**General Certificate of Education (A-level)
January 2011**

**Computing**                                    **COMP2**

**(Specification 2510)**

**Unit 2: Computer Components, The Stored Program Concept and The Internet**

# Final

# *Mark Scheme*

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all examiners participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for standardisation each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, examiners encounter unusual answers which have not been raised they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

**Notation used in GCE Computing mark schemes**

; - means a single mark
// - means alternative response
/ - means an alternative word or sub-phrase
**A** - means acceptable creditworthy answer
**R** - means reject answer as not creditworthy
**I** - means ignore.

| Qu | Part | Sub Part | Marking Guidance | Mark | Comments |
|---|---|---|---|---|---|
| 1 | a | | Address (bus); | 1 | |
| 1 | b | | 1; **R** 33 | 1 | |
| 1 | c | | A – Visual display unit;   **A** VDU<br>B – Processor;          **R** CPU<br>C – (Main) memory;<br>D – Keyboard; | 4 | |
| 2 | | | $\quad$ G $\quad$ H $\quad$ K<br>$\quad$ 0 $\quad$ 1 $\quad$ 1<br>$\quad$ 1 $\quad$ 1 $\quad$ 0<br>$\quad$ 1 $\quad$ 0 $\quad$ 1<br>$\quad$ 1 $\quad$ 0 $\quad$ 1<br>$\quad$ ; $\quad$ ; $\quad$ ;<br><br>1 mark for each correct column | 3 | |
| 3 | | | $(\overline{\overline{A}.\overline{B}})$ becomes A + B ;<br>**A** (A+B);<br>**A** A OR B;<br><br>$B+B.\overline{C}$ becomes B ;<br><br>$A.B+A.\overline{B}$ becomes A ;<br><br>$A.(B+1)$ becomes A ;<br><br>1 mark for each | 4 | |
| 4 | a | | Operand - 5<br>Opcode - LOAD ;<br>Both needed for the mark<br>**A** binary value 101 with any number of preceding zeroes for the operand | 1 | |

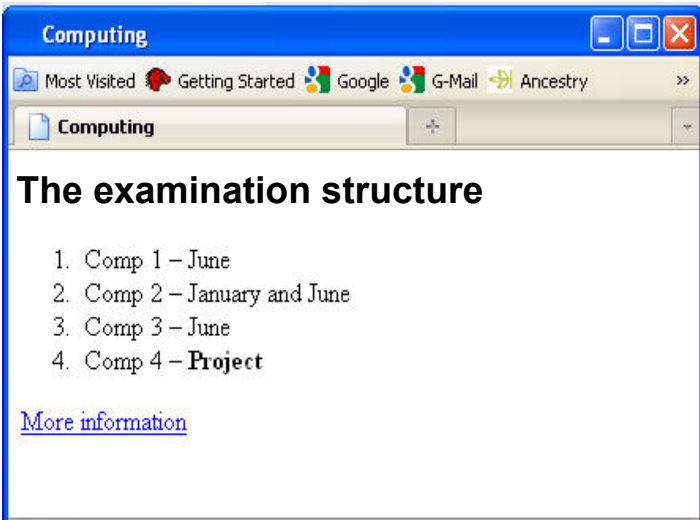| 4 | b | | `LOAD 7;`<br>`ADD  8` } Both Add instructions for the mark - do not<br>`ADD  3` } need to follow each other.<br>`STORE 21;`<br>The operands for LOAD and ADD can be in any order<br>**I** an end of line indicator symbol e.g. ";"<br>**I** comments explaining code<br>**I** additional unnecessary commands<br>**R** commands with a # or ( ) or [ ] in the operand<br>**A** operands in binary<br>**A** operands in binary and opcodes in binary, if candidate has provided a translation table<br>**A** correct operands in hex if using &<br>**MAX 2** if code would not produce correct result | 3 | |
| 5 | | | LASER<br>Page printer;<br>Print drum coated in (negative static) charge;<br>Printer generates <u>bit map</u> of page;<br>Laser beams shone/directed at/"draws" on print drum;<br>Via rotating (octagonal) mirror;<br>Laser is modulated (turned on & off);<br>Laser removes/neutralises/reverses electric charge on drum;<br>where image should be dark/black;<br>Toner is given (negative) charge;<br>Charged drum picks up toner;<br>Toner transferred from drum to paper; ("from drum" may be implicit in order of answer)<br>Toner is fused/bonded/melted/stuck to paper by (heated rollers/pressure); (must be clear that toner is already on paper when it is fused, not still on drum)<br>**I** incorrect charges e.g. positive when should be negative<br>INK JET<br>Heater behind ink reservoir is warmed;<br>Vaporises droplet of ink. Expands and forces small ink blob out onto paper;<br>Electricity applied to piezoelectric crystal;<br>Deforms crystal shape;<br>Fires/squirts/shoots spots of ink; **NE** places<br>Some colours produced from mix of ink spots fired together;<br>Heater turns off – ink cools sucks remainder of droplet back in.<br>Repeated for all colours and each nozzle;<br>Electric current switched off piezoelectric crystal returns to original shape;<br>Print head moves across each line of paper/ repeated for each part of each character // Prints line by line;<br>Ink dries before paper emerges from printer;<br><br><br>**A** laser / ink jet printer uses (black), cyan, magenta, yellow (Note – only accept this point once) | 8 | |

| Mark Bands and Description | |
|---|---|
| 7-8 | *To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of language criteria (QLx).*<br><br>*SUB* Candidate has provided a clear explanation of principles of operation, including at least 7 of the points listed above of which 3 must come from each printer operating explanation.<br>*QL1* Text is legible.<br>*QL2* There are few, if any, errors of spelling, punctuation and grammar. Meaning is clear.<br>*QL3* The candidate has selected and used a form and style of writing appropriate to the purpose and has expressed ideas clearly and fluently.<br>*QL4* Sentences and paragraphs follow on from one another clearly and coherently.<br>*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).*<br><br>*SUB* Candidate has provided a clear explanation of principles of operation, including at least 5 of the points listed above of which 2 must come from each printer operating explanation.<br>*QL1* Text is legible.<br>*QL2* There are few, if any, errors of spelling, punctuation and grammar. Meaning is clear.<br>*QL3* The candidate has selected and used a form and style of writing appropriate to the purpose and has expressed ideas clearly and fluently.<br>*QL4* Sentences and paragraphs follow on from one another clearly and coherently.<br>*QL5* 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 language criteria (QLx).*<br><br>*SUB* Candidate has provided a limited explanation of principles of operation, including at least 3 of the points listed above. Candidate does not need to cover both types of printer.<br>.<br>*QL1* Text is legible.<br>*QL2* There may be occasional errors of spelling, punctuation and grammar. Meaning is clear.<br>*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.<br>*QL4* The candidate has used well-linked sentences and paragraphs.<br>*QL5* Appropriate specialist vocabulary has been used. |

| 1-2 | | | *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.*<br><br>*SUB* Candidate has provided a weak explanation which covers at least 1 of the points listed above for 1 mark or 2 points to get 2 marks.<br>*QL1* Most of the text is legible.<br>*QL2* There may be some errors of spelling, punctuation and grammar but it should still be possible to understand most of the response.<br>*QL3* The candidate has used a form and style of writing which has many deficiencies. Ideas are not always clearly expressed.<br>*QL4* Sentences and paragraphs may not always be well-connected or bullet points may have been used.<br>*QL5* Specialist vocabulary has been used inappropriately or not at all. | | |
| 0 | | | Candidate has not made reference to any of the points listed above. | | |

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 | a | | system (software) / operating system;<br>**R** – OS<br>**A** – (device) driver | 1 | |
| 6 | b | i | Software that can carry out many tasks// has many purposes/uses;<br>**NE** "many things" // "many functions" // "general purposes"<br>**R** for everyday use/tasks | 1 | |
| 6 | b | ii | Word processor, spreadsheet, database, desktop publishing/DTP, presentation or other suitable example;<br><br>**R** web browser // image/photo editor | 1 | |
| 6 | c | i | (It is) immediately available; **A** "off the shelf"<br>(It has a) lower cost as development costs shared amongst many; **NE** cheaper<br>Wide range of training/support available;<br>Regular upgrades available;<br>Can hire staff with experience of package;<br>More likely to be bug-free as already in widespread use/"tested" by many users;<br>**A** it has been "tried and tested"<br>**R** no bugs / tested more | MAX 2 | |
| 6 | c | ii | No appropriate software to solve the problem exactly;<br>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;<br>To ensure competitors do not get access to the software;<br>To run on/support existing hardware/software;<br>No unnecessary features; | MAX 1 | |
| 7 | a | | Very hard/difficult to understand;<br>Very easy to make mistakes;<br>Hard to find any errors/mistakes in the code;<br>Time consuming to develop software in assembly language;<br>Lack of portability;<br>Lack of in-built functions/procedures;<br><br>**NE** harder to learn | MAX 2 | |
| 7 | b | | Compiler produces object code to distribute that is difficult to reverse engineer/ no need to distribute the source code;<br>Compiler optimises the code // The object code /program runs faster (as it does not need translating);<br>**NE** "Runs faster", if not clear whether this applies to the program or the compiler.<br>The target computer has no need to have the original compiler;<br>Object code can be installed on target computer;<br>No interpreter available for target machine; | 2 | |
| 8 | a | | <br>One mark for each of the following from the diagram<br><br>"Computing" in top - title bar ;<br>"The examination structure" in large font, or labelled as large;<br>Blank lines between "The examination structure" and list and between list and "More information";<br>Numbers 1 to 4 on consecutive lines (in order);<br>Numbered list indented;<br>"Project" in Bold or labelled bold; | | |

| | | | | | |
|---|---|---|---|---|---|
| | | | "More information"  with underline ;<br>**MAX 4**  if there is any additional text | MAX<br>5 | |
| 8 | b | | color : red; text-align: center<br>1 mark for color: red<br>1 mark for text-align: center<br>1 mark for semi-colon to separate statements and use of colons between properties and values.<br>**I** minor spelling errors<br>**A** for text-align: align, font-align<br>**A** alignment for align<br>**A** for color: text-color, font-color, textcolor, fontcolor, text color, font color<br>**A** color spelt as colour<br>**A** center spelt as centre<br>**I** quotation marks around values | 3 | |
| 9 | a | | Provides reliability of transmission // check transmission successful;<br>Error detection and correction // error handling **A** either detection or correction;<br>Acknowledgement of received packets;<br>Retransmission of packets if necessary;<br>Flow control /  congestion avoidance / congestion management;<br>Packet sequencing;<br>Adding TCP headers;<br>Pass data to correct process in application layer;<br>Allocates port numbers;<br>Dividing data into packets / reassembles data from packets; **NE** "chunks", transports packets<br>Connection establishment / maintenance;<br>Creation of virtual circuits // creating an end-to-end connection; | MAX<br>2 | |
| 9 | b | | HTTP/ HTTPS/ SMTP/  POP3/ Telnet / SSH;<br>The above are only the most common examples. Students may provide alternatives and these should be checked. | 1 | |
| 9 | c | | Network (layer);<br>**A** IP (layer) | 1 | |
| 10 | a | | (aqa.org.uk)   domain name;<br>**R** FQDN<br>(courses/computing.html)    path  name // location of file/resource/object/document // path of file/resource/object/document;<br>**NE** file name | 2 | |

| 10 | b | | A set of (agreed) rules / codes / signals (for data exchange between systems);<br>Agreed standard for communication between computer systems; | MAX 1 | |
|---|---|---|---|---|---|
| 10 | c | | Both use the same protocol;<br>Both are client-server based;<br>Both have a similar purpose // both used to share information/data/resources; **A** access<br>Both use TCP/IP;<br>Both are accessed through the use of a URL;<br>Concept that web pages can be accessed through a web browser on either system // use of same software; | MAX 2 | |
| 10 | d | | Easier to remember a FQDN or converse for IP address i.e.<br>IP addresses are less memorable;<br>FQDN can identify (to a human) what a site is whereas an IP address cannot // easier to understand; | MAX 1 | |
| 11 | a | | Copyright Design and Patents Act (1988) // Copyright and Related Regulations (2003) // Digital Economy Act (2010);<br>**NE** Copyright, Copyright Act | 1 | |
| 11 | b | | Encrypt the music file;<br>A (decrypt) key is needed for playback; **R** code, PIN, password for key<br>Download server keeps records of authorised clients (hardware devices) allowed to decrypt music; **R** tied to IP address<br>Playback tied to a particular (set of) hardware device(s); **A** Using a digital watermark in the music file a form of steganography;<br>**R** cannot be transferred to other devices<br>**NE** "player" for "device" | MAX 2 | |
| 12 | | | GOOD AT :<br>Can make precise/accurate/complex calculations/actions;<br>**NE** – "good at maths/logic" – need the concept of complex<br>More consistent than humans;<br>Repetitive tasks;<br>Can work in conditions too dangerous for a human;<br>Working with large volumes of data;<br>Fast processing of data / calculations;<br>Can perform task without breaks // for longer than humans; **R** don't get bored<br><br>BAD AT:<br>Image recognition;<br>Shape detection;<br>If the conditions change they adapt poorly // not very | | |

| | | | adaptable // learning; **A** "can't think for themselves" <br> Poor at coping with emergencies/unexpected circumstances; <br> Creativity // invention // lateral thinking; <br> Bad at discriminating; <br> Processing qualitative data; <br> Recognising human concepts e.g. emotion; <br> **A** Cannot recognise when it makes mistakes; <br><br> Above are exemplars only. Award credit for other valid points. <br><br> **MAX 3 if all points are about just good or just bad.** | MAX 4 | |