



# **2013 Computing**

## **Higher**

### **Finalised Marking Instructions**

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## **Part One: General Marking Principles for COMPUTING HIGHER**

This information is provided to help you understand the general principles you must apply when marking candidate responses to questions in this Paper. These principles must be read in conjunction with the specific Marking Instructions for each question.

- (a)** Marks for each candidate response must always be assigned in line with these general marking principles and the specific Marking Instructions for the relevant question. If a specific candidate response does not seem to be covered by either the principles or detailed Marking Instructions, and you are uncertain how to assess it, you must seek guidance from your Team Leader/Principal Assessor.
- (b)** Marking should always be positive ie, marks should be awarded for what is correct and not deducted for errors or omissions.

### **GENERAL MARKING ADVICE: COMPUTING HIGHER**

The marking schemes are written to assist in determining the “minimal acceptable answer” rather than listing every possible correct and incorrect answer. The following notes are offered to support Markers in making judgements on candidates’ evidence, and apply to marking both end of unit assessments and course assessments.

**Part Two: Marking Instructions for each Question**

**SECTION I**

Question			Expected Answer/s	Max Mark
1			<p>Adv: Unicode allows larger range of characters/character set/more alphabets to be represented. <b>(1)</b></p> <p>Dis: Unicode requires larger memory/backing store size (as it uses 16 bits per char). <b>(1)</b></p>	<b>2KU</b>
2			24 (bits)	<b>1PS</b>
3			<ul style="list-style-type: none"> <li>• (Image is stored as a) grid of pixels/2D Array of pixels</li> <li>• Number of bits represents the range of colours/bit depth</li> <li>• (unique) binary number for each colour</li> <li>• each pixel represented as a binary number/byte/bit</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2KU</b>
4	a		Macro virus	<b>1KU</b>
4	b		<ul style="list-style-type: none"> <li>• Anti-virus software not kept up to date/new virus not detected by anti-virus software.</li> <li>• Anti-virus software may have been switched off/developed a fault.</li> <li>• Virus is camouflaged/dummy lines of code added to virus/lines of virus code appear in different order/polymorphic virus.</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
5			<p>(Make use of) spooling/printer server <b>(1)</b></p> <p>Any one of following for 1 mark:</p> <ul style="list-style-type: none"> <li>• Data can be saved to fast backing storage/HD/etc</li> <li>• sent to the printer as and when it is ready/RAM free to receive it.</li> </ul>	<b>1KU</b> <b>1PS</b>
6			Reset/Interrupt/NMI/Clock/other valid response.	<b>2KU</b>
7			<p>Diagram A: The network cannot operate <b>(1)</b></p> <p>Diagram B: No effect on the network/Nodes communicate via other paths <b>(1)</b></p>	<b>2PS</b>

Question		Expected Answer/s	Max Mark
8		Step 1 – Address bus set up (with location to be written to) (1) Step 3 – write (control) line is activated (1)	2KU
9		<ul style="list-style-type: none"> <li>Identifies the data to be used by/passed into and out of subroutines/subprocesses/procedures/functions.</li> <li>Data flow identifies parameters (order, type, value, reference, IN, OUT, IN/OUT).</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	1KU
10		<p>TrueBasic: LET physicsTerm\$ = firstTerm\$ &amp; secondTerm\$  Visual Basic: physicsTerm = firstTerm &amp; secondTerm  Java: physicsTerm: = firstTerm + secondTerm  LiveCode: PUT firstTerm &amp; secondTerm INTO physicsTerm  (or any other valid syntax)</p> <p><b>(1mark for assignment to physicsTerm, 1 mark for correct concatenation)</b></p>	2PS
11		<ul style="list-style-type: none"> <li>The scope of a global variable is the entire program. (1)</li> <li>The scope of a local variable is one subroutine. (1)</li> </ul>	2KU
12		<ul style="list-style-type: none"> <li>stores list of values</li> <li>each element has the same data type</li> <li>uses a single identifier</li> <li>uses indexing</li> <li>has fixed number of elements.</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	2KU
13		<ul style="list-style-type: none"> <li>Allows new functions to be added to existing software.</li> <li>Enables the automation of complex/repeated operations.</li> <li>Allows customisation of interface/menus/package.</li> <li>Allows access to low level functions.</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	2KU
14		<ul style="list-style-type: none"> <li>ITG has no bias (towards the client group or the software house) during testing.</li> <li>The developers may be reluctant to choose test data which highlights shortfalls in their own work, unlike the ITG.</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	1KU

Question			Expected Answer/s	Max Mark
15			<ul style="list-style-type: none"> <li>The program will work on computer systems other than the one it was designed on/using alternative OS <b>(1)</b></li> <li>with little or no change. <b>(1)</b></li> </ul>	<b>2KU</b>
16			<ul style="list-style-type: none"> <li>The purpose of the subroutine</li> <li>The required list of parameters</li> <li>The order of the parameters</li> <li>Each parameter type</li> <li>Data flow</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
17			<ul style="list-style-type: none"> <li>Perfective <b>(1)</b></li> <li>This is a new requirement from the client/not in the original specification. <b>(1)</b></li> </ul>	<b>2PS</b>

**SECTION II**

<b>Question</b>		<b>Expected Answer/s</b>	<b>Max Mark</b>
<b>18</b>	<b>a</b>	<ul style="list-style-type: none"> <li>• Small physical size</li> <li>• Large (data storage) capacity</li> <li>• Low power requirements</li> <li>• Fast access times</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2PS</b>
<b>18</b>	<b>b</b>	<ul style="list-style-type: none"> <li>• Data format conversion – converting temperature signals eg analogue to digital/ serial to parallel.</li> <li>• Buffering – temporary storage of data in transit between the component and the computer/compensates for differences in speed.</li> <li>• Handling of status signals – to ensure data from sensors are received correctly</li> <li>• Voltage conversion – to change voltage level of sensor to relevant value for computer.</li> <li>• Protocol conversion – to ensure sensor and computer adhere to the same protocols.</li> </ul> <p><b>(1 mark for naming, 1 mark for description for 2 of the above)</b></p>	<b>2KU 2PS</b>
<b>18</b>	<b>c</b>	<p>1 picture = <math>4 * 6 * 1024 * 1024</math> <b>(1)</b> * 24 <b>(1)</b> bits</p> <p>603979776 bits = 72 Megabytes            12 Gigabytes = <math>1024 * 12</math> Megabytes  <b>(1 for unification of units)</b></p> <p>Max no. pictures = <math>(1024 * 12)/72 = 170</math> pictures  <b>(1 for rounding down)</b></p>	
<b>18</b>	<b>d</b>	<ul style="list-style-type: none"> <li>• Input/Output (management) – coordinate transfer of blocks of data/check if devices ready for data transfer/detect transmission errors/buffer data transit.</li> <li>• File management – update FAT/locate location of data blocks for storing (updating) file/protect existing files from being overwritten.</li> <li>• Memory management – to hold the address/location of the uploaded data whilst it is in main memory/protect existing data from being overwritten.</li> <li>• Resource allocation – ensure processor time and memory are allocated to the process.</li> <li>• Interpreting user instructions – receive user commands to backup data.</li> <li>• Error reporting – report any problems encountered during the process.</li> </ul> <p><b>(1 KU each function name, 1 PS each description)</b></p>	<b>2KU 2PS</b>

Question		Expected Answer/s	Max Mark
18	e	Copyright, Designs & Patents Act	1PS
19	a	Data bus width is incorrect (1) Any one of following (1)... <ul style="list-style-type: none"> <li>• 8 bit small for modern computer (likely 64–128 bit)</li> <li>• 8 bit gives 35 bit address bus</li> <li>• 8 bytes, not bits</li> <li>• Other valid response</li> </ul>	2PS
19	b	$2^{AB} * 8 = 34359738368$ (1) so $2^{AB} = 4294967296 = 2^{32}$ , (1) Address bus width = 32bits (1) <b>OR</b> $2^{AB} * 8 = 32$ Gigabytes (1) $2^{AB} = 32 * 2^{30}/8 = 4 * 2^{30} = 2^{32}$ (1) Address bus width = 32 bits (1) <b>OR</b> $2^{AB} = 32$ Gb/64bits (1) $2^{AB} = 4294967296$ (1) Address bus width = 32 bits (1)	3PS
19	c	<ul style="list-style-type: none"> <li>• Cache has faster access time than main memory (1) /shortens fetch time. (1)</li> <li>• Holds frequently used instructions (1) /short fetch time. (1)</li> <li>• Wider internal bus (1) therefore faster transfer. (1)</li> <li>• Cache is on the processor (1) /shorter fetch time (faster transfer). (1)</li> </ul> <p style="text-align: right;"><b>2 marks for any one valid bullet</b></p>	2KU
19	d	<ul style="list-style-type: none"> <li>• Application based tests measure performance in real-life tasks</li> <li>• Take account of the whole system</li> <li>• Are more independent of architecture</li> <li>• and therefore give a more realistic view of performance.</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	2PS
19	e	<ul style="list-style-type: none"> <li>• Security of data/access (1) harder to control without a centralised server (1)</li> <li>• Centralised storage of data needed (1) to allow users access from varying machines (1)</li> <li>• Cannot perform centralised backup easily (1) since data is stored on different systems (1)</li> <li>• Large number of peers (1) would lead to problems with backup/hard to locate distributed files (1)</li> <li>• Different levels of access required (1) harder to set up in peer-to-peer (through shared folders) (1)</li> </ul> <p style="text-align: right;"><b>2 marks for any one valid bullet</b></p>	2PS

Question			Expected Answer/s	Max Mark
19	f		<ul style="list-style-type: none"> <li>Data sent to a single node with switch <b>(1)</b> hub broadcasts to all nodes <b>(1)</b></li> <li>Each connected node on a switch receives full bandwidth <b>(1)</b> nodes on a hub share the bandwidth <b>(1)</b></li> <li>Hub broadcasts increasing traffic <b>(1)</b> point-to-point switch leading to reduced chance of collisions <b>(1)</b></li> </ul> <p><b>1 for reference to switch, 1 for reference to hub</b></p>	2KU
19	g		<ul style="list-style-type: none"> <li>disk editor</li> <li>disk cleanup</li> <li>disk defragmenter</li> <li>compression software</li> <li>firewall</li> <li>any other valid response</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	2KU
20	a		<ul style="list-style-type: none"> <li>Observe/shadow a pupil/teacher as they go from class to class and take notes on their activities.</li> <li>Look at any current materials/course documents used by class teachers.</li> <li>Interview staff and/or pupils.</li> <li>Use questionnaires.</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	2KU
20	b		<ul style="list-style-type: none"> <li>To act as part of a legally binding contract between the client and the developers.</li> <li>To act as the main guide to the remaining stages of the software development process.</li> <li>To <u>identify exactly/detail/specify precisely</u> what new maths software will do.</li> <li>Identify scope and boundaries of problem.</li> <li>Validate final program against software specification.</li> <li>Any other valid response.</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	2KU
20	c		Flow chart, structure diagram/chart, semantic net, etc	<p style="text-align: right;"><b>Any 1</b></p> <p>1KU</p>



Question		Expected Answer/s	Max Mark		
20	d	Top down breaks down problem into simpler steps <b>(1)</b> Stepwise refinement continues this process until coding becomes trivial. <b>(1)</b>	<b>2KU</b>		
20	e	<ul style="list-style-type: none"> <li>• The nature of the problem to be solved</li> <li>• Type of language (event-driven, etc)</li> <li>• Type of user interface</li> <li>• Type of hardware/OS</li> <li>• The current skills of the programming team</li> <li>• Features of the language (data types/functions/etc)</li> <li>• Portability of language</li> <li>• Any other valid</li> </ul> <p style="text-align: right;"><b>1 mark for one acceptable response</b></p>	<b>1PS</b>		
20	f	<p>Brief description of test/document/process that evidences:</p> <ul style="list-style-type: none"> <li>• Speed of execution/use of the processor</li> <li>• Amount of RAM/memory used</li> <li>• Use of cache memory/registers/disk accesses</li> <li>• Benchmarking tests</li> <li>• Efficient use of loops/data structures/parameters/etc or examples of these</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2PS</b>		
21	a	<table border="0" style="width: 100%;"> <tr> <td style="width: 40%; vertical-align: top;"> CASE price   when &lt;= 500 then      discountRate = 10  when &lt; 1000 then      discountRate = 12  when &gt;= 1000 then      discountRate = 15  End CASE </td> <td style="width: 60%; vertical-align: top; border-left: 1px solid black; padding-left: 10px;"> 1 mark for correct start with variable name price and end of CASE or equivalent.   1 mark for <b>three</b> correct conditions (accept (&gt;500 AND))   1 mark for <b>three</b> correct assignments </td> </tr> </table>	CASE price  when <= 500 then discountRate = 10 when < 1000 then discountRate = 12 when >= 1000 then discountRate = 15 End CASE	1 mark for correct start with variable name price and end of CASE or equivalent.  1 mark for <b>three</b> correct conditions (accept (>500 AND))  1 mark for <b>three</b> correct assignments	<b>3PS</b>
CASE price  when <= 500 then discountRate = 10 when < 1000 then discountRate = 12 when >= 1000 then discountRate = 15 End CASE	1 mark for correct start with variable name price and end of CASE or equivalent.  1 mark for <b>three</b> correct conditions (accept (>500 AND))  1 mark for <b>three</b> correct assignments				

Question		Expected Answer/s	Max Mark
21	b	An array <b>(1)</b> of Booleans/strings <b>(1)</b> .	<b>2PS</b>
21	c	<ul style="list-style-type: none"> <li>• Uses a stored set/list of facts and rules (about music and mood)</li> <li>• Pattern matching used to apply these rules to user's mood</li> <li>• Queries can be used (to interrogate the knowledge base)</li> <li>• Justification facility might explain music choice</li> <li>• Lists can be processed</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2PS</b>
21	d	<ul style="list-style-type: none"> <li>• The order that program code is executed is dependent on which check boxes the user selects</li> <li>• Code is attached to on-screen objects (such as buttons) which are selected by the user</li> <li>• Code blocks are activated by user actions (such as clicking on buttons)</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1KU</b>
21	e	<ul style="list-style-type: none"> <li>• If maintenance is required, code would need to be re-entered from listing or the machine code edited.</li> <li>• No test record for the program will make maintenance more difficult.</li> <li>• No user guide may cause problems for novice users.</li> <li>• No technical guide may cause installation problems.</li> <li>• Many other valid answers are possible.</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2PS</b>

Question			Expected Answer/s	Max Mark	
22	a	i	<p>Fastest = HorseTimes(1)</p> <p>Loop from 2 to 5</p> <p>If HorseTimes (current) &lt; Fastest then Set Fastest = HorseTimes (current) End of if statement Return to start of loop</p>	<p><b>1 mark for correct initialisation (accept assignment of large value)</b></p> <p><b>1 mark for correct loop structure (accept 1 to 5/loop terminator)</b></p> <p><b>1 mark for correct conditional structure</b></p> <p><b>1 mark for correct assignment</b></p>	<b>4PS</b>
22	a	ii	<ul style="list-style-type: none"> <li>• Change the &lt; sign to &gt; (can also accept &gt; =).</li> <li>• Change the initialisation value if appropriate eg slowest = 0.</li> </ul>		<b>1PS</b>
22	a	iii	Counting occurrences.		<b>1PS</b>
22	b		<ul style="list-style-type: none"> <li>• A compiler will translate the contents of a loop only once.</li> <li>• An interpreter will translate the contents of a loop every time it repeats.</li> <li>• A compiler does not use processor time retranslating.</li> </ul>	<b>Any 2</b>	<b>2PS</b>
22	c	i	<ul style="list-style-type: none"> <li>• Systematic testing will test each subroutine, subsystem and then the whole system independently</li> <li>• Testing will take place in a logical/ordered/planned way <b>OR</b> following an agreed plan</li> <li>• Other valid</li> </ul>	<b>Any 1</b>	<b>1KU</b>
22	c	ii	<ul style="list-style-type: none"> <li>• Comprehensive testing will use normal, extreme and exceptional test cases</li> <li>• Test the full range of inputs/across all combinations</li> </ul>	<b>Any 1</b>	<b>1KU</b>

**SECTION III**

**Part A –Artificial intelligence**

Question			Expected Answer/s	Max Mark
23	a		<ul style="list-style-type: none"> <li>• Cannot go on forever – rules do not allow it</li> <li>• Clearly defined rules/moves</li> <li>• Clearly define start and end conditions</li> <li>• No element of chance</li> <li>• Closed world</li> <li>• Limited/restricted domain</li> <li>• You have complete information – no aspects of the game are hidden unlike many other games</li> <li>• It can be expanded using search trees because all possible moves can be evaluated</li> <li>• Any other reasonable response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
23	b	i	The ability of a <u>machine</u> to do things thought to require intelligence when done by people.	<b>1KU</b>
23	b	ii	<ul style="list-style-type: none"> <li>• Chess computer is problem solving – an aspect of intelligence</li> <li>• Chess computer can beat people that have intelligence so must be intelligent</li> <li>• Chess computer would know if board is set up wrongly</li> <li>• Demonstrate other aspects of intelligence – learn/cognitive ability/recall</li> <li>• Any other suitable response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
23	b	iii	<ul style="list-style-type: none"> <li>• Chess computer has no actual understanding of the game or the situation</li> <li>• Chess computer is an example of a machine displaying the programmer's intelligence</li> <li>• Chess computer cannot learn</li> <li>• Limited aspects of intelligence are involved</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
23	c		After a few moves the number of nodes will grow massively <b>(1)</b> /few moves ahead will have a huge number of nodes when/evaluating a small number of nodes ahead eg 6 moves = $20^6=64\ 000\ 000$ .	<b>1PS</b>

Question			Expected Answer/s	Max Mark
23	d	i	Heuristic	1KU
23	d	ii	<ul style="list-style-type: none"> <li>Reduces search time <b>(1)</b> by not evaluating/examining/expanding poor moves (and their evaluation functions)/by expanding better moves <b>(1)</b></li> <li>Reduces search space <b>(1)</b> by not evaluating/examining/expanding poor moves (and their evaluation functions)/by expanding better moves <b>(1)</b></li> </ul>	2PS

Question			Expected Answer/s	Max Mark
24	a	i	Semantic net	1KU
24	a	ii	<ul style="list-style-type: none"> <li>Each line represents a fact.</li> <li>Each line informs/decides the predicate.</li> <li>The nodes inform/decide the arguments of a Prolog fact.</li> <li>The arrow direction decides the order of the arguments.</li> </ul> <p style="text-align: right;"><b>1 mark for any valid response</b></p>	1PS
24	b	i	<ul style="list-style-type: none"> <li>have(spiders, eight_legs)</li> <li>have(spiders, silk)</li> <li>are(black_widow, spiders)</li> <li>any other suitable response</li> </ul> <p><b>1 mark for correct predicate, 1 mark for arguments in the correct order</b></p>	2PS
24	b	ii	<p>have(X,Y):- are(X,Z) , have(Z,Y)  Accept :  have(X,eight_legs):- are(X,spider) , have(spider, eight_legs)  OR  have(X,eight_legs):- are(X,Z) , have(Z, eight_legs)</p> <p><b>1 mark correct form of head of rule, 1 mark <u>are</u> and <u>have</u>, 1 mark correct use of variables (as capital letters).</b></p>	3PS
24	b	iii	<ul style="list-style-type: none"> <li>Reduces the need for stating multiple/numerous/additional facts.</li> <li>Allows all members of a group to have the same attributes without having to write each out.</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	1PS
25	a		(8, 8, 8)	1PS

Question			Expected Answer/s	Max Mark
25	b	i	(8,10,6) and (11,7,6)  <b>1 mark each</b>	<b>2PS</b>
25	b	ii	<ul style="list-style-type: none"> <li>• (2,19,3) AND THEN ONE OF (4,17,3) or (2,16,6) or (4,19,1)</li> <li>• (1,17,6) AND THEN ONE OF (1,11,12) or (2,16,6) or (2,17,5)</li> <li>• (2,20,2) AND THEN ONE OF (4,18,2) or (2,18,4)</li> </ul> <b>1 mark for first node, 1 mark for <u>corresponding</u> second node.</b> <b>Award 1 mark for a correct second node from an incorrect first node.</b>	<b>2PS</b>
25	b	iii	<ul style="list-style-type: none"> <li>• Breadth-first will find optimal solution to the puzzle (shortest solution will be found first).</li> <li>• Depth-first may expand a large number of nodes down the left side without finding a solution.</li> <li>• Avoids being stuck in an infinite loop by repeating asset of nodes.</li> </ul> <b>1 mark for any valid response</b>	<b>1KU</b>
25	c		Moves can be evaluated independently <b>(1)</b> by multiple processors at the same time. <b>(1)</b>	<b>2PS</b>
26	a		A=blaven B=928 Must have A= , B=	<b>2PS</b>
26	b		Matches at 5, <u>sub-goal munro(A, ,P)</u> Matches at 1, A instantiates benmacdhui, P to 1309, <u>new sub_goal munro(B, , R)</u> Matches at 1, B instantiates benmacdhui, R to 1309, <u>new sub_goal 1309&gt;1309 fails</u> <u>Backtracks to line 1/line 2</u> , match at 2, instantiates B=cairntoul, R to 1291, <u>new sub_goal 1309&gt;1291 succeeds</u> <u>Outputs A=benmacdhui B=cairntoul</u>	<b>6PS</b>
26	c		<ul style="list-style-type: none"> <li>• variable temporarily adopts a value (which is true)</li> <li>• variable adopts a current value</li> <li>• instance of a variable (which is currently true)</li> </ul>	<b>1KU</b>

Question			Expected Answer/s	Max Mark
27	a	i	Knowledge base	1KU
27	a	ii	<ul style="list-style-type: none"> <li>Why a question is being asked.</li> <li>How a conclusion is reached.</li> </ul>	2KU
27	a	iii	<ul style="list-style-type: none"> <li>User confidence in advice</li> <li>Testing the expert system</li> <li>Any other suitable response</li> </ul> <p style="text-align: right;"><b>1 mark for any one suitable response</b></p>	1PS
27	b	i	Subject area is restricted to a small area of knowledge eg respiratory compared to medicine.	1KU
27	b	ii	<ul style="list-style-type: none"> <li>Restricted number of facts/rules</li> <li>Faster development time</li> <li>Processing/memory requirements are reduced.</li> </ul> <p style="text-align: right;"><b>1 mark for any one suitable response</b></p>	1PS
27	b	iii	<ul style="list-style-type: none"> <li>Lack of common sense</li> <li>Level of expertise required to set up/maintain</li> <li>Inability to learn/acquire new knowledge</li> <li>Inflexibility</li> <li>Lack of empathy/human can empathise.</li> </ul>	1KU
27	c	i	Corrective	1PS
27	c	ii	<ul style="list-style-type: none"> <li>Language/terminology of the domain will be difficult <b>(1)</b> causing difficulty when altering rules. <b>(1)</b></li> <li>Expert would have difficulty with the formulation/expression of their own knowledge <b>(1)</b> causing difficulty when formulating rules. <b>(1)</b></li> <li>Difficulty when testing <b>(1)</b> by having to check output with a human expert. <b>(1)</b></li> <li>Both domain expert and knowledge engineer expertise are required when performing maintenance. <b>(1)</b></li> <li>Any other suitable response</li> </ul> <p><b>Award one mark each from either half of any explanation.</b></p>	2PS



Question			Expected Answer/s	Max Mark
28	a	i	<ul style="list-style-type: none"> <li>• Sound split into phonemes/blocks</li> <li>• Phonemes/blocks pattern matched against stored sounds/patterns</li> <li>• Words are identified from the phoneme/blocks</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2KU</b>
28	a	ii	<ul style="list-style-type: none"> <li>• The phonemes/sounds are the same/very similar for mature-much your (or similar example)</li> <li>• Accept speaker's accents</li> </ul> <p style="text-align: right;"><b>1 mark for any valid response</b></p>	<b>1PS</b>
28	b		<p>There is ambiguity in the sentence <b>(1)</b> such as</p> <ul style="list-style-type: none"> <li>• Charges as a noun has different meanings</li> <li>• Charges can be a noun and a verb</li> <li>• Dropped as a verb has more than one meaning</li> <li>• Submarine attack or attacked.</li> </ul> <p style="text-align: right;"><b>Any 1 of bullets for 2<sup>nd</sup> mark</b></p>	<b>2PS</b>
28	c		Speech synthesis	<b>1KU</b>
28	d		<ul style="list-style-type: none"> <li>• NL searching,</li> <li>• NL database interfaces,</li> <li>• speech driven software</li> <li>• chatterbots</li> </ul>	<b>1PS</b>

**SECTION III**

**PART B - Computer Networking**

Question			Expected Answer/s	Max Mark
29	a		<ul style="list-style-type: none"> <li>• Allocate different levels of user right/Ensure file &amp; folder permissions are set correctly/Allow access only to appropriate areas</li> <li>• Encrypt all data/Ensure that data is not intercepted during transmission</li> <li>• Use of a Firewall</li> <li>• Use a secure protocol such as HTTPS</li> <li>• Use Packet Switching to transfer data</li> <li>• Use a “call back” facility</li> <li>• Any other valid response.</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2PS</b>
29	b	i	<ul style="list-style-type: none"> <li>• There is a direct connection/dedicated channel between two devices</li> <li>• Established for the duration of transmission</li> <li>• All data follows the same physical path</li> </ul> <p style="text-align: right;"><b>1 mark for any valid response, max of 2 marks</b></p>	<b>2KU</b>
29	b	ii	<ul style="list-style-type: none"> <li>• Packet switching usually faster than circuit <b>(1)</b> as it allows network hardware to decide on most efficient/fastest route <b>(1)</b></li> <li>• Communication channels can be shared <b>(1)</b> since packets from different users can be mixed along a transmission line <b>(1)</b></li> <li>• Security may be improved <b>(1)</b> because if line is “hacked” only individual packets will be intercepted rather than whole message/file <b>(1)</b></li> </ul> <p style="text-align: right;"><b>2 marks for a valid example with explanation</b></p>	<b>2PS</b>
29	b	iii	<ul style="list-style-type: none"> <li>• Check for simultaneous transmission/line is free</li> <li>• Check to see if a collision is detected</li> <li>• Make nodes wait a random amount of time</li> <li>• Re-transmits after a collision</li> <li>• Allows many users to access network at the same time</li> </ul> <p style="text-align: right;"><b>1 mark for any valid response, max of 2 marks</b></p>	<b>2KU</b>

Question			Expected Answer/s	Max Mark
29	c	i	<ul style="list-style-type: none"> <li>• TCP splits the file into packets</li> <li>• TCP adds a header</li> <li>• TCP reassembles the packets when they arrive at their destination address</li> </ul> <p style="text-align: right;"><b>1 mark for any valid response, max of 3 marks</b></p>	<b>3KU</b>
29	c	ii	<ul style="list-style-type: none"> <li>• IP adds its own address header to each packet.</li> <li>• IP routes the packets around the network.</li> </ul> <p style="text-align: right;"><b>1 mark for any valid response, max of 2 marks</b></p>	<b>2KU</b>
29	c	iii	<ul style="list-style-type: none"> <li>• http</li> <li>• FTP</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
29	d		<ul style="list-style-type: none"> <li>• The <u>firewall prevented</u> access to the network</li> <li>• Examples of firewall, eg: IP address blocking, Blocking of ports</li> <li>• Wrong access rights allocated/set</li> <li>• Incorrect recording/entry/typing of username/password</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
29	e		<ul style="list-style-type: none"> <li>• No closing card tag</li> <li>• &lt;/card&gt; missing</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>

Question			Expected Answer/s	Max Mark
30	a	i	Spider or Crawler Based Search Engine	1KU
30	a	ii	Meta-Search Engine	1KU
30	b		<ul style="list-style-type: none"> <li>• Accesses a database of valid domain names/URLs</li> <li>• Translates the I-Play domain name/URL into its IP address</li> <li>• Returns correct IP address of the I-Play website to the machine requesting the website</li> </ul> <p style="text-align: right;"><b>1 mark for any valid response, max of 2 marks</b></p>	2PS
30	c		<ul style="list-style-type: none"> <li>• Games are immediately available to the customer</li> <li>• Less manufacturing costs</li> <li>• No postage costs</li> <li>• Don't get lost in post</li> <li>• Patches/upgrades are available instantly</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	1PS
30	d		<p>Rate = Size/time</p> <ul style="list-style-type: none"> <li>• Size = 200 x 8 = 1600 Megabits</li> <li>• Rate = 1600/(3 * 60) = 8.9 Mbps</li> </ul> <p style="text-align: right;"><b>1 mark for each bullet point</b></p>	2PS
30	e		<ul style="list-style-type: none"> <li>• Players might be intimidated with face-to-face contact with people <b>(1)</b> but find the anonymity of a website "safe" <b>(1)</b></li> <li>• Collaboration with other players may be a prerequisite for making progress in a game <b>(1)</b> hence players are encouraged to interact with other people <b>(1)</b></li> <li>• Social interaction is required for playing multiplayer games <b>(1)</b> and encourages friendships with other players <b>(1)</b></li> <li>• Increased accessibility to other players online <b>(1)</b> by encouraging communication as part of the game <b>(1)</b></li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>2 marks for a valid example with explanation</b></p>	2PS
30	f		<ul style="list-style-type: none"> <li>• Use Anti-Virus Software – used to help to protect a network against virus threats.</li> <li>• Firewall – analyse data coming into network to prevent denial of service attack.</li> <li>• Use of fault tolerance components – duplicating hardware components so that if a piece of hardware fails, you will have another sitting waiting to take its place.</li> <li>• Use of uninterrupted power supplies – supplies enough electricity to a server to keep it going during a power cut.</li> <li>• Regular maintenance – Using good quality components and having regular maintenance checks can help to avoid failure of hardware components.</li> </ul> <p style="text-align: right;"><b>2 marks for each valid example with explanation</b></p>	2KU 2PS

Question			Expected Answer/s	Max Mark
30	g	i	<ul style="list-style-type: none"> <li>• Data could be intercepted (while being transmitted and copied)</li> <li>• Monitoring of data transmission</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
30	g	ii	<ul style="list-style-type: none"> <li>• Changing/deleting data on the network</li> <li>• Deliberately bringing down the network/Denial Of Service Attack</li> <li>• Modification of the data stream/Creation of a false stream/generates false information</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
30	g	iii	<ul style="list-style-type: none"> <li>• A passive attack does not involve any alteration/changing of the data</li> <li>• No changes would be monitored by the software</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
30	h		<ul style="list-style-type: none"> <li>• Devices are too far apart</li> <li>• Interference from other devices/atmospheric interference</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>
30	i		<ul style="list-style-type: none"> <li>• ADSL will provide faster access to the website/have higher bandwidth than ISDN</li> <li>• More multimedia content can be transmitted</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2PS</b>

Question			Expected Answer/s	Max Mark
31	a	i	Presentation	1PS
31	a	ii	Network	1PS
31	b		Class B <b>(1)</b> As this allows 65,534 devices to be networked/has sufficient addresses <b>(1)</b> <b>1 mark for correct class and 1 mark for explanation</b>	2PS
31	c	i	<ul style="list-style-type: none"> <li>Bandwidth consumption <b>(1)</b>. This degrades the network performance by sending a large number of data packets in a short period of time <b>(1)</b></li> <li>Resource starvation <b>(1)</b>. An attack which is intended to use resources that would bring the network down <b>(1)</b></li> <li>Programming flaws <b>(1)</b>. This takes advantage of bugs in networking software <b>(1)</b></li> <li>Attacking the routers <b>(1)</b>. This involves “hi-jacking” data packets and routing them to the target server, which then gets flooded with data packets, or re-directing them to false addresses <b>(1)</b></li> <li>Domain Name Server attacks <b>(1)</b>. This involves sending a large number of DNS queries with a spoofed IP address of the target server <b>(1)</b></li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	2KU
31	c	ii	<ul style="list-style-type: none"> <li>System resources are taken up by the attempted attack <b>(1)</b> which prevents normal use of the network <b>(1)</b></li> <li>The former employee would know where weaknesses are in the network <b>(1)</b> and therefore have the knowledge to be able to bypass security <b>(1)</b></li> <li>Correctly formed packets are not picked up by the firewall or anti-virus <b>(1)</b> and these packets are then “flooded” onto the network <b>(1)</b></li> </ul>	2PS
31	d		<p>Allows them to...</p> <ul style="list-style-type: none"> <li>monitor e-mails</li> <li>monitor telephone calls</li> <li>check Internet history</li> <li>access decryption keys/encrypted data</li> <li>undertake undercover surveillance</li> <li>Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	2KU

Question		Expected Answer/s	Max Mark
31	e	<ul style="list-style-type: none"> <li>• <code>&lt;center&gt; &lt;b&gt; Tax Calculator &lt;/b&gt;&lt;/center&gt;</code></li> <li>• <code>&lt;div align=center&gt; &lt;b&gt; Tax Calculator &lt;/b&gt;&lt;/div&gt;</code></li> <li>• <code>&lt;p align="center"&gt; &lt;b&gt;Tax Calculator &lt;/b&gt;&lt;/p&gt;</code></li> </ul> <p><b>1 mark for correct open/close of &lt;b&gt; tag (accept &lt;strong&gt; as valid alternative)</b></p> <p><b>1 mark for correct open/close of &lt;center&gt; OR &lt;div align =center&gt; OR &lt;p align ="center"&gt; tag</b></p> <p><b>1 mark for correct nesting of tags <u>and</u> no additional incorrect tags such as &lt;head&gt; or &lt;title&gt; ie &lt;center&gt;&lt;b&gt;&lt;/b&gt;&lt;/center&gt;</b></p>	3PS
31	f	<ul style="list-style-type: none"> <li>• Small file size <b>(1)</b> due to JPEG files being compressed <b>(1)</b></li> <li>• Fast download times <b>(1)</b> due to small file size/JPEG files being compressed <b>(1)</b></li> <li>• JPEG supports millions of colours/has large bit depth/24 bit <b>(1)</b> to allow a more realistic/better quality image <b>(1)</b></li> <li>• Standard file format <b>(1)</b> allowing the image to be opened by many programs <b>(1)</b></li> </ul> <p><b>2 marks for any valid response, max of 2 marks</b></p>	2PS

**SECTION III**

**Part C – Multimedia Technology**

Question			Expected Answer/s	Max Mark
32	a	i	Storyboard	1KU
32	a	ii	<ul style="list-style-type: none"> <li>• Details each of the multimedia objects (and their attributes)</li> <li>• Details navigation structure</li> <li>• Details user interface</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	1KU
32	b		<ul style="list-style-type: none"> <li>• Do not need different viewers/players</li> <li>• Do not have to learn authoring code (HTML etc) to create slides</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	1PS
32	c		<ul style="list-style-type: none"> <li>• To allow hardware decoding of files</li> <li>• To add effects</li> <li>• Synchronise channels for sound</li> <li>• Allow compress/decompress</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any two</b></p>	2KU
32	d	i	The note would play for longer	1PS
32	d	ii	The sound would play at a faster speed	1PS
32	e		Normalisation	1PS
32	f		<ul style="list-style-type: none"> <li>• Embed files <b>(1)</b> – all graphics etc are included in the presentation file <b>(1)</b></li> <li>• Container file <b>(1)</b> – allows different component files to be stored as a single file <b>(1)</b></li> </ul> <p><b>1 mark for name of a method and 1 mark for the description</b></p>	2PS



Question			Expected Answer/s	Max Mark
33	a		<ul style="list-style-type: none"> <li>• SVG is a vector graphic file format</li> <li>• allows logo to be resized with no loss of quality</li> <li>• as it is resolution independent</li> <li>• logo includes few objects so file size likely to be small</li> </ul> <p style="text-align: right;"><b>1 mark for each of any two bullets</b></p>	<b>2PS</b>
33	b		<p>Image B (1) GIF supports transparency/opacity (JPEG does not) (1)</p>	<b>2PS</b>
33	c		<ul style="list-style-type: none"> <li>• image starts to appear in stages</li> <li>• Low resolution appears first</li> <li>• subsequently refined to display complete/full image</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2PS</b>
33	d	i	<ul style="list-style-type: none"> <li>• Combination of pixels of different colours</li> <li>• Dithering is used to give the illusion of colours/shades in an image</li> <li>• not in the palette</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2KU</b>
33	d	ii	GIF only supports 256 colours/is 8 bit	<b>1PS</b>
33	e	i	<ul style="list-style-type: none"> <li>• To define the available colours for the file</li> <li>• To attempt/allow the consistent display of colours</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1KU</b>
33	e	ii	<ul style="list-style-type: none"> <li>• Allows customisations of colour set</li> <li>• change to CLUT/palette affects entire graphic at once (rather than editing individual pixels)</li> <li>• Restricts the bit depth to restrict the file size</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	<b>1PS</b>

Question			Expected Answer/s	Max Mark
33	f	i	<ul style="list-style-type: none"> <li>Repeated pixels of the same colour</li> <li>are stored using colour code of 1 pixel followed by the number of repeats</li> </ul> <p style="text-align: right;"><b>1 mark for each point</b></p>	<b>2KU</b>
33	f	ii	<ul style="list-style-type: none"> <li>Patterns/sequences of pixels are stored in a dictionary/table</li> <li>Pointers are used to reference the dictionary/table</li> <li>Shorter code replaces larger patterns of pixels</li> </ul> <p style="text-align: right;"><b>Any 2</b></p>	<b>2KU</b>
33	g	i	The numbers indicate the mix of colours (red, green and blue) (needed to represent a colour)	<b>1PS</b>
33	g	ii	The colour would become more blue	<b>1PS</b>
33	g	iii	$2^{24}$ or $2^8 \times 2^8 \times 2^8$ or $256 \times 256 \times 256$ or $16777216$	<b>1PS</b>

Question		Expected Answer/s	Max Mark
34	a	File size=60 Mb = 60x8x1024x1024 bits=503316480 bits <b>(1)</b> Sample size=(Sampling freqxSampling depthxChannels) <b>(1)</b> Time = File size/sample size = 503316480/(88200 x 24 x 2) = 503316480/4233600 = 118.88... s = 119 s <b>(1)</b>	<b>3PS</b>
34	b	<ul style="list-style-type: none"> <li>• Don't have to connect to a computer to transfer data</li> <li>• Infinite memory available(use of large/multiple cards)</li> <li>• Can change card when full</li> </ul>	<b>1PS</b>  <b>Any 1</b>
34	c	<ul style="list-style-type: none"> <li>• Natural sound is analogue <b>(1)</b></li> <li>• needs converted to digital before processing <b>(1)</b></li> <li>• by digital computer <b>(1)</b></li> </ul>	<b>2PS</b>  <b>Any two of three</b>
34	d	WAV has more natural/better quality sound <b>(1)</b> <ul style="list-style-type: none"> <li>• MP3 uses lossy compression</li> <li>• WAV uses lossless compression</li> </ul> <b>(1 for any one bullet)</b>	<b>2PS</b>
34	e	<ul style="list-style-type: none"> <li>• Recordings are 2 track/channel</li> <li>• System detects stereo <b>(1)</b> (so only uses 2 channels)</li> <li>• Speakers are poorly positioned so losing their effect</li> </ul> <b>1 mark each for any two bullets</b>	<b>2PS</b>

Question			Expected Answer/s	Max Mark
34	f	i	<ul style="list-style-type: none"> <li>No cable/it is wireless/both phones have WiFi</li> <li>Fast transfer rate</li> <li>Large range</li> </ul> <p style="text-align: right;"><b>1 mark for each</b></p>	<b>2KU</b>
34	f	ii	<p>Bluetooth <b>(1)</b></p> <ul style="list-style-type: none"> <li>connection is <u>direct</u> between devices</li> <li>short range required</li> <li>both will have Bluetooth (if they have WiFi)</li> <li>other valid response with justification</li> </ul> <p style="text-align: right;"><b>1 mark for one valid bullet</b></p>	<b>2PS</b>
34	g		<p>No. of frames = <math>60 \times 15 = 900</math> <b>(1)</b>  File size = No. of frames x No of pixels x bit depth  = <math>900 \times 640 \times 360 \times 2</math> bytes <b>(1)</b>  = 414720000 bytes = 405000 Kb = 395.5078125Mb  = 396 Mb <b>(1)</b></p>	<b>3PS</b>

Question		Expected Answer/s	Max Mark
35	a	<ul style="list-style-type: none"> <li>• A simple image containing few objects/shapes</li> <li>• Use a simple logo</li> <li>• Accept valid example</li> </ul>	1PS
35	b	Has to be converted to a bit map (before rendering)	1PS
35	c	<ul style="list-style-type: none"> <li>• A 2D bitmap image mapped onto surface of 3D object (to give the impression of roughness/smoothness)</li> <li>• The application of a type of surface to a 3D image.</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	1KU
35	d	<ul style="list-style-type: none"> <li>• Depth/z coordinate</li> <li>• Shadow</li> <li>• Angle of rotation</li> <li>• Any other valid response</li> </ul> <p style="text-align: right;"><b>Any 1</b></p>	1KU
35	e	<ul style="list-style-type: none"> <li>• VRML</li> <li>• WRL</li> <li>• X3D</li> </ul> <p style="text-align: right;"><b>1 mark for any one of these (note there are others)</b></p>	1KU

[END OF MARKING INSTRUCTIONS]