance/emphasise cells	Fill cell(s) (colours, shading, patterns), bold, underscore, italics, borders, merge cells, font styles (font face, point size), add comments to a cell
		(iii)	Adjust row/column/cell sizes so that all data/labels/formulae are visible	Display formulae/data, adjust column width, row height
14d	Perform searches		Select subsets of data using more than one criterion as specified	Use numeric, text, date, time and Boolean operators: AND, OR, NOT, >, <, =, >=, <=, wildcards, data range, specified data items only
14e	Sort data		Use one or two criteria as specified	Ascending, descending, alphanumeric, numeric, date, time
14f	Output the selected data	(i)	Use the display features of the package to produce an electronic or printed report with selected data only	Display calculations/formulae, display data/labels in full (with no truncation). Header, footer, page layout, label production, fit to page, fit to (n) page(s) by (n) page(s), display selected extracts, display validation rules, screen shots, show/hide row/column headings
		(ii)	Export the data into a format that can be used in a different package	Export data into a format like common text (.csv, .txt, .rtf). Export into graph/charting package

A2 Level

For A2 level the candidates must be able to meet all of the Assessment Objectives 8 to 14 for AS level as well as Objectives 15 to 17 for A2 level.

Section 15

Integration 2 – Mail Merge

Candidates should be able to use a word processor with mail merge facilities and a data handling package in order to create mail merged documents.

Using word processing, database and spreadsheet facilities, candidates should be able to:

Assessment Objectives	Performance Criteria		Skills
15. Create a mail merge master document with automated merge codes, link to a data source, generate individual form letters, and produce output in a variety of formats.			
15a Create a master document	(i)	Create a master document structure	Locate file, open file, import file, identify file type (.csv, .txt, .rtf). Key in data.
	(ii)	Create a source file in the most appropriate applications package	Define a database record structure by assigning the following field/data types: Text, numeric, (integer, decimal, currency, percentage, date/time), Boolean/logical (yes/no, true/false). Use meaningful file and field names. Locate file, open file, import file, identify file type (.csv, .txt, .rtf). Key in data. Set keys including primary keys and foreign keys. Understand the function and use of flat-file and relational databases. One-to-many relationship, one-to-one relationship. Cut, copy, paste, drag and drop, fill, replication, multi-layered workbooks, import data into spreadsheet, import from another file into another open spreadsheet, use common file interchange formats, working sheet. Understand the need for 100% data entry accuracy
	(iii)	Check data entry	Validate data, verify data. Understand the purpose of validation and verification
	(iv)	Set up variable fields for automatic completion	Link the master document to the source file(s). Identify and use the correct field names within merge codes. Conditional operators used (e.g. IF)
	(v)	Set up variable fields to control record selection/omission at mail merge run time	IF, NEXT, SKIPIF, NEXTIF, COMPARE, IF-THEN-ELSE
	(vi)	Set up fields for manual completion	FILLIN
	(vii)	Create appropriate prompts to the user for manual completion	PROMPT
	(viii)	Automatically select the required records	QUERY

Assessment Objectives	Performance Criteria	Skills
15b Use manual methods and software tools to ensure error-free accuracy	Manually proof-read and correct all document(s)/source data files. Use appropriate software tools to ensure the document(s)/file(s) are error free.	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. Use automated tools (spell-checker and grammar-checker) and check they are correctly used to ensure text is suitable for its purpose.
15c Perform mail merge	Generate the form letters using the master document and data source(s).	Merge to new document, merge to printer, merge to e-mail, merge to fax.

Section 16

Integration 3 – Automation

Candidates should be able to use a variety of packages, techniques and functions to select the appropriate document(s) and data source(s) and produce automated document(s) as required.

Suitable packages could include one or more of these features:

- *Object oriented programming languages*
- *Macros*
- *Hyperlinks*

The exact techniques, functions and methods used will depend on the application software chosen and the methods employed by the candidate to achieve the required result. Selecting the most appropriate method is part of the assessment. Candidates should be able to:

Assessment Objectives	Performance Criteria	Skills
16. Create an automated procedure which enables the user to select both the required document and the data to merge it with.		
16a Select software	(i) Select a software application suitable for the task	Select the most appropriate package(s) from a variety of software packages available
	(ii) Create an automated document	Paste link, object link embedding (OLE)
	(iii) Set up a suitable selection facility which will allow the required document(s) to be selected	The skills required for this section will depend upon the software selected for the task. Examples could include: menu, drop down menu, hyperlink, push button, list box, combo box, command button, radio buttons
	(iv) Set up a further facility to enable the user to select the data to be merged with the chosen document(s)	The skills required for this section will depend upon the software selected for the task. Examples could include: menu, drop down menu, hyperlink, push button, list box, combo box, command button, radio buttons

Section 17

Output Data

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

Using a range of software packages, candidates should be able to:

Assessment Objectives	Performance Criteria	Skills
17. Output data in different forms		
17a Save and print as specified	Save and print the document/ presentation/object/data	Selected document(s) (e.g. letters, labels, cards, invitations, invoices, statements, passes), master document, (merge codes, macros, code, procedures), screen shots, merged documents, database report, data table, queries, database relationships, different file formats, print directories/folder structure, file details. Prepare colour documents in such a way that they can be printed on black/white printer without losing relevance using coloured patterns which will render as grey scale patterns

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 A/AS Level written papers. The 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 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.