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General Certificate of Education (A-level)
June 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.

Further copies of this Mark Scheme are available from: aqa.org.uk

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To Examiners:

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.

Notation used in GCE Computing mark schemes:

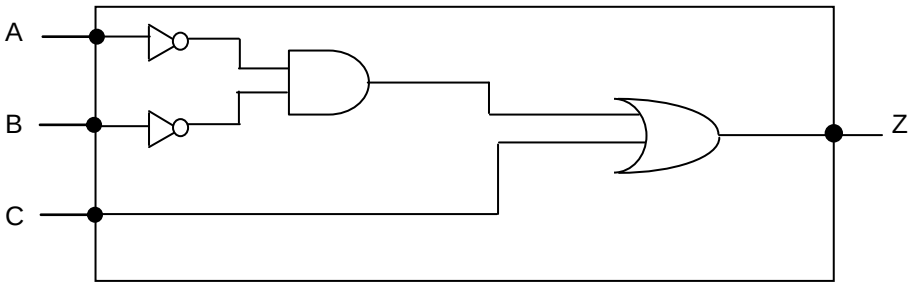
; - means a single mark
// - means alternative response
/ - means an alternative word or sub-phrase
A - means acceptable creditworthy answer
R - means reject answer as not creditworthy
I - means ignore.

<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><th></th><th>General Purpose</th><th>Special Purpose</th><th>Bespoke</th></tr>
<tr><td>Word Processor</td><td>✓</td><td></td><td></td></tr>
<tr><td>Payroll</td><td></td><td>✓</td><td>A ✓</td></tr>
<tr><td>Flight control software</td><td></td><td></td><td>✓</td></tr>
</table>
R Answers with more than one tick on a row.</td><td>3</td><td></td></tr>
<tr><td>1</td><td>b</td><td></td><td>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</td><td>3</td><td></td></tr>
</table>

2			(http means) Hypertext transfer protocol (will be used) // this is the protocol / set of rules (that will be used) **A** "The protocol" as a BOD mark on this occasion but just the word "protocol" as **NE**. **R** format (www means) Resource/web page/web site/URL is part of the world wide web // on a web/virtual server; **NE** world wide web on its own (uk means) Country the site is <u>registered</u> in; **A** organisation / company based in UK **NE** site in the UK, country on its own	**3**	

3	**a**		NAND 1 1 1 0; NOR 1 0 0 0;	**2**	
3	**b**		 1 mark for NOT gates on both A and B; 1 mark for AND with inputs from $\overline{A}$ and $\overline{B}$; **A** inputs from A and B 1 mark for OR gate with inputs from AND gate output and C and output connected to Z;	**3**	

3	**c**		$(\overline{A \cdot B}) + (\overline{A \cdot \overline{B}})$ $(\overline{A} + \overline{B}) + (\overline{A} + B)$; ; 2 marks – 1 each for De Morgans rule for each side of the central OR (award the mark for right hand expression, even if double NOT over B is not cancelled) $\overline{A} + \overline{B} + B$; Recognising NOT A OR NOT A is NOT A, and producing a correct expression $\overline{A} + 1$; Recognising B or NOT B is 1 Final answer 1 ; **Alternative answer** $\overline{(A \cdot B) \cdot (A \cdot \overline{B})}$; Application of De Morgan's to entire expression $\overline{(A \cdot B) \cdot (A \cdot \overline{B})}$; Cancellation of NOTs; 1 mark – De Morgans on entire expression $\overline{A \cdot B \cdot \overline{B}}$; Recognising A and A is A $\overline{A \cdot 0}$; Recognising B ANDed with its complement is 0 $\overline{0}$; Recognising 0 AND anything is 0 Final answer 1 ; **NOTE :** Marks can be awarded for the skills above if seen but MAX 3 (out of 4) for whole question if working has errors in it **A** T, True for 1 and F, False for 0 **A** alternative notations : • For $X \cdot Y$ allow X AND Y, $X \wedge Y$, $X \cap Y$, XY • For X+Y allow X OR Y, $X \vee Y$, $X \cup Y$ • For $\overline{X}$ allow NOT X, $\neg X$ Or by truth table M = marking point M M M M A B A.B $\overline{A.B}$ $\overline{B}$ $\overline{A.\overline{B}}$ $\overline{\overline{A.B}}$ $\overline{A.B}$ + $\overline{A.\overline{B}}$ 1 0 0 0 1 1 0 1 1 0 1 0 1 0 0 1 1 1 0 0 1 1 1 0 1 1 1 1 0 0 0 1 1	**MAX 3 for stages** **1 for final answer** **= 4**	

4	**a**		Second (generation); **A** 2 **R** assembly code / language Note: Adding "assembly" / "assembler" does not talk out a valid mark for second / 2	**1**	
4	**b**		(memory) Address / location / offset; **A** line number **R** instruction number	**1**	
4	**c**		(y) Opcode / operation code; **A** op-code **NE** operation (z) Operand;	**2**	
4	**d**		**Individual Instructions:** One to one / each assembly language instruction translates to one machine code instruction; **Programs:** Figure 2 assembly language equivalent of figure 3 // figure 3 machine code version of figure 2 // figure 3 is assembled version of figure 2; **NE** figure 3 "binary version" of figure 2 **NE** different generations of language	**1**	

5

Concept that data passed up/down between layers; **A** by example – just one needed but must be correct **NE** just describing the layers in the correct order

Application layer selects appropriate protocol for the communication / protocol mentioned by example;
The role of the application layer is to interact with the user via appropriate application software (eg web browser / ftp client) or the users system (eg synchronising files);

Transport layer establishes end to end communication // Transport layer establishes a virtual path;
Transport layer deals with error control (acknowledgements\retransmission) / segmentation / flow control
Communication split into packets by transport layer // re-assembled by receiver;
Packets are numbered by transport layer;
Transport chooses a Port number for client and destination;

Network/IP layer supplies appropriate IP addresses for source and destination (when sending packets);
Network/IP layer involved with packet routing / moving datagrams to the next network node (router);
Combination of IP address and Port = Socket / described;

Link layer receives packets from network layer and adds MAC addresses; **A** hardware address for BOD
Link layer moves packets between 2 internet hosts;
Link layer adds frame header and footer to packets;
Link layer deals with physical connection/cabling;
A Link layer includes network card / drivers;

Network/IP layer strips IP addresses (if receiving packets) // Link layer strips MAC address (if receiving);

Idea of encapsulation described re datagram;

Mark Bands and Description	
6-8	*To achieve a mark in this band, candidates must meet the subject criterion (SUB) and all of the quality of language criteria (QLx).* *SUB* Candidate has provided a clear explanation of principles of operation, including at least 6 of the points listed above and **at least 3** distinct levels of the TCP/IP stack. *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.
3-5	*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 a limited explanation of principles of operation, including at least 3 of the points listed above and **at least two** distinct levels of the

				TCP/IP stack. *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.		
			1-2	*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.* *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 and **at least one** distinct level of the TCP/IP stack. *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 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.**	**8**	

6	**a**		A private/restricted access/closed user group network (used to share information / operations within an organisation) ;	**1**	
6	**b**		<html> <head> <title>Public Lectures 2011</title> </head> <body> <h1 align=center>Lecture Titles</h1> - The Flamsteed Lecture - The Arkwright Lecture - The Denning Lecture All places are Free Tickets MUST be booked in advance </body> </html> "Public Lectures 2011" between the <title> and </title> tags; <h1> and </h1> around "Lecture Titles"; **A** h2 for h1 **A** and where x>=6 align=center in the <h1> tag // style="text-align:center" in the <h1> tag; **A** use of and instead and surrounding the list; - and surrounding each of the three items in the list; and around each sentence at the bottom of the page; **A** use of <u>two</u> tags between the sentences instead **A** for and around "All places are Free"; **A** and and around "MUST"; **A** and **I** minor changes to text **I** just **one** additional or tag in each of the following places: before the heading, after the heading, after the bulleted list.	**MAX 6**	

7	**a**		1 – clock; 2 – (Main) memory / IAS ; **A** RAM **R** ROM 3 – Control bus; 4 – VDU controller / output controller; **A** controller for other named output device 5 – Processor ; **R** Central Processing Unit / CPU	**5**	
7	**b**		Memory address register; **R** abbreviations	**1**	
7	**c**		Memory buffer register / memory data register; **R** abbreviations	**1**	
7	**d**		Address bus has 64 lines / tracks/ wires // there are 2 ^64 memory locations available; **NE** 64 bits wide, moves 64 bits of data	**1**	

8	**a**		40 gigabytes-2 terabytes magnetic hard disk; 4.7- 8.5 gigabytes DVD+R; 512 megabytes – 128 gigabytes flash memory card; 600 – 800 megabytes CD -R; **A** incorrectly copied device names which clearly have the same meaning e.g. "flash memory" for flash "memory card". Only mark first occurrence of each medium.	**4**	
8	**b**		Internet connection may be too slow for (a large) download // takes a long time to download; Download can be interrupted which may cause loss of download; Worried about security of online shopping ; - Note: NOT Viruses Have physical/permanent copy to reinstall from in case of failure; **A** idea that there is a "backup" if computer failure for a BOD mark; Computer not on Internet // to install offline;	**MAX 2**	
8	**c**		Recorded pit size is much smaller; Spiral spacing on DVD is closer/smaller; **A** "groove", "track" Different wavelength of lasers; DVD multi-layered / double sided; **A** Length of track on DVD is longer; **R** More tracks;	**MAX 1**	
8	**d**		Data can only be written serially/ not a random access medium; **A** sequential for serial; Locating/finding/seeking data may take too long to be used as online store; **NE** slow to read/write	**MAX 1**	

9	**a**		The Information Commissioner; **R** Data Protection Commissioner, Data Commissioner	**1**	
9	**b**	**i**	Not covered as not about individuals/people; **A** not personal data NE is not personal information **A** data about a product	**1**	
9	**b**	**ii**	Covered as could be used to identify living individuals; **A** is personal data **NE** is personal information	**1**	
9	**c**	**i**	Data should be accurate/up to date; Data should be kept no longer than necessary (for purpose); **A** responses expressed as "data has not been …."	**MAX 1**	
9	**c**	**ii**	Data should be kept securely; **A** responses expressed as "data has not been …."	**1**	
9	**d**		Regulation of Investigatory Powers (Act) **R** RIPA **NE** Investigatory Powers Act	**1**	

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