



6.1 Hardware and software part 1 Mark Scheme

Mark schemes

Q1.

Mark is for AO1 (knowledge)

The role of the operating system is to hide the complexities of the hardware from the user;

A. other reasonable answers that are not resource management

[1]

Q2.

Processor management // Allocation of processors // Allocation of processor time // (process) scheduling // thread management;

A. Processing management, CPU management

Allocation/management of RAM / memory // allocation of buffers;

Allocation/management of / control of I/O devices/peripherals //

I/O management // device driver management;

File / backing store / secondary store management / access / organisation;

Power / battery management;

Interrupt handling;

A. Provision of Application Program Interface / API

A. interface between hardware and applications

A. Provision / management of (windows in) user interface

A. Management of system security

A. Answers by example, only one example of each type

A. A description of a type of software management but not just "software management". e.g. loading of programs, software installation, registering DLLs.

A. Managing network connections but **R.** Network management

R. Software management alone unless role of OS in this is clear e.g. installation of new software, updating registry

MAX 3

[3]

Q3.

(a) **Mark is for AO1 (understanding)**

Version: B;

1

(b) **Marks are for AO1 (understanding)**

A compiler produces object code whilst an interpreter does not;

A compiler translates the whole of the source code into object code whilst an interpreter translates line by line;

The object code produced by a compiler will execute faster, (once it is compiled) than interpreting the source code (every time the program is run)

An interpreter can run (syntactically correct) parts of a program whilst there are syntax errors in other parts of it, which a compiler cannot;

Max 2

2

(c) **Marks are for AO1 (understanding)**

Intermediate code is not (directly) executable //
Intermediate code will be run / interpreted by a virtual machine // Compiled
into an executable just before running / just in time;

Intermediate code can be run on different computing platforms // One solution
can be targeted at multiple platforms;

Max 2

2

[5]

Q4.

SUBJECT MARKING POINTS:

Role of the operating system (1 point):

To hide the complexities of the hardware from the user // provision of virtual
machine;

Tasks carried out by most operating systems (MAX 3 points):

Processor scheduling // allocation of processors // process scheduling;

A processor management

Thread management;

Context switching;

Inter-process communication;

Memory management // allocation of memory / RAM;

Virtual memory provision // a brief explanation of what virtual memory is;

I / O management // allocation of I / O devices // management of / communication
with (device) driver software ;

A examples of devices

File management // organisation of files on storage devices // loading and saving of
files;

A examples of devices

Interrupt handling;

Power / battery management;

Provision of a user interface // allows user to interact with computer;

Provision of an Application Programming Interface / API (so that application
software can call operating system routines);

A management of system security

A managing communications over a network

A just names of tasks e.g. "memory management"

A "storage management" for one of "memory management" or "file management"

Additional functionality of a real time operating system (MAX 3 points):

Must be able to deal with many events occurring simultaneously;

Must be able to deal with events that occur at unpredictable times;

Must produce output / perform processing within a specified / predictable / known
time interval // Must produce output quickly enough to affect (the source of) the
inputs;

A quickly enough for task, in a timely manner

NE quickly, instantly, in a reasonable time

Must be fail-safe;

Must be able to quickly switch between threads / processes // quickly allocate

memory // quickly handle interrupts;
Must support non-sequential application programs;

HOW TO AWARD MARKS:

Mark Bands and Description

To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of written communication criteria (QWCx).

- SUB Candidate has made seven mark-worthy points and successfully covers all of the three topic areas (role, tasks, real time).
- QWC1 Text is legible.
- QWC2 There are few, if any, errors of spelling, punctuation and grammar. Meaning is clear.
- QWC3 The candidate has selected and used a form and style of writing appropriate to the purpose and has expressed ideas clearly and fluently.
- QWC4 Sentences (and paragraphs) follow on from one another clearly and coherently.
- QWC5 Appropriate specialist vocabulary has been used.

7

To achieve a mark in this band, candidates must meet the subject criterion (SUB) and all 5 of the quality of written communication criteria (QWCx).

- SUB Candidate has made at least four mark-worthy points and successfully covers at least two of the three topic areas (role, tasks, real time).
- QWC1 Text is legible.
- QWC2 There may be occasional errors of spelling, punctuation and grammar. Meaning is clear.
- QWC3 The candidate has, in the main, used a form and style of writing appropriate to the purpose, with occasional lapses. The candidate has expressed ideas clearly and reasonably fluently.
- QWC4 The candidate has used well-linked sentences (and paragraphs).
- QWC5 Appropriate specialist vocabulary has been used.

4-6

To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of written communication criteria (QWCx).

- SUB Candidate has made a small number of relevant points but only successfully covers one or two of the three topic areas (role, tasks, real time).
- QWC1 Most of the text is legible.
- QWC2 There may be some errors of spelling, punctuation and grammar but it should still be possible to understand most of the response.
- QWC3 The candidate has used a form and style of writing which has many deficiencies. Ideas are not always clearly expressed.
- QWC4 Sentences (and paragraphs) may not always be well-connected.
- QWC5 Specialist vocabulary has been used inappropriately or not at all.

1-3

Candidate has made no relevant points

0

Note: Even if English is perfect, candidates can only get marks for the points made at the top of the mark scheme for this question.

If a candidate meets the subject criterion in a band but does not meet the quality of written communication criteria then drop mark by one band, providing that at least 4

of the quality of language criteria are met in the lower band. If 4 criteria are not met then drop by two bands.

[7]

Q5.

- (a) 1 special purpose (application software);
A specific purpose
R special (software) / specialist (software)
- 2 word processor // spreadsheet // presentation software / program // database;
A any other sensible answer
R (web) browser
R text editor
- 3 translator (software / program);
A translating / translation
- 4 utility (software / program);

R just trade name of a specific piece of software unless used as an example (ie MS Word)

4

- (b) (i) assembly (language);
A assembly code
R assembler
- (ii) has to be translated into machine code // each assembly language instruction will be translated into machine code equivalent;
 by an assembler;
A converted for translated
A first generation for machine code

1

2

- (iii) Because it does not have the same processor (type) // the instruction set is different // different architecture / platform;

(Assembled / linked for a) different operating system;
NE operating software

The program refers to a memory address that does not exist on this computer // relocatable code used but addressing system on new machine different;

not enough memory space;
 required peripherals are not available;
 required library (code / program) missing;

MAX 1

[8]

Q6.

- (a) (i) 192.168.0.x where x is not 0 or 255;

1

(ii) 192.168.2.x where x is not 0 or 255;

1

(iii) 192.168.2.y where y is not 0 or 255 and is not the same as x in (ii);

1

- (b) **Reason:** To reduce (network) congestion // improve throughput // *to cut the number of collisions**; **A** faster operation / transmission;
Explanation: *by cutting the number of collisions** // by reducing the number of stations / computers connected to each section of cabling // because two computers in one segment can communicate at the same time as two computers in another segment;
Note: * = Do not award **2 marks** for cutting the number of collisions – only award one for either reason or explanation.

Reason: To improve security;

Explanation: by localising packet transmission to one segment;

Reason: To improve reliability;

Explanation: By limiting effect of cable failure to one segment;

R answers referencing the computers not working at all

Award marks for either:

- **one reason + explanation**
- **two reasons**
- **two explanations**

2

- (c) (i) No need for maintenance // no need to upgrade // no need to install patches for software // could employ fewer technical staff;
Lower hardware requirements for computers (as processing done on web server); **A** examples of lower hardware requirements but **R** just cheaper hardware
No (high) one-off purchase cost; Platform independence // can access the software on many devices; **A** examples eg PC and tablet.
Software can be used from anywhere that there is an Internet connection // from outside of office; **Note:** To award this point must be clear that can be accessed from outside of office, just "can be accessed from any computer" is not enough.
Can still access software and data if a specific computer is not working;
A reduced management cost / effort when a reason is given, such as no need to install software on each computer, but just "does not need to be installed on each computer" is not enough on its own.

MAX 2

2

- (ii) Reliance on Internet // unreliable internet connection may mean software inaccessible;
Reliance on the company that develops the software to keep providing the service;
Slow connection speed may make software difficult / annoying to use;
Concern over security of saved documents // security of transmission;
May be an ongoing cost to pay for using the software;
Lack of control over which version to use / when upgrades happen;
Software may slow when used by many users simultaneously;
Higher cost (to company) of fast internet connection to connect many computers to SaaS;

MAX 1

- (d) LAN usually baseband whilst WAN broadband* // only one communication can take place at a time on a LAN whereas multiple communications can take place simultaneously on a WAN;
 LAN communication links have higher speeds than WAN;
 LAN has lower latency than WAN;
 Lower error rates on LAN than WAN;
 Communications medium in LAN likely to be privately owned, whereas likely to be leased / publicly owned in a WAN;
 Use different protocols (at link layer / hardware level);
 Different hardware required to connect (**A** examples);
 WAN may have greater security risks (as data transmitted over larger area, on public system, through more servers or devices);
A WAN may use satellites / microwave whilst LAN may use cables / radio / WiFi* - this point cannot be awarded for just saying WAN uses cables on LAN radio or vice-versa as both LAN and WAN can use either of these
MAX 2

Only one side of the difference needs to be provided (as the other is implicit) except for the points marked with an * for which both sides are needed.

2

[10]

Q7.

- (a) Data Protection (Act);
- (b) Data should be kept securely;
- (c) Data should be fairly and lawfully processed;
 Data should be obtained for specified and lawful purposes. (**A** Data should be processed for limited purposes);
 Data should be adequate, relevant and not excessive;
 Data should be accurate // kept up to date;
 Data should not be kept longer than necessary;
 Data should be not transferred to other countries without adequate protection;
 Data should be processed in accordance with the rights of the data subjects.

1

1

Max 1

- (d) That data is not being encrypted // data is not being sent securely // that hackers might be able to see personal data;
A the protocol / it is not secure
R website not secure

HTTPS // HyperText Transfer Protocol Secure;

2

- (e) Word processor : General purpose (application software);
 Parent portal : Bespoke;
 Web server : Special purpose (application software);

3

[8]

Q8.

Hardware:

physical components // devices (that make up the computer) //
electrical circuit // electrical components (that make up the computer);
NE components

Software:

programs / instructions that are run/executed (by the computer);
A codes that are run / executed
A programs that enables computer to run
A programs that allow user to perform tasks

Need both parts to gain mark

[2]

Q9.

(a)

Comp	S/ware	Hardware	Hardware and software
Wireless router			TICK;
Compiler	TICK;		
Keyboard		TICK;	A TICK;

A crosses used rather than ticks

R answers where two columns have been ticked in a single row

3

- (b) (i) Provide an interface between the computer and user;
To manage devices / files / memory;
To provide a virtual machine;
To provide a software platform on which other programs can run // to run application software;
To hide the complexity of the hardware from the user;
NE to allow user to use hardware
R to execute commands

Max 1

- (ii) To allow sharing of run-time code across programs;
To save memory as routines are only loaded when needed;
To provide access to procedures / functions when writing a program;
To reduce amount of programming required // time taken to write program;

Max 1

- (c) (i) Meets all of the end-user requirements;
Only performs necessary functions;
Can be fitted into existing hardware / software;

Max 1

- (ii) More expensive as have to cover production costs;
Not available immediately // have to wait for software to be written;
Less widely tested so more likely to contain bugs;
Lack of 3rd party support;

NE (more) expensive
R “no testing”

Max 1

[7]

Q10.

Processor management // Allocation of processors // Allocation of processor time // (process) scheduling // thread management;
A processing management
Allocation/management of RAM / memory // allocation of buffers;
Allocation/management of / control of I/O devices/peripherals // I/O management // device driver management;
File / backing store / secondary store management / access / organisation;
Power / battery management;
A Interrupt handling;
A Provision of Application Program Interface / API;
A interface between hardware and applications;
A Provision / management of (windows in) user interface;
A Management of system security;
A Answers by example, only one example of each type
A A description of a type of software management but not just “software management”. e.g. loading of programs, software installation, registering DLLs.
R Software management alone unless role of OS in this is clear e.g. installation of new software, updating registry

Max 3

[3]

Q11.

(a)

	General Purpose	Special Purpose	Bespoke
Word Processor	✓		
Payroll		✓	A ✓
Flight control software			✓

R Answers with more than one tick on a row.

3

(b) 1 – Operating System;
R OS, Operating Software

2 – Assembler / Compiler / Interpreter;
TO “assembly language”

3 – Backup / Anti virus / defragmenter / encryption / compression / archive / system profilers / application launchers;
Accept any other examples of a utility

3

[6]

Q12.**(a) Interactive OS:**

User and computer in direct / two-way communication // User makes input to computer then waits for output before making next input;

A system, software, program, OS for computer

Network OS:

(Layer of software that) redirects requests to remote resources; (**A** examples) in a way that is transparent to user;

Must make one point about interactive and one point about network

Max 2

- (b)** Flow of program/execution sequence determined by events // program executes relevant code-handling block / procedure / sub-routine in response to events;

Example of event such as clicking a button;

Message sent to program when event occurs;

System loop executes until application closes; this receives and processes messages // use of event-listener/handler;

If several events occur they are queued;

Max 2

[4]

Q13.

- (a)** System (software) / operating system;

R OS

A (device) driver

1

- (b) (i)** Software that can carry out many tasks// has many purposes/uses;

NE “many things” // “many functions” // “general purposes”

R for everyday use/tasks

1

- (ii)** Word processor, spreadsheet, database, desktop publishing/DTP, presentation or other suitable example;

R web browser // image/photo editor

1

- (c) (i)** (It is) immediately available;

A “off the shelf”

(It has a) lower cost as development costs shared amongst many;

NE cheaper

Wide range of training/support available;

Regular upgrades available;

Can hire staff with experience of package;

More likely to be bug-free as already in widespread use/“tested” by many users;

A it has been “tried and tested”

R no bugs / tested more

Max 2

- (ii)** No appropriate software to solve the problem exactly;

The only way to obtain software to do exactly/precisely what they want // may need particular features not in special purpose software // will be developed to match their needs;

To ensure competitors do not get access to the software;
 To run on/support existing hardware/software;
 No unnecessary features;

Max 1

[6]

Q14.

- (a) (i) **Hardware:** Electrical/physical components/parts/circuits of the computer;
 R Examples
 R Just components/parts **NE**
 R Physical device **NE**
 R System
- (ii) **Software:** Programs / sequences / series of instructions which run / execute (on) the hardware / computer ;
 R Examples only
 R Application **NE**
 R Code **NE**
- (b) 1. Special Purpose (software); **A** Specialist / Specific purpose (software)
 2. General Purpose (software);
 3. System Software; **A** Systems Software
 4. Utilities;

1

1

4

[6]

Q15.

- (a) To hide the complexities of the hardware from the user // Provision of virtual machine;
 R Provision of user interface **NE**
A machine for hardware but **R** system, computer
 Manages the hardware (resources) // allocation of hardware resources (to processes);
A Examples of resources

2

- (b) Subject-related points:

Desktop computer used for many different/generic purposes; so ...

- desktop OS must support a wide range of peripherals/storage devices;
- desktop OS must run wide range of software/packages;
- desktop OS more customisable (by user);
- desktop OS must manage security;

Desktop computer requirements more likely to change over time // more likely to want to add new features/support new applications; so....

- desktop OS has modular design / easier to upgrade;

Desktop computers made by many different manufacturers // to varying specifications; so....

- desktop OS must run on wider range of hardware platforms;

Desktop computer more likely to be networked; so...

- desktop OS must support networking protocols;

Embedded systems (often) made at low cost // may have minimal processing requirement; so...

- embedded system OS has lower hardware requirements (allow e.g. such as slower processor, less RAM);

Embedded systems have few inputs and outputs to user; so...

- embedded system OS provides no/minimal user interface;
- embedded system OS designed to deal with input from sensors // output to control devices;

Embedded systems (often) in battery powered devices; so

- managing power consumption particularly important; **A** example of power management

Embedded systems (are sometimes) real-time // for safety-critical applications; so...

- real-time embedded system OS must be designed to guarantee speed of response // respond very quickly;*
- real-time embedded system OS must deal with many inputs simultaneously;*
- real-time embedded system OS may need to be failsafe;*
- real-time embedded system OS may incorporate redundancy;*

* - These points only valid if real-time system specifically referenced.

A any mix of points. The reason does not have to be stated to award a mark for the difference/feature.

A converse of the points if the point itself has not been given.

To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of written communication criteria (QWCx).

SUB	Candidate has made three or more relevant points.
QWC1	Text is legible
QWC2	There are few, if any, errors of spelling, punctuation and grammar. Meaning is clear.
QWC3	The candidate has selected and used a form and style of writing appropriate to the purpose and has expressed ideas clearly and fluently.
QWC4	Sentences and paragraphs follow on from one another clearly and coherently.
QWC5	Appropriate specialist vocabulary has been used.

3-4

To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of written communication criteria (QWCx).

SUB	Candidate has made two relevant points.
QWC1	Text is legible
QWC2	There may be occasional errors of spelling, punctuation and grammar. Meaning is clear.
QWC3	The candidate has, in the main, used a form and style of writing appropriate to the purpose, with occasional lapses. The candidate has expressed ideas clearly and reasonably fluently.
QWC4	The candidate has used well-linked sentences and paragraphs.
QWC5	Appropriate specialist vocabulary has been used.

To achieve a mark in this band, candidates must meet the subject criterion (SUB). The quality of written communication should be typified by the QWCx statements.

SUB	Candidate has made just one relevant point.
QWC1	Most of the text is legible.
QWC2	There may be some errors of spelling, punctuation and grammar but it should still be possible to understand most of the response.
QWC3	The candidate has used a form and style of writing which has many deficiencies. Ideas are not always clearly expressed.
QWC4	Sentences and paragraphs may not always be well-connected or bullet points may have been used.
QWC5	Specialist vocabulary has been used inappropriately or not at all.

1

Candidate has made no relevant points.

0

Note: Even if English is perfect, candidates can only get marks for the points made at the top of the mark scheme for this question.

If a candidate meets the subject criterion in a band but does not meet the quality of written communication criteria then drop mark by one band, providing that at least 3 of the quality of written communication criteria are met in the lower band. If 3 criteria are not met then drop by two bands.

4

[6]

Q16.

General purpose software–

- Carries out many different tasks/variety of tasks; **A** more than one task **NE** tasks
- Any reasonable example e.g. word processor, spreadsheet;

Bespoke software–

- Bespoke;
- Written to a particular customer's requirements / needs;
- Example of bespoke software package must clearly have been made for a particular organisation or is implicit from the application (likely to be very large scale or hardware related); n.b. stock control system **NE** where as stock control system for particular company is correct

Special purpose software–

- Special purpose;
- Carries out one/a specific/particular task; **A** just one task
- Any reasonable example e.g. stock control, accounting, route planning, web browser, air traffic control;
R anti-virus

General points–

- Off-the-shelf // immediate availability for either general purpose or special purpose//bespoke is NOT immediately available/not off the shelf; (once only)
- If contradictory examples for any class of software T.O.

Mark Bands and Description

To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of language criteria (QLx).

SUB Candidate has made at least 5 relevant points, including at least one from each type of software.

QL1 Text is legible.

QL2 There are few, if any, errors of spelling, punctuation and grammar. Meaning is clear.

QL3 The candidate has selected and used a form and style of writing appropriate to the purpose and has expressed ideas clearly and fluently.

QL4 Sentences and paragraphs follow on from one another clearly and coherently.

QL5 Appropriate specialist vocabulary has been used.

5–6

To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of language criteria (QLx).

SUB Candidate has made at least 3 relevant points, including at least one point from two different types of software.

QL1 Text is legible.

QL2 There may be occasional errors of spelling, punctuation and grammar. Meaning is clear.

QL3 The candidate has, in the main, used a form and style of writing appropriate to the purpose, with occasional lapses. The candidate has expressed ideas clearly and reasonably fluently.

QL4 The candidate has used well-linked sentences and paragraphs.

QL5 Appropriate specialist vocabulary has been used.

3–4

To achieve a mark in this band, candidates must meet the subject criterion (SUB). The quality of language should be typified by the QLx statements.

SUB Candidate has made at least 1 relevant point.

QL1 Most of the text is legible.

QL2 There may be some errors of spelling, punctuation and grammar but it should still be possible to understand most of the response.

QL3 The candidate has used a form and style of writing which has many deficiencies. Ideas are not always clearly expressed.

QL4 Sentences and paragraphs may not always be well-connected or bullet points may have been used.

QL5 Specialist vocabulary has been used inappropriately or not at all.

1–2

Candidate has made no relevant points.

0

Note: Even if English is perfect, candidates can only get marks for the points made at the top of the mark scheme for this question.

If a candidate meets the subject criterion in a band but does not meet the quality of language criteria then drop mark by one band, providing that at least 3 of the quality of language criteria are met in the lower band. If 3 criteria are not met then drop by two bands.

[6]

Q17.

(a) **Rationale:**

The key difference is that application software performs a user oriented task whereas system software performs a machine oriented task.

Application Software:

Used to perform task that is independent of computer/that user would have to do if didn't have computer/real world task;

A You for user

A Performs a task for the user

R Task

Max 1

System Software:

Software that performs tasks to run computer;

Layer of software which enables user to operate computer;

Interface between user and computer;

Hides complexity of computer from user/provides virtual machine;

Software that lets user communicate with/manage hardware;

Software to run applications/hardware/programs/computer/ packages;

Software required to make computer work;

Max 1

(b) Operating System;

Library program;

NE Library

Translator/Compiler/Interpreter/Assembler;

A Translation

R Examples of types

Max 2

[4]

Q18.

(a) the electrical / physical components / parts (electronic circuits) of the computer;

A by example (only acceptable on this occasion)

1

(b) programs (sequences of instructions) which run on the hardware/computer;

1

[2]

Q19.

Software	Category (letter only)
Spreadsheet Software	D;
Anti-virus software	C; <i>Accept A</i>
Operating System	A; <i>If not given above</i>
Air Traffic Control Software	E // B;

[4]

Q20.

1. system(s) (software);
2. general purpose (software); **R** generic
3. library (program/software);
4. utility (software); **R** maintenance / system tools
5. translator (software); **A** translation
6. compiler;
7. accounting software / route planner / games /web page design anything reasonable;

A web browser

A good description (followed by a brand name)

R DTP / Graphics /Presentation /firewall / anti-virus

R Bespoke (only)

R not specific e.g. 'bank program'/ 'learning difficulties program'

[7]

Q21.

- (a) Text / scene / code / object editor;

A Word processor

A form/screen for text/code entry/input/write

1

- (b) Translates (**A** converts/changes) program code/source program; from high level language; into machine code/object code;

R binary

Checks the program code/statements for errors;

If no errors found the executable file is generated;

T/O –1 Mark if the explanation includes 'executing the machine code'

Max 2

error report/list; **A** error message(s) **R** error (only)

an intermediate (object) file;

A a copy of the source code;

1

- (c) Interpreter software translates/checks/reads the program code one statement at a time (**A** line by line);

Checks the statement for the correct syntax;

If no errors found, interpreter recognises the statement;

Interpreter calls a procedure to execute the statement;

A if no error found, that statement is executed;

If an error is found, program execution is halted (and the error reported);

The program runs until an error is found;

Max 2

- (d) (i) Interpreter should allow for faster program development / faster error correction / errors easier to identify ;

A easier to debug

1

- (ii) Compiler/source code will not be needed in order to distribute the final executable code / the exe code (alone) can be distributed to others;

the exe code (**A** the program) will execute (run) faster;

the exe code/ the program cannot be changed (by others);

Max 1

[8]

Q22.

Component	Software	Hardware	Hardware and Software
An application program	✓		
A printed circuit board which controls the wash programme inside a washing machine			✓
Main memory chips in the PC		✓	

More than one entry per row – look for a single tick

If mixture of X and ticks used mark (as long as one entry per row)

[3]

Q23.

- (a) (Sequence of) program instructions / program code / program; Instructions processed by the processor ;

Max 1

(b)

Software Category	Example
programming language translator	(i) compiler //interpreter//assembler ; R. any named language
(ii) utility // system (software) ;	Disc defragmenter
(iii) library program/files // System (software) ; R. library (only), library software, program libraries	A DLL file which is used by several applications programs
General purpose applications program	(iv) word processor/ database/ spreadsheet /desktop publishing A. web browser / presentation software ; R. CAD

(ii) and (iii) answers must be different

4

[5]

Q24.

Software	Description (letter below)
Income tax calculation software	G
Translator software for the C++ programming language	A/ D ;
Word processing software	F ;

AC ;

Operating system	A ;
------------------	-----

R A used for two answers

[4]

Q25.

- (a) Computer programs/sequence of instructions which run on the hardware/perform some task;

1

- (b) **Software types**

- 1 library program // operating system;
A Dynamic link library files R DLL
R BIOS / bootstrap loader / drivers / OS
- 2 library program // operating system;
- 3 (language) translator;
- 4 interpreter // disassembler;

Examples

- 5 route planner//payroll// accounting// tax calculator//web browser //games
// anything reasonable;
A graphics/image/sound editing software (if not given in 6)
- 6 spreadsheet / DTP / presentation software / graphics/image/sound
editing software/ CAD / CAM ;
- 7 (disc) formatter // (disc) defragmenter // scanning disc for bad sectors; //
file recovery/management/search/;
(file) compression;
Antivirus / spyware;
Firewall;
System restore;
Backup software;
A encryption

7

EXAM PAPERS PRACTICE

[8]

Q26.

- (a) Resource management
Memory management;
Resource allocation and scheduling;
File / magnetic disc / secondary store /backing store management;
Peripheral device management;
Interrupt handling;
A valid specific tasks one mark per task to max:

3

- (b) Provision of a virtual machine
Hide the complexities of the machine from the user;
// provide an interface between the user and the computer;

1

- (c) Network OS *in addition to a stand-alone computer*
Control access by multiple users;
Share network resources such as (shared files / applications / databases)
Manage more than one user using an application concurrently;

Manage printing from more than one computer on the network;
 Manage security with more than one work station;
 Redirect request to a remote resource (e.g. shared disk);
 Establish / maintain communication between the work station and the server /
 between two workstations; R connections

1 mark per point to max

3

[7]

Q27.

- (a) Server provides a resource/the Internet/a database/file/application/CD
 ROM/printer;
 Within a network;
 Client computer requests the service;
 and waits for the response;
 I any reference to the user

Max 3

3

- (b) (i) Software request causes an event;
 A external change causes an event
 The event causes a program/ procedure/ function to execute;
 I References to user
- (ii) Mouse Click// mouse movement// key pressed// record read/ written//any
 external/internal device requires attention;

2

1

[6]

Q28.

(a)

Software	Description (letter below)
Route planner software	B / D;
New point of sale software for Supermarket X's checkout terminals	B;
Translator software for the Java programming language	C;
Spreadsheet software	A;

4

- (b) Library program ...
 Previously written program code;
 Program code available from third parties;
 Program routines previously saved/compiled;
 Code which can be incorporated into current/future developments;
 Program files which are used by other/many applications

Q29.

- (a) Electrical/electronic/physical components/parts of computer/system;

A any example e.g. motherboard

R peripherals(b)

1

- (b)
- C - **processor / CPU**;
B - faster execution of program instructions / programs; simultaneous processes possible;
A computer runs faster
 - C - **(main) memory / RAM**;
B - more programs resident in memory; reduces main memory to disc data transfers / programs execute faster;
R stores more data
 - C - **secondary/disc store / hard disc**;
B - more programs/data can be permanently stored / available; faster access/loading speed;
 - C - **motherboard**;
B - allows for faster execution of programs / connection of new I/O ports (e.g. USB / Firewire);
 - C - **(3D) graphics/video card**;
B - display of high resolution / 3-D graphics / maximise the benefits possible from some software / better quality images // dedicated processor;
 - C - **Sound card**;
B - better quality sound / surround sound
 - C - **Modem**;
B - External communication /e.g. connect to the Internet
 - C - **Network card / NIC**;
B - communication with other PCs // provides some external communication/connection;
 - C - **CD drive**;
B - higher read/write speed
 - C - **DVD drive**;
B - increased storage /e.g. higher quality media;
R. Router / Cache

Max 4

- (c) A Sound card / Graphics card / Modem / Network card / Main memory if not given in (b)

- C- **new I/O port**
A example e.g. TV input/USB;
B - connection to devices which were not previously possible
/ connection to an additional device e.g. a second parallel

printer;

R Motherboard / CPU/ hard disc / CD drive / **DVD** drive

Sound card

B - to output audio on the PC (for the first time) - accept as a B. for (c) only

Max 2

[7]

Q30.

- (a) Browser / web browser / Internet browser;

1

- (b)
- forwards/backwards a page;
 - address bar for the display of the URL;
 - setting up/organising 'Favorites' pages;
 - setting up of the Home page;
 - move to the Home page;
 - refresh the current page;
 - stop loading the current page/ download;
 - history - show a list of the last (say) 20 pages displayed;
 - security - change settings /e.g. enable/disable graphics/pop-ups/other content/plugin-ins;
 - browsing - change settings;
 - view (HTML) source (code);

R HTML editor

Max 2

- (c) StationeryIsUs.co.uk/default.htm // www.StationeryIsUs.co.uk/default.htm;
A StationeryIsUs.co.uk // www. StationeryIsUs.co.uk
I. http:// ignore case

1

- (d) IP address (which matches with this URL); **R.** IP number

1

- (e) uk / co.uk / com / gov / tv / biz / net / org / ed / mil / info or from any other country eg fr ,it
A co.uk / ac.uk / sch.uk

Any two for 1 mark

1

[6]

Q31.

- (a) Operating system;
Utility program (or an example of one);
Library program;
Compiler/assembler/interpreter/translator;
Driver;
User interface;
A BIOS
R Any programming language

3

- (b) Payroll;

Stock Control;
 Production control;
 Sales;
 Invoicing;
 Word processing;
 Spreadsheet;
 Database;
 Desk top publishing;
 Browser;
 Or any appropriate application
R e-commerce NE

3

[6]

Q32.

- (a) (i) Layer of software which enables users to operate computer;
 Interface between user and computer;
 Software which allows user to communicate with / manage hardware;
 Software to run applications/hardware/programs/computer/packages;
R system on its own as n.e. software to make computer/hardware work /
 used to maintain hardware;
R platform
R software used to run the system / it (n.e.)

1

- (ii) Operating system;
 Utility programs (*or any example of one*) /library programs/compilers/
 assembler/ interpreter / translator / driver / Graphical User
 Interface/bootstrap loader;
A BIOS;
A antivirus/firewall software;
R any programming language

1

- (b) (i) Program to perform end user task;
 A real world task/ program produced by end user/ you *instead of user*,

1

- (ii) Any suitable example e.g. word processor
 /spreadsheet/Database/payroll/ Accounts/etc;
A browser

1

- (c) Software specially written/ tailor-made for an End user/ them/ company/
organisation;
A custom-made;
R customized
I for a task/ purpose

1

[5]

Q33.

- (i) Allow addresses in the Pointer column.

Position	Name	Running Time	Address	Pointer	
1	Process6	7	01400	4 (02300)	1 mark for 4,5,3 correct
3	Process7	17	01700	5 (04100)	1 mark for null pointer correct A sensible const. Name representing null pointer
4	Process2	17	02300	3 (01700);	
5	Process9	45	04100	-1; A 0;	
6	Process5	2	01200	8 (01900)	
					1 mark for 8,1 correct
8	Process19	5	01900	1 (01400);	

3

- (ii) Array; of records; OR linked list; of records; OR 4 1-D arrays;
One for each column; OR one 1-D array for process name;
One 2-D arrays for numerical data;

2

- (iii) Marks to be allocated as follows:

1 for initialisation

1 for while not at end of list

1 for printing

1 for getting next pointer

P1 if headpointer is reassigned

ListPointer ← HeadPointer;

While ListPointer <>-1 Do;

Print ListArray[ListPointer].Name;

ListPointer ← ListArray[ListPointer].Pointer;

Any name acceptable for ListPointer and ListArray

Note: a sorting method gets a maximum of 3 marks (inefficient)

Alternative solution

REPEAT UNTIL next=-1 OR IF listpointer <>-1 then REPEAT..

4

- (iv)

List	Reason
List of suspended/blocked/halted/unrunnable processes;	waiting for a resource or complete a requested I/O transfer;
List of inactive/dormant jobs;	Waiting to be admitted to the system;

I currently running processes

I interrupt

2

[11]

Q34.

- (a) Operating System// any utility// any user interface// library programs//compiler// assembler// interpreter// translator// driver
A BIOS
R any programming language

1

- (b) (i) Software written for a specific/ particular/ certain area/problem/task/function; or by example
R bespoke software 1
- (ii) Appropriate to many areas/tasks/functions/problems/uses; or by example 1
- (c) (i) Designed for the specific task// uses less memory/ disc space//does not have unnecessary features;
R bespoke software 1
- (ii) Able to perform many tasks//can be used for many purposes//cheaper to purchase;
I Fewer errors 1
- [5]

Q35.

- (a) (i) Layer of software which enables users to operate computer;
Interface between user and computer;
Software which allows user to communicate with/manage hardware;
Software to run/control/manage applications/hardware/programs/
computer/packages;
R system on its own as n.e.
Software to make computer/hardware work/used to maintain hardware/
computer;
R operating system R software used to run the system R platform
A valid example given here can be carried forward to (iii) 1
- (ii) Program written to perform end user task; A real world task/you *instead of user*
Program to enable user to do an end-user task;
Program produced by end user; 1
- (iii) Operating system/utility programs (*or any example of one*)/library programs/compilers/assembler/interpreter/translator/driver/Graphical user interface;
A BIOS; R *any programming language* 1
- (b) (i) Word processor/spread sheet/database/ DeskTopPublishing/Graphics package/voice recognition; etc. 1
- (ii) Software written to solve a specific/particular/certain/given problem/task function;
Or by example: payroll/accounts/weather forecasting, web browser etc;
R any programming language 1
- (c) (i) Software specially written/tailor-made for an end user/ them/ company/organisation;

A custom-made;
R for a task/purpose

1

- (ii) **Advantage:** (Exactly) matches end user requirements;
More suited to their needs/tasks // tailored to the needs of the user;
User has input into design;
No unnecessary facilities;
Disadvantages: Not tried and tested / likely to have more bugs;
Expensive to buy (as no wide user base to share cost) ;
Takes longer to be available;
A takes time to produce;
Need to specify requirements;
Lack of technical/user support/training;
No recommendation possible;
Not able to see a demo version;
Lack of manuals / documentation; **R** no manuals....
R expensive **A** more expensive;
R cost more to produce
R users needs may change therefore needs updating;

1

[9]



Examiner reports

Q1.

Students demonstrated a lack of understanding of the term “resource management.”

Q2.

This question was about operating systems. Two thirds of candidates were able to identify three appropriate types of management that would be carried out by an operating system.

Q4.

The focus of this question was operating systems, and in particular real time operating systems. A good range of responses were made, with just under half of students achieving at least four of the seven available marks. Most students had a good understanding of the role and functions of a standard operating system but responses were weaker in relation to real time operating systems. Students often made the point that real time operating systems had to respond within a fixed time frame, but were unable to develop this further to explain how this was achieved. Answers often focussed on the hardware requirements of a real time system instead of the operating system. A commonly held misconception was that real time systems were always designed to respond very quickly.

Q5.

- (a) In this part, candidates were expected to complete a figure representing the classifications of various types of software. Over half of the candidates achieved three or more marks for this part. Candidates should be reminded that answers such as 'Microsoft Word document' will not be accepted as generic terms such as word processor are required. The most challenging item for candidates to identify was translator software.
- (b) This part was well tackled with a good number of candidates securing all of the marks. For part (i) a few candidates provided the answer 'assembler' which was not accepted as the name for the second generation of programming language. The majority of candidates either answered with assembly code or assembly language which both secured the mark. Part (ii) was also generally well known, but there was confusion over what would be used to translate the assembly code into machine code. Most candidates secured at least one mark, but if they then discussed compiler or interpreters they did not secure the second mark which was for mentioning assembler. Part (iii) was found to be slightly more challenging and around 40% of candidates secured the mark. Good answers talked about differences between processors or the architecture of machines with a few including detailed examples. Weaker responses demonstrated some confusion over what the meaning of executable and discussed problems in the actual program itself, for example a bug in the code.

Q6.

- (a) This parts (i) to (iii) all required students to determine IP addresses. In each part, approximately three quarters of students did so correctly. Common mistakes were to write IP addresses that were formed from three octets instead of four, to write IP addresses that were not appropriate for the segment or to give a value of 0 for the last octet of an IP address.

- (b) This part was well tackled with the vast majority of students achieving at least one mark and just under half achieving both marks. Many students discussed collisions or the effects of cable failure. Students who missed out on the second mark usually did so because they failed to explain their answer in enough technical detail.
- (c) This parts (i) and (ii) were about Software as a Service, or SaaS. The vast majority of students achieved one mark on each part, although only just over a third achieved both marks for part (i). For part (i), the most commonly seen correct responses related to the fact that the software could be used on Internet-connected computers outside of the office and that the hardware requirements would be lower for SaaS. Some candidates made good points about the company not having to update the software, but others mistakenly suggested that the company would only have to update the software once, confusing SaaS with a thin client system. With SaaS, the company would not have to update the software at all as this would be handled by the provider of the SaaS. For part (ii), the most commonly seen correct response was that unreliability of the Internet connection or service would make the software inaccessible.
- (d) This part was poorly tackled, with just under half of students achieving any marks. The most commonly seen correct response was that a LAN would use baseband and a WAN broadband. Other valid responses included that a LAN would have faster transmission speeds and lower latency than a WAN and that more security issues might need to be dealt with on a WAN. Some students compared the communication media that would be used. Those who did so in detail often achieved a mark, but many made vague or incorrect points such as that a LAN would be wireless and a WAN wired. Some students assumed that a WAN and the Internet were the same thing and gave responses relating to IP addresses that did not really answer the question.

Q7.

The majority of students correctly identified that the first part of this question concerned the Data Protection Act. Students did struggle, however, to identify the principle required for part (b) and then to name another for part (c). It was common to see statements about certain activities for protecting data rather than stating actual principles. Part (b) was looking for the idea of data security and some students correctly identified the difference between internal and external security. The common answers for part (c) included keeping data up to date and not keeping data longer than necessary.

The majority of students correctly identified that HTTPS would be the preferred protocol for transmitting this data and over 60% secured the second mark for this question part with the common answer of HTTP not being a secure protocol. There appears some confusion over what HTTPS actually is and answers such as 'the website could be hacked' or 'the website is not secure' did not gain marks. At this level we would encourage students to appreciate that HTTPS is a protocol involving the encryption of data transmitted between two devices for the purpose of making the transmission secure but the protocol doesn't imply that all of the data on a website is actually secure.

Part (e) was answered well by students with the majority scoring 2 or 3 marks. Mistakes included identifying the web server software as either an operating system or a utility program. It seems possible that students do not have experience of servers and how they operate.

Q8.

The majority of students could explain clearly what was meant by hardware and software. Those that lost marks tended to be vague in their answers with not enough detail to

secure a mark at this level. Some of the weaker students mentioned that software is a program but left off the necessary statement that the programs would be executed by the hardware. A small number of students gave responses along the lines that hardware is 'touchable' which is not an appropriate description.

Q9.

The majority of students secured all of the marks for question part (a) and correctly distinguished between hardware and software. A compiler was occasionally identified as being hardware, rather than software. The wireless router was identified as being made up of hardware and software by a pleasing number of students.

The majority of students attempted to state one role of the operating system, but their answers occasionally failed to provide enough clarity to secure the mark. A group of students wrote about providing a user interface but did not include anything to distinguish this from the user interface of application software.

The purpose of library programs was not well known; students provided answers concerning either collecting together resources or archiving files. It seems that the use of library programs to provide access to pre-written procedures was only known to a small group of students.

The advantages and disadvantages of bespoke software have appeared on past papers. The majority of students could provide an advantage and this was usually centred around the software meeting the exact needs of the client. Providing a disadvantage proved harder and this was usually through students either not providing enough information or not being precise enough. Being expensive is not enough to secure a mark, but the students who identified that it would be expensive due to all of the development and production costs being met by the one client were rewarded with the mark. A few students stated that bespoke software would not be tested. This was not awarded a mark as it is to be expected that the software would be tested by the software developer. There was a mark, however, for pointing out that bespoke software might have more limited testing than software that has been available for a long time. In the same way, students should be careful about stating that bespoke software would have no support as this might not be the case. However, it is to be expected that bespoke software would have limited 3rd party support compared with software such as office applications that have a wide variety of 3rd party support (for example through books and training courses).

Q10.

This question was very well answered, with the majority of students being able to describe three different types of management that would be performed by an operating system and thus scoring full marks.

Q11.

Part (a) was very well answered with the majority of candidates correctly identifying the category to which each software program belonged. Candidates who dropped marks tended to put Flight Control Software down as special purpose rather than the correct answer of bespoke.

Part (b) was generally well answered. Common mistakes were answering, 'operating software,' rather than the correct answer of, 'operating system.' Candidates need to be aware of the correct term. Some candidates failed to understand the question and used the labels from part (a) of 'general purpose', 'special purpose' and 'bespoke'.

Q12.

Part (a): This topic was poorly understood. Many candidates did little more than rephrase the terms given on the question paper in their responses. An interactive operating system is one in which the user and computer are in direct two-way communication. A network operating system contains a layer of software that redirects requests to remote resources in a way that is transparent to the user. Stating that a network operating system was used to connect to a network was not enough; various hardware and software components are involved in this. Some candidates confused a network operating system with the use of thin-client computing or assumed that one would only be used on a file server.

Part (b): The responses to this question part were much better than those to part (a), with almost half of candidates achieving both available marks. Good candidates identified that an event-driven program would respond to events by calling specific subroutines and were also able to give an example of an event. Some responses also mentioned the use of a system loop or event handlers. The most common mistake was to write an answer that was too vague and could equally be applied to programs that were not event driven, such as, "an event driven program reacts to user inputs or runs certain code based on the inputs made".

Q13.

Part (a) asked candidates to identify system software and the majority managed to do this successfully. A few candidates answered with 'device driver' which was also awarded a mark.

It was surprising to see only half of candidates secure the mark for part (b)(i). Marks were lost by candidates giving vague answers or by giving examples of application software, rather than explaining what it is, which the question required. Correct responses identified that general purpose application software can perform many tasks for the user.

The majority of candidates secured the mark for part (b)(ii) by producing a correct example of general purpose application software. A few candidates gave brand names of software packages, for example 'Word', even though they are warned against this on the front page of the examination paper.

Q14.

Similar questions about hardware and software categories have been asked before. Definitions of what is hardware and software were both well known, although there was a substantial minority of candidates who thought that hardware was confined to peripherals. Software was slightly less well described as we were looking for two linked points that included a 'sequence of instructions' and that they would 'run' on the hardware. Often candidates omitted one or the other of these points. The table about classes of software was generally well answered and for once few brand names were used.

Q15.

Part (a): Most candidates scored at least one mark for this question part by explaining that the operating system provided a virtual machine or abstracted the user from the complex hardware.

Some however only described the provision of a user interface, which was not sufficient to gain the mark for abstraction from the hardware.

Part (b): Most candidates showed some understanding of the differences between the two types of operating system, with many scoring high marks. The most commonly made mistake was to discuss the same point repeatedly, usually that a desktop operating

system would perform a wider range of tasks. Good answers also referred to upgradability, the range of software applications that could be run, the range of hardware that might be supported and the likely minimum hardware requirements of the operating system. Some candidates assumed erroneously that embedded systems and real time systems were the same things. On this occasion we were lenient when marking answers that had made this assumption.

The vast majority of candidates wrote appropriately structured answers with only minor errors in grammar and spelling. A bigger problem was the legibility of some answers, but very few were impossible to read.

Q16.

This question was very well answered with many candidates gaining full marks. The use of language was mostly very good, although often the actual quality of the handwriting left much to be desired. There was also some confusion between special purpose and bespoke software types. The part relating to bespoke application programs was sometimes vaguely answered with poor examples that were special purpose examples such as payroll accounting or tax planning programs. A common way of missing a mark was to state the example as a brand name rather than a generic name. Finally there is still some confusion as to what an application package is. Utility and library software were often given, inappropriately, as one of the types.

Q17.

Candidates were better able to explain the purpose of system software than of application software, although some of the explanations of system software that did gain credit were quite superficial and only just worth a mark. System software is software that is required to manage the operation of the hardware. Application software was often poorly explained. It is software that allows the user to complete user-oriented tasks which the user would want to do regardless of whether they had a computer or not. All software performs tasks.

Many good examples of types of system software were given, most commonly the operating system and library programs. The most frequently seen error was to give examples of utility programs such as a disk defragmenter when the question had specifically asked for types other than utilities.

Q18.

A significant number of candidates described hardware in such a way as to make it appear that only peripheral devices were classified as hardware. Hardware is all the physical components (electronic circuits) of the computer. Although this time marks were awarded for explaining the term by example, this is unlikely to be the case in future examinations.

Software are the programs which run on the hardware. Candidates who stated that software is a series of instructions missed the mark available as this is not a precise enough explanation.

Only a **sequence** of instructions can be classed as a program. Some candidates mistakenly think that data are software.

Q19.

Most candidates correctly categorised the software given in the table. However, a minority of candidates failed to understand the instructions of writing the category letter given in the question into the table.

Q20.

Well answered. The most common omission was 'library software'. Candidates would be well advised to study the published mark scheme for a 'ruling' on the classification of some software where there is possible debate as to which is a 'best fit' classification.

Q21.

- (a) This was the first time candidates had been asked for an essential feature of a program development environment for the creation of program code and a correct answer was given only by the more able candidates.

(b)(c)(d)

These questions should have been straightforward bookwork-type questions as candidates were asked to describe how a compiler and an interpreter process a source program and there were many ways in which the candidates could score the marks. Candidates often let themselves down by their poor communication skills and answers such as, 'read a whole program and produce an .exe out of this,' said nothing other than a re-wording of the stem of the question. The word 'it' – commented on in previous Reports on the Examination - was again in evidence for part (d) and the answer was then unclear as to whether the candidate was referring to the compilation process or the running of the executable code.

Many answers stated the compiler output as being the executable code, despite this being stated in the question.

Q22.

Well answered; the majority of candidates scored the maximum three marks.

Q23.

- (a) This was a single mark question which the vast majority of candidates scored. If candidates answered this at the executable program level then we are expecting an answer which describes a 'sequence of instructions' – 'set of' is considered insufficient as it opens up the possible interpretation of a set of menu selections or similar.
- (b) There were still some scripts which used brand names despite the clear instruction on the front page rubric not to do this. Although a straightforward question, the majority of candidates were often unable to score the full four marks.

Q24.

This was a similar style of question to that previously set and candidates scored well. Some candidates failed to read the rubric of the question 'no letter should be used more than once' and so lost a possible mark.

Q25.

- (a) Surprisingly few candidates were able to provide a definition of software; there were all too many vague answers such as "the things which cannot be touched".
- (b) Again some candidates failed to read the question paper rubric that "credit will not be given for brand names", and candidates lost as many as three marks despite clearly knowing a correct software example.

A wrong answer of “bespoke software” for example 5 was not uncommon.

For (b) most candidates scored five or six marks, but the maximum seven was rarely achieved.

Q26.

Some candidates demonstrated no understanding of this topic; more than one candidate seemed to be referring to the stock control of some resources for part (a). More gained marks from a reasonable attempt at part (b).

Part (c) asked for tasks that a network operating system would have in addition to those of an operating system for a stand-alone computer. This was one question where full answers enabled the candidate to gain marks. Answers such as ‘managing the transfer of files’ or ‘manage data being input and output’ were insufficient as operating systems for stand-alone computers have these tasks as well. A good set of answers was ‘Network storage / file sharing across computers’, ‘Printer access - sharing printer queues from different computers’, and ‘multiple users – control access / security’.

Q27.

This question was straight forward book work but it was very poorly done. Most candidates ignored the fact that there were three marks for part (a) and failed to answer in sufficient depth. Although many candidates had some idea that a server is likely to provide some resource, few were able to describe the client-server relationship.

Most candidates had some knowledge of event driven operating systems but many failed to obtain full marks due to weak explanations. Few candidates showed that they understood the nature of an event in this context.

Q28.

(a) Although a new style question for this area of the specification, candidates mostly scored the full four marks.

(b) This was the first time this question had been asked and it was poorly answered. Whilst it is appreciated that candidates may well not have had practical experience of the use of library programs in their own programming experience after some three months, they would have experienced DLL files when installing software.

Common wrong answers were the confusion of library programs with either utilities, or a vague statement referring to information stored in a large archive.

Q29.

(a) Most candidates scored the one mark.

(b) Although not examined on previous papers, candidates scored highly on this question no doubt able in many cases to draw on their own experiences.

Some candidates missed out on full marks with a weak explanation of the benefit to be gained – e.g. ‘more storage’ on its own is not a benefit for changing the hard drive.

A worrying misconception of a few students was that it is possible to change in isolation either the data bus or address bus.

- (c) Again well answered with the majority of students able to suggest an additional component. Candidates who did not appreciate the meaning of PCB then wrongly suggested components such as DVD drives or an additional hard drive. More worrying were the candidates who suggested the additional component could be a motherboard or the processor.

Q30.

Most candidates scored well on this question.

- (a) There were still some scripts where the candidates suggested a brand name such as Internet Explorer, and consequently scored zero.
- (b) The question asked for 'features' and the majority of candidates were able to describe these. The common wrong answer was to just say what a browser does i.e. display web pages, and not describe specific features, which were generally well known. One-word answers however were very common.
- (c) This part was well answered by many candidates.
- (d) IP addresses appear to be well understood.
- (e) Some candidates lost the mark with the inclusion of some domain name before the top-level identifier.

Q31.

Candidates generally did well on this question. More marks were obtained on part (b) than on part (a).

- (a) Most candidates were able to give one or two satisfactory examples but there were some examples of product names, despite the question stating specifically that they would not be accepted.
- (b) Many candidates obtained full marks. The most common mistake was to state product names.

Q32.

- (a) Generally answered well but some candidates continue to answer with brand names such as Windows XP. Some candidates were unable to express themselves clearly in part (i).
- (b) Many candidates gave poor descriptions in part (i) but most candidates were able to give a suitable application.
- (c) The main failing was candidates' inability to express themselves clearly.

Q33.

Many candidates were able to complete the pointer column in the table correctly but could not adequately describe a suitable data structure for this table. Most stated array or linked list but very few noticed that the columns required different data types and therefore an **array of records** or a **linked list of records** or several arrays were required for full marks. In part (iii) many candidates could write a suitable algorithm, some even provided very elegant, recursive, solutions. However, a few candidates reassigned values to the head pointer as they worked their way through the list. This is not appropriate. Others

printed the pointer rather than the name. A possible solution gaining full marks would be:

```
ListPointer ← HeadPointer
While ListPointer < > -1 Do
    Print ListArray[ListPointer].Name
    ListPointer ← ListArray[ListPointer].Pointer
EndWhile
```

In part (iv) very few candidates seemed to remember that the list they were working with in the question was that of runnable processes, and that only one process at any one time can be running, so a list of running processes would not be sensible. This leaves suspended processes (waiting for a resource) and inactive jobs (waiting to be admitted to the system).

Q34.

- (a) Good marks were obtained from this part of the question. There were still some candidates who responded with a branded product but these were in the minority.
- (b) Good marks were also obtained here but some candidates confused “special purpose applications software” and “bespoke software”. Some candidates also felt that it was necessary to tailor special purpose applications software. As regards (ii) the most common misunderstanding was that the ability to transfer data between applications using the clipboard made the software general purpose.
- (c) Again candidates confused “special purpose applications software” with “bespoke software” and spoke of tailoring software to specific needs. Many candidates failed to obtain credit in part (ii) by simply stating “cheaper” without any further explanation.

Q35.

Candidates find it very difficult to express themselves clearly and concisely to define computing terms.

System software is the layer of software which enables users to operate the computer hardware, such as an operating system. Many candidates wrongly think that software already loaded on the system at time of purchase is system software.

Application software is any program written to perform an end user task, such as word processing software.

Special purpose application software is software written to solve a particular problem, such as accounts software.

Bespoke software is software specially written for an organisation with the advantage of the software exactly matching the user’s requirements and the disadvantages that the organisation will have to wait for it to be written and it will not be as tried and tested as readily available software. Many candidates wrongly state that bespoke software is more expensive to write. It may be more expensive to the client because the cost of production can not be spread over a wider user base.