Version 1.0 0712

General Certificate of Education (A-level)
June 2012

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.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334).
Registered address: AQA, Devas Street, Manchester M15 6EX.

COMPONENT NUMBER:	COMP2
COMPONENT NAME:	Computer Components, The Stored Program Concept and The Internet
STATUS:	Final
DATE AND VERSION NUMBER:	July 2012 v 1.0

To Examiners:

1. **When to award '0' (zero) when inputting marks on CMI+:**
   A mark of 0 should be awarded where a candidate has attempted a question but failed to write anything credit worthy.

   Insert a hyphen when a candidate has not attempted a question, so that eventually the Principal Examiner will be able to distinguish between the two (unattempted/nothing credit worthy) in any statistics.

2. This mark scheme contains the correct responses which we believe that candidates are most likely to give. Other valid responses are possible to some questions and should be credited. Examiners should refer off mark scheme responses that they believe are creditworthy to a Team Leader.

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
DPT - means "Don't penalise twice". In some questions a specific error made by a candidate, if repeated, could result in the loss of more than one mark. The DPT label indicates that this mistake should only result in a candidate losing one mark, on the first occasion that the error is made. Provided that the answer remains understandable, subsequent marks should be awarded as if the error was not being repeated'.

<table>
<tr><th>Qu</th><th>Part</th><th>Sub Part</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>1</td><td>a</td><td></td><td>
<table>
<tr><td>Comp</td><td>S/ware</td><td>Hardware</td><td>Hardware and software</td></tr>
<tr><td>Wireless router</td><td></td><td></td><td>TICK;</td></tr>
<tr><td>Compiler</td><td>TICK;</td><td></td><td></td></tr>
<tr><td>Keyboard</td><td></td><td>TICK;</td><td>A TICK;</td></tr>
</table>
A – crosses used rather than ticks
R – answers where two columns have been ticked in a single row
</td><td>3</td><td></td></tr>
</table>

1	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	
1	b	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	
1	c	i	Meets all of the end-user requirements; Only performs necessary functions; Can be fitted into existing hardware/software;	MAX 1	
1	c	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	
2	a	i	Indicates the basic machine operation/function/command; Executable binary code; **A** "instruction" – with a valid example	MAX 1	
2	a	ii	Represents a single item of (binary) data / a single value; Represents a memory address / storage location; The value that the instruction operates on; **A** parameter for the operation **NE** "address"	MAX 1	

2	b		Easier to understand; Takes less time to code (as using mnemonic opcodes and hex operands); Fewer mistakes made in coding; Ability to add comments to code; Use of symbolic names for operands // easier to remember opcodes/mnemonics; Use of labels; Easier to maintain/debug; **NE** easier to read/code/write **NE** quicker **A** converse points if clearly discussing machine code	MAX 2	
3	a	i	To manage/control/execute commands on a remote machine; **A** remote access/login **A** – a clear example of remote management **NE** remote viewing **R** remote desktop	1	
3	a	ii	Enable files on one host/computer/client to be copied to another host/computer/server; To manage files on a remote computer/server; **A** to upload/download/transfer files **NE** "sharing" **NE** load a file **NE** transfer data	1	
3	a	iii	To retrieve/fetch (stored) email; To check for <u>new</u> emails; **A** access/download/receive **R** sending **TO** any mention of sending **NE** just "email"	1	
3	b	i	192.168.3.205 // 74.125.4.148 // 208.43.202.29;	1	
3	b	ii	80 // 25 // 58539 // 57458 // 57459; **I** colons	1	
3	b	iii	192.168.3.205:80 // 192.168.3.205:25 // 74.125.4.148:58539 // 208.43.202.29:57458 // 208.43.202.29:57459 ;	1	

3	c		Servers might be in another room / site / cupboard / inaccessible ; Servers might not have a keyboard / monitor installed ; Can manage multiple servers from one machine; Servers can be managed outside of work hours / from anywhere; It would be quicker (**A** more convenient) (to manage from her machine than visit the servers) // better time management; Server rooms are often uncomfortable places for people to work in; **NE** she does not need to go to the servers	MAX 2	
4	a		*Imperative:* Instructions are executed in a programmer defined sequence // Instructions specify how to solve the problem; **A** executed line by line (in sequence) *HLL:* A language that uses English-like/more meaningful keywords // one instruction maps to several machine code instructions // has structures for assignment/iteration/selection ; **NE** a language that is like English	2	
4	b		Languages used for a specific problem type/domain; **A** different uses/purposes/tasks Access to specific data types; Providing different function libraries; Languages developed for specific hardware / devices ; Languages developed for visual applications/GUIs; Competition between different companies who develop languages;	MAX 1	

5			Key points of subject criteria: *FETCH:* Contents of Program Counter/PC transferred to Memory Address Register/MAR; Address bus used to transfer this address to main memory; Contents of addressed memory location loaded into the Memory Buffer Register/MBR; Transfer of content uses the data bus; Increment contents of Program Counter/PC; Increment Program Counter/PC and fetch simultaneously; **A** any part of fetch process Transfer content of Memory Buffer Register/MBR to the Current Instruction Register/CIR; *DECODE:* Decode instruction held by the Current Instruction Register/CIR; The control unit decodes the instruction; Instruction split into opcode and operand; *EXECUTE:* If necessary, data is fetched; The opcode identifies the type of instruction it is; Execute instruction by relevant part of processor; Result stored in accumulator; Status register updated; If jump/branch instruction Program Counter/PC is updated; **Mark bands and description** **6** To achieve a mark in this band, candidates must meet the subject criterion (SUB) and all of the 5 quality of language criteria (QLx). SUB Candidate has provided at least 6 points. At least one point made for each of the fetch, decode and execute stages. Answer must mention at least 3 registers. *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	6	

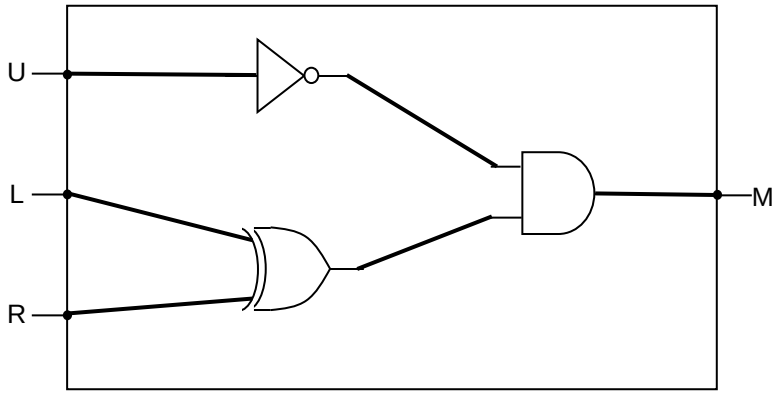
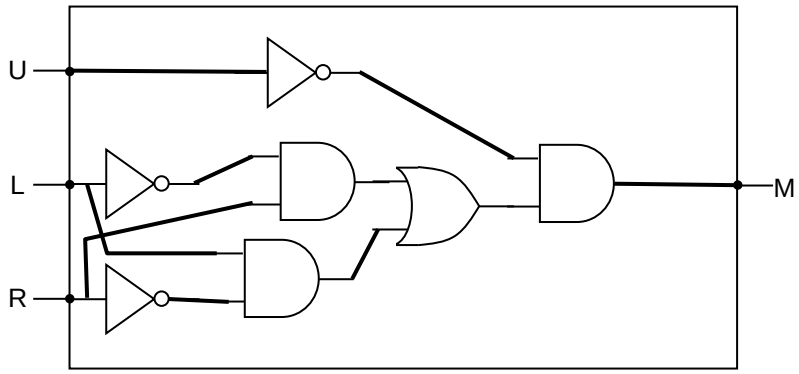
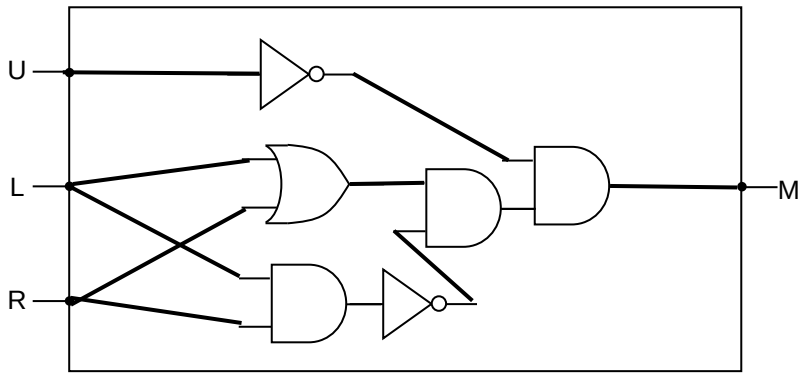
					follow on from one another clearly and coherently. *QL5* Appropriate specialist vocabulary has been used.		
				4-5	To achieve a mark in this band, candidates must meet the subject criterion (SUB) and 4 of the 5 quality of language criteria (QLx). SUB Candidate has provided at least 4 points covering at least 2 of the fetch, decode, execute stages. Answer must mention at least 2 registers. *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.		
				1-3	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 provided at least one valid 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. 0 Candidate has not made reference to any of the points above.		
6	a	i	Touch(-sensitive) screen;	1	
6	a	ii	Smartcard reader // RFID reader // Radio Frequency Identification reader; Touch (sensitive) screen; *(if not awarded for part i)*	MAX 1	
6	a	iii	RFID reader // Radio Frequency Identification reader; *(if not awarded for part ii)*	1	
6	b		Document placed onto glass (pane) // scanner has a glass pane; Under which is a bright light/rows of red, green & blue LEDS; and array of optical sensors / CCD array; covered to exclude ambient light; sensor array/light moved steadily (under glass) to scan whole document; the reflected light is converted into an equivalent electrical signal; more light reflected from bright regions than dark regions; Link between reflected light and colour explained;	MAX 4	
7	a	i	(#)header; **R** Id=”header” **I** quotation marks	1	
7	a	ii	(.)boldRed; **R** class=”boldRed” **I** quotation marks	1	
7	a	iii	div // p // h1 ; **I** angled brackets **A** answers of the type …	1	
7	b		A colour scheme made up of different shades/hints of one single colour; **A** made of up black, white and grey**s**/shades of grey **NE** black and white	1	

7	c		Can be used by search engines/programs to categorise/list the page; Provides metadata about the document; **A** a more general use of a meta tag – for example to provide a description of the page/site // indicate author	1	
7	d		<link rel="stylesheet" type="text/css" href="styles.css"> Mark : 1 - link; 2 - stylesheet; 3 - styles.css; **A** - quotes	3	

8	a		**AND Gate** **Input X** / **Input Y** / **Output Q** 0 / 0 / 0 0 / 1 / 0 1 / 0 / 0 1 / 1 / 1 **XOR Gate** **Input X** / **Input Y** / **Output Q** 0 / 0 / 0 0 / 1 / 1 1 / 0 / 1 1 / 1 / 0 1 mark for each of the output columns	2	

8	b	i	$(L \oplus R) . \overline{U}$ [Brackets are not necessary] 1 mark for use of correct operands (L,R,U); 1 mark for use of XOR with L,R; 1 mark for NOT U anded with other part; alternative : $(L + R). (\overline{L. R}). \overline{U}$ 1 mark for use of correct operands (L,R,U); 1 mark for alternative XOR expression; 1 mark for AND NOT U; alternative : $(L. \overline{R} + \overline{L}. R). \overline{U}$ 1 mark for use of correct operands (L,R,U); 1 mark for alternative XOR expression; 1 mark for AND NOT U;	3	Acceptable notation for symbols : ~ for NOT X.Y allow X AND Y, XэY,X)Y, XY X+Y allow X OR Y, X(Y, X∗Y

8	b	ii	 L, R connected to XOR gate; U connected to NOT gate; Output of a two input AND gate connected to M; **MAX 2** if circuit does not reflect the correct logic **Alternative :**  U connected to NOT gate; Correct gates used for L and R before last AND gate; Output of a two input AND gate connected to M; **Alternative :**  Marked as above alternative.	3	

8	c		**Solution 1:** $Q = \overline{\overline{A} \,.\, (\overline{\overline{B} \,.\, A})}$ [Application of De Morgan's Law –**1 mar** $Q = A.B.A$ [allow simplification of double nots at same time] [Simplification of A.A to A – **1 mark**] $Q = A.B$ [Correct solution – **1 mark**] **Solution 2:** $Q = \overline{A} + (\overline{\overline{B} + \overline{A}})$ [Application of De Morgan's Law – **1 mark**] $Q = \overline{\overline{A} + \overline{B} + \overline{A}}$ [allow simplification of double nots at same time] $Q = \overline{\overline{A} + \overline{B}}$ [Simplification of NOT A OR NOT A to NOT A – **1 mark**] $Q = A.B$ [De Morgan's again to correct solution – **1 mark**] No working marks for truth table solution (asked to use De Morgan's in question)	3	1 mark for De Morgan; 1 mark for simplification; 1 mark for final answer; Other notations as for question 8b
9	a		*Legislation* Health and Safety (Regulations); Display Screen Equipment Regulations; *Affect* Monitors should be moveable/adjustable to alter height/ reduce glare / minimize flicker; **A** top of screen at eye level Chairs should be moveable/adjustable; Position of mouse/keyboard assessed // keyboard should be separate from screen; Consideration of lighting; Space under desk for legs; Supply a foot-rest / wrist-supports; **A** feet should be touching flat surface Set up software to use readable fonts // select colours that are easy on the eye; Cables should not be left loose; Sufficient workspace around computer; **MAX 1** mark for legislation **MAX 2** for affect	3	

9	b	i	Copyright, Designs and Patents (Act) ; **R** – Copyright	1	
9	b	ii	Number of licenses the library has; If the software needs a license; Type of license the library has; Library has a site-wide license; Check that software can (legally) be used on more than one machine; **A** its terms of use	MAX 1	
9	c		Contract/rules/regulations that an employee must follow // a member of an organisation is bound by; **NE** agreement/terms **R** Laws alone instead of rules Contents of a code (may) not be legal requirement; Breaking rules could result in disciplinary action/possibility of losing job;	MAX 1	

UMS conversion calculator www.aqa.org.uk/umsconversion