GCE

Computer Science

H446/01: Computer systems

A Level

Mark Scheme for June 2025

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This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which marks were awarded by examiners. It does not indicate the details of the discussions which took place at an examiners' meeting before marking commenced.

All examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the report on the examination.

MARKING INSTRUCTIONS

PREPARATION FOR MARKING
RM ASSESSOR

1. Make sure that you have accessed and completed the relevant training packages for on-screen marking: *RM Assessor Online Training: OCR Essential Guide to Marking*.

2. Make sure that you have read and understood the mark scheme and the question paper for this unit. These are available in RM Assessor

3. Log-in to RM Assessor and mark the **required number** of practice responses ("scripts") and the **required number** of standardisation responses.

MARKING

1. Mark strictly to the mark scheme.

2. Marks awarded must relate directly to the marking criteria.

3. The schedule of dates is very important. It is essential that you meet the RM Assessor 50% and 100% deadlines. If you experience problems, you must contact your Team Leader (Supervisor) without delay.

4. If you are in any doubt about applying the mark scheme, consult your Team Leader by telephone or the RM Assessor messaging system, or by email.

5. **Crossed Out Responses**
   Where a candidate has crossed out a response and provided a clear alternative then the crossed out response is not marked. Where no alternative response has been provided, examiners may give candidates the benefit of the doubt and mark the crossed out response where legible.

   Rubric Error Responses – Optional Questions
   Where candidates have a choice of question across a whole paper or a whole section and have provided more answers than required, then all responses are marked and the highest mark allowable within the rubric is given. Enter a mark for each question answered into RM assessor, which will select the highest mark from those awarded. *(The underlying assumption is that the candidate has penalised themselves by attempting more questions than necessary in the time allowed.)*

Multiple Choice Question Responses
When a multiple choice question has only a single, correct response and a candidate provides two responses (even if one of these responses is correct), then no mark should be awarded (as it is not possible to determine which was the first response selected by the candidate).
When a question requires candidates to select more than one option/multiple options, then local marking arrangements need to ensure consistency of approach.

Contradictory Responses
When a candidate provides contradictory responses, then no mark should be awarded, even if one of the answers is correct.

Short Answer Questions (requiring only a list by way of a response, usually worth only **one mark per response**)
Where candidates are required to provide a set number of short answer responses then only the set number of responses should be marked. The response space should be marked from left to right on each line and then line by line until the required number of responses have been considered. The remaining responses should not then be marked. Examiners will have to apply judgement as to whether a 'second response' on a line is a development of the 'first response', rather than a separate, discrete response. *(The underlying assumption is that the candidate is attempting to hedge their bets and therefore getting undue benefit rather than engaging with the question and giving the most relevant/correct responses.)*

Short Answer Questions (requiring a more developed response, worth **two or more marks**)
If the candidates are required to provide a description of, say, three items or factors and four items or factors are provided, then mark on a similar basis – that is downwards (as it is unlikely in this situation that a candidate will provide more than one response in each section of the response space.)

Longer Answer Questions (requiring a developed response)
Where candidates have provided two (or more) responses to a medium or high tariff question which only required a single (developed) response and not crossed out the first response, then only the first response should be marked. Examiners will need to apply professional judgement as to whether the second (or a subsequent) response is a 'new start' or simply a poorly expressed continuation of the first response.

6. Always check the pages (and additional objects if present) at the end of the response in case any answers have been continued there. If the candidate has continued an answer there, then add a tick to confirm that the work has been seen.

7. There is a NR (**No Response**) option. Award NR (No Response):

- if there is nothing written at all in the answer space
- OR if there is a comment which does not in any way relate to the question (e.g., 'can't do', 'don't know')

- OR if there is a mark (e.g., a dash, a question mark) which is not an attempt at the question.

Note: Award 0 marks – for an attempt that earns no credit (including copying out the question).

8. The RM Assessor **comments box** is used by your team leader to explain the marking of the practice responses. Please refer to these comments when checking your practice responses. **Do not use the comments box for any other reason.**
If you have any questions or comments for your team leader, use the phone, the RM Assessor messaging system, or e-mail.

9. Assistant Examiners will send a brief report on the performance of candidates to their Team Leader (Supervisor) via email by the end of the marking period. The report should contain notes on particular strengths displayed as well as common errors or weaknesses. Constructive criticism of the question paper/mark scheme is also appreciated.

10. For answers marked by levels of response:
    a. **To determine the level** – start at the highest level and work down until you reach the level that matches the answer
    b. **To determine the mark within the level**, consider the following

Descriptor	Award mark
On the borderline of this level and the one below	At bottom of level
Just enough achievement on balance for this level	Above bottom and either below middle or at middle of level (depending on number of marks available)
Meets the criteria but with some slight inconsistency	Above middle and either below top of level or at middle of level (depending on number of marks available)
Consistently meets the criteria for this level	At top of level

11. **Annotations**

Annotation	Meaning
^	**Omission mark**
BOD	**Benefit of the doubt**
C	**Subordinate clause / consequential error**
	**Incorrect point**
E	**Expansion of a point**
FT	**Follow through**
NAQ	**Not answered question**
P	**Point being made**
REP	**Repeat**
	**Correct point**
TV	**Too vague**
0	**Zero (big)**
BP	**Blank Page – this annotation must be used on all blank pages within an answer booklet (structured or unstructured) and on each page of an additional object where there is no candidate response.**
L1	**Level 1**
L2	**Level 2**
L3	**Level 3**

12. **Subject Specific Marking Instructions**

Question			Answer	Mark	Guidance
1	(a)		1 mark max for each correct bus to max 3. **Data bus** ○ Transmits/carries <u>data/instructions</u> (between the hardware components / between CPU and memory). **Address bus** ○ Transmits/carries the (memory) <u>address/location</u> (where data will be sent to/retrieved from). **Control bus** ○ Transmits/carries (control) <u>signal(s)</u> (to control/coordinate CPU operations).	3	

Question			Answer	Mark	Guidance
1	(b)	(i)	1 mark for input device with a suitable example and 1 mark for output device with suitable example to max 4 e.g.: **Input Device** ● **Keyboard …** ● …Allow him to enter the game instructions / test the game ● **Mouse**… ● …Allow him to select/manipulate objects in graphics programs ● **Graphics tablet**… ● …Allow him to draw the characters in his game ● **Microphone**… ● …Allows him to record game narration/ instructions **Output Device** ● **Monitor**… ● …Display images / graphics he is working on for the game ● **Speakers**… ● …Allows him to edit/hear sound effects in the game	4	The devices and examples must be relevant to something Charlie could be doing when doing computer game design/editing/testing. If device name is wrong, ignore example. If device name given in example space (and no device name has been stated) allow both marks.

Question			Answer	Mark	Guidance
1	(b)	(ii)	1 mark for identifying a secondary storage type and 1 mark for a suitable reason to max 2. **Type:** Solid State (1) **Possible Reasons:** e.g.: ● Durable/robust (1) ● Fast **read/write** speeds (1) ● Large storage capacity (1) **Type:** Magnetic (1) **Possible Reasons:** e.g.: ● Cheap to buy **per unit** (1) ● Large (enough) storage capacity (1) ● Fast **read/write** speeds (1)	2	Do not allow **optical** storage. The reason must be related to the type of secondary storage provided. Allow FT to MP2 if suitable device itself is named e.g. HDD drive, flash drive.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td></td><td>(c)</td><td>(i)</td><td>1 mark for each correct row.
<table><tr><th>Statement</th><th>CPU</th><th>GPU</th></tr><tr><td>Suited to performing simple operations in parallel on larger data sets.</td><td></td><td>✓</td></tr><tr><td>Suited to complex operations on smaller data sets.</td><td>✓</td><td></td></tr></table></td><td>2</td><td>Ignore rows with a tick in both boxes.

Allow alternative marks to a tick e.g. ‘yes’</td></tr>
<tr><td></td><td></td><td>(ii)</td><td>1 mark for each to max 2, e.g.:

● More responsive gameplay
● Shorter loading times/rendering
● More realistic/immersive graphics
● Higher frame rates/smoother gameplay
● Higher resolutions/HD/4k graphics
● Better multiplayer experience</td><td>2</td><td>Must be relevant to graphics in gameplay

Ignore general points about a GPU/multiple cores or reverse points about benefit for CPU

Only mark first benefit given per answer space</td></tr>
<tr><td>1</td><td>(d)</td><td>(i)</td><td>● Multi-Tasking</td><td>1</td><td></td></tr>
<tr><td>1</td><td>(d)</td><td>(ii)</td><td>1 mark for each to max 3, e.g.:
● Puts processes into different categories/ queues
● Each queue has a different priority/quantum/scheduling approach
● Processes can move between queues…
● …based on their behaviour/priority
● Designed to minimise I/O bottle necks
● …balances longer and shorter processes</td><td>3</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance
1	(d)	(iii)	2 marks for valid explanation. ● Allows the **operating-system/software** to communicate/interface with external hardware ● Translates operating-system instructions into a form that devices can use ● Allows peripherals from different manufacturers to work with different OS ● Abstracts hardware complexity (the OS and software don't need to know specific commands)	2	
1	(e)		1 mark for suitable utility software and 1 mark for purpose to max 4, e.g.: ● **Defragmentation**… ● …puts fragmented files in consecutive storage locations ● **Encryption**… ● …scrambles data so it cannot be understood ● **Compression**… ● …reduces the amount of storage space files take up/creates more storage space ● **File repair**… ● …repairs damaged/corrupt files ● **Backup**… ● …copies data to another storage device ● **Security/anti-virus**… ● …protects the computer against threats / malware/hacking etc. ● **System clean-up**… ● …removes files that are no longer needed	4	Accept firewall, file management, disk management with reasonable purpose

Question			Answer	Mark	Guidance
2	(a)	(i)	2 marks for each difference to max 4. ● **Von Neumann** stores data and instructions in the same memory unit ● **Harvard** stores data and instructions in separate memory units ● **Von Neumann** fetches data and instructions sequentially/follows FDE cycle ● **Harvard** can fetch data and instructions at the same time ● **Von Neumann** uses a single bus for both data and instructions ● **Harvard** uses different buses for data and instructions	4	Must be a full comparison for 2 marks to be given. Each comparison must be comparing the same feature.
2	(a)	(ii)	1 mark for each to max 2. ● Makes the CPU more efficient ● Increases the throughput of the CPU ● Allows parts of the FDE cycle to happen simultaneously (so increases performance) ● Reduces latency/ idle time	2	DNA '**faster**'/'**more efficient**' on their own.

Question			Answer	Mark	Guidance
2	(a)	(iii)	2 marks for each difference to max 4. ● **CISC** has a larger instruction set ● **RISC** has a smaller instruction set ● **CISC** requires more complex hardware/ requires cooling ● **RISC** requires less complex hardware/ requires little cooling ● **CISC** takes multiple **clock** cycles to execute an instruction ● **RISC** takes one **clock** cycle to execute an instruction ● **CISC** tends to use more energy ● **RISC** tends to use less energy ● **CISC** has more addressing modes ● **RISC** has fewer addressing modes ● **CISC** uses less RAM ● **RISC** uses more RAM ● **CISC** is difficult to pipeline ● **RISC** is easier to pipeline	4	Must be a full comparison for 2 marks to be given. Each comparison must be comparing the same feature.

Question			Answer	Mark	Guidance
2	(a)	(iv)	1 mark for each to max 2. ● Multiple **instructions/threads** can be processed at the **same time** ● Improves multi-tasking ● Enables parallel processing ● Increases the performance of the computer	2	Allow 'FDE Cycles' for MP1
2	(b)		**Mark Band 3 – High level (7-9 marks)** The candidate demonstrates a thorough knowledge and understanding of virtual machines. The material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate provides a thorough discussion which is well balanced. Evaluative comments are consistently relevant and well-considered. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Mark Band 2 – Mid level (4-6 marks)** The candidate demonstrates reasonable knowledge and understanding of virtual machines. The material is generally accurate but at times underdeveloped.	9	Answers may include, but are not limited to, some of the points below: **AO1** Virtual Machines: • A machine that exists as software • Behaves as another program or piece of hardware • Needs a real machine to run on • For the user it will be indistinguishable Virtual Storage: • A file will be visible to a virtual machine as secondary storage • Remote storage that is mounted locally to seem like local storage • Stored on remote servers. Thick/Thin client: • Thick client involves all the processing being completed on the client. This can result in minimal use for a server, possibly only storing common data

Question			Answer	Mark	Guidance

			The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation.
			
			The candidate provides a sound discussion, the majority of which is focused. Evaluative comments are for the most part appropriate, although one or two opportunities for development are missed.
			
			There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence.
			
			Mark Band 1 – Low Level (1-3 marks)
			
			The candidate demonstrates a basic knowledge of some aspects of virtual machines. The material is basic and contains some inaccuracies.
			
			The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided.
			
			The candidate provides a limited discussion which is narrow in focus. Judgments if made are weak and unsubstantiated. The information is basic and communicated in an unstructured way.
			
			The information is supported by limited evidence and the relationship to the evidence may not be clear.
			
			0 marks
			No attempt to answer the question or response is not worthy of credit.
					• Thin client means the client just deals with user input and output which are transmitted to a server. The server does all the complex processing
					
					AO2 Application
					
					Thin client approach:
					• Potentially safer to store the database/sensitive data on virtual servers as the underlying system is not vulnerable to security breaches.
					• As the virtual machine is software, if it is compromised it can be terminated and restarted from a safe state
					• More efficient use of hardware as storage/processing resources are shared//not sat idle on a laptop not being fully utilised
					• Can dynamically shift resources
					  ○ If a user is doing a processor intense task more virtual cores can be allocated to them // a user doing low intensity tasks can have fewer
					  ○ If a user needs larger storage requirements, space can be dynamically allocated to them
					• There is limited offline functionality and users may only be able to work if there is an internet connection.
					• It's difficult to personalise for individual users.
					• May need a lot of bandwidth to be able to access the large databases and carryout the data processing.

Question			Answer	Mark	Guidance
					Thick client approach: ● The computers have their own processing power to run complex processing locally. ● Often has offline functionality as they can continue to work without an internet connection ● Devices can be customised to meet the user's needs. ● Possibly less secure (than thin client) as the security software on the devices needs to be managed. ● May need more advanced devices so therefore will increase the upfront costs. **AO3 Evaluation** ● There are cost savings to using thin client approaches. ● The ability to dynamically allocate resources would benefit users who have unusually large processing jobs as they will not cause unacceptable wait times. ● As the users are mobile, they are reliant on network access or mobile access. ○ May not allow 3rd party access. ○ Mobile data access may be slow or even non-existent. ● If a user has a fully powered laptop in case of connectivity issues it will remove the cost saving advantages ● If there is slow network access the user could be subject to unacceptable waits due to latency issues.

Question			Answer	Mark	Guidance
3	(a)	(i)	1011 1101	1	
	(a)	(ii)	BD	1	
	(a)	(iii)	228	1	
	(b)		1 mark for each to max 2 ● Divides… ● …by 8 / 2^3	2	**Allow:** multiplies by 2^{-3} or ⅛ or 0.125 (1)
	(c)		1 mark for each to max 6 ● Both exponents converted 0011 = 3 0010 = 2 ● Both mantissas shifted 0110.10 010.010 ● Align mantissas: 0110.10 010.010 ● Binary subtraction: 02 0110.~~1~~00 0010.010 0100.010 ● Correct mantissa 010001 ● Correct exponent 0011	6	Correct answer with valid **binary working for calculation** = full marks. Where denary working is clearly used to calculate the answer, do not allow MP4 **Example of 2's complement addition** Convert 2nd mantissa to 2's comp e.g.: 010.010 >> 101.11 0110.10 + 1101.11 ~~1~~ 0100.01 1111

Question			Answer	Mark	Guidance
	(d)	**(i)**	1 mark for each to max 2 ● Nibble 1 - 1010 ● Nibble 2 - 0010 Solution: Byte **1010 0011** AND Mask **1010 1110** Result **1010 0010**	2	
		(ii)	1 mark for: ● To extract/enable/disable bits in a value	1	Allow: To encrypt data

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>4</td><td>(a)</td><td></td><td>1 correct answer = 1 mark
2 correct answers = 2 marks
5 correct answers = 3 marks

<table>
<tr><th>Description</th><th>Command</th></tr>
<tr><td>Load the value stored in the memory address into the accumulator.</td><td>LDA / LOAD</td></tr>
<tr><td>Branch without checking the value in the accumulator.</td><td>BRA / BR</td></tr>
<tr><td>Store the value from the accumulator into the memory address.</td><td>STA / STO</td></tr>
<tr><td>Branch if zero is in the accumulator.</td><td>BRZ / BZ</td></tr>
<tr><td>Branch if zero or a positive number is in the accumulator.</td><td>BRP / BP</td></tr>
</table>
</td><td>3</td><td></td></tr>
</table>

Question			Answer	Mark	Guidance

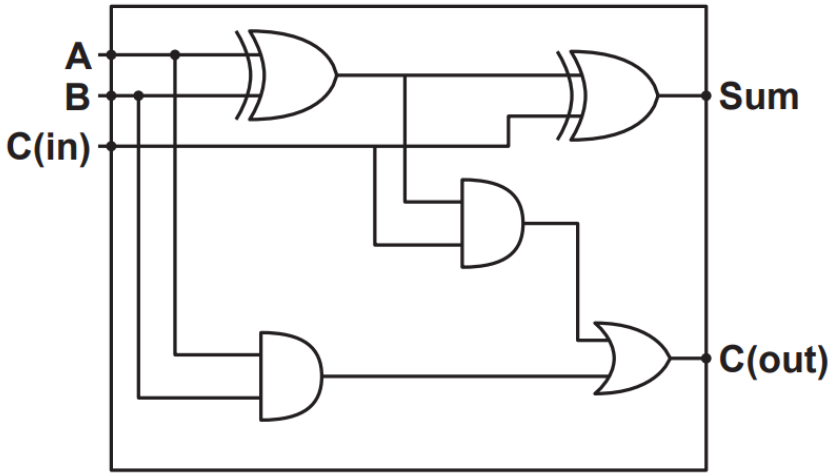
4	(b)		1 mark for each to max 4:
			● Correctly inputting two values and storing at least one value
			● Correctly subtracting one number from the other
			● Correct use of branch
			● Correct output for each path
				4	Accept alternative mnemonics from the spec: STO, LOAD, BR, BZ, BP, IN, INPUT, COB, END.
					
					If labels used must be a corresponding DAT location for MP1.
					
					POSSIBLE SOLUTION:
					`INP`
					`STA FIRST`
					`INP`
					`STA SECOND`
					`SUB FIRST`
					`BRP OUTPUTSECOND`
					`LDA FIRST`
					`OUT`
					`HLT`
					`OUTPUTSECOND LDA SECOND`
					`OUT`
					`HLT`
					`FIRST DAT 0`
					`SECOND DAT 0`

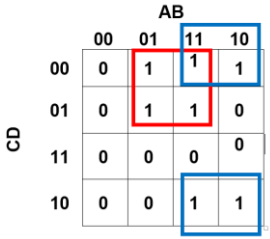
Question			Answer	Mark	Guidance
4	(c)		**Mark Band 3 – High level (9-12 marks)** The candidate demonstrates a thorough knowledge and understanding of high/low level languages. The material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate provides a thorough discussion which is well balanced. Evaluative comments are consistently relevant and well-considered. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Mark Band 2 – Mid level (5-8 marks)** The candidate demonstrates reasonable knowledge and understanding of high/low level languages. The material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation. The candidate provides a sound discussion, the majority of which is focused. Evaluative comments are	12	Answers may include, but are not limited to, some of the points below: **AO1 Knowledge** High Level Languages: ● Uses English-like syntax/words. ● Easier for humans to read, create and debug ● Is problem orientated ● Not locked to any particular architecture (but needs a translator for the given architecture) ● Programmer is not in control of what machine code instructions are generated by the translator. Low level languages: ● Written in binary / 1s and 0s. ● Processor specific. ● Programs are based around the instructions available. ● Programmer has direct control over what instructions are being run and what memory is being used. ● Provides an interface between programmer and hardware. **AO2 Application** 1) This program could be written in a **high level language**. This is because it will most likely contain a user interface that makes various network requests to fetch the news and then present this to the user. 2) This program could be written in a **low level language** as it is for an embedded system it may have a novel architecture and have no translator. It would also need direct access to the hardware and memory management.

Question			Answer	Mark	Guidance
			for the most part appropriate, although one or two opportunities for development are missed. There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence. **Mark Band 1 – Low Level (1-4 marks)** The candidate demonstrates a basic knowledge of some aspects of high/low level languages. The material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides a limited discussion which is narrow in focus. Judgments if made are weak and unsubstantiated. The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear. **0 marks** No attempt to answer the question or response is not worthy of credit.		3) This program could be written in a **high level language**. This is because it will contain a user interface that will most likely require a lot of functionality which can be simplified in a high level language. 4) This program could be written in **either**. Low level would give direct access to the memory management to better handle large amounts of data being processed. Higher level may have libraries for the data manipulation required. 5) This program could be written in a **low level language**. This is because it will need to have direct access to the computer hardware to deal with memory allocation/deallocation, buffers, data structures, registers, interrupts etc. **AO3 Evaluation** ● Low level languages allow you to direct access the devices resources such as the memory to allow you to optimise the devices performance. ● Low level languages are commonly used in embedded systems as they have limited resources available. ● Low level languages are commonly used in real-time systems when speed is a crucial factor ○ Direct control of instructions means the ability to control the speed ○ Direct control over the memory addresses used allows control of the memory footprint ● High level languages allow for faster development. They contain built-in functions to write code quicker. ● High level languages are work across different platforms so they can be run on different operating systems.

<table>
<tr><th colspan="3">Question</th><th>Answer</th><th>Mark</th><th>Guidance</th></tr>
<tr><td>5</td><td>(a)</td><td></td><td>1 mark for each correct row.

<table><tr><th>A</th><th>B</th><th>S</th><th>C</th></tr><tr><td>0</td><td>0</td><td>0</td><td>0</td></tr><tr><td>0</td><td>1</td><td>1</td><td>0</td></tr><tr><td>1</td><td>0</td><td>1</td><td>0</td></tr><tr><td>1</td><td>1</td><td>0</td><td>1</td></tr></table></td><td>4</td><td></td></tr>
<tr><td>5</td><td>(b)</td><td></td><td>1 mark for each to max 2:
● A half adder can only add 2 single bits // has no third bit
● Full adder can handle a 3rd bit/carry in</td><td>2</td><td>Allow: ‘has no carry bit’ for MP1</td></tr>
</table>

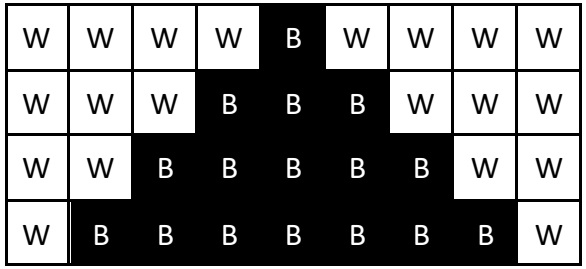
Question			Answer	Mark	Guidance
5	(c)		1 mark for each to max 4: ● New XOR joining output of first XOR and Cin ● New AND joining output of first XOR and Cin ● New OR joining both AND gates ● Sum and Cout connected, all correct and no additional gates Solution:  	4	

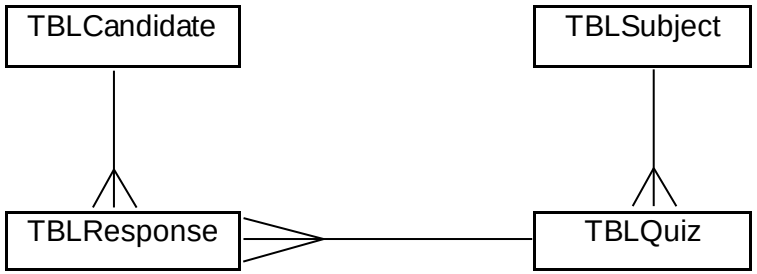
Question			Answer	Mark	Guidance
5	(d)		1 mark for each to max 4: ● Correctly identifying group 1 (red group) and correctly identifying group 2 (blue group) using wrap around ● Identifying (B∧¬C) / B AND NOT C ● Identifying (A∧¬D) / A AND NOT D ● Joining all expressions with an OR // v // + Solution: (A∧¬D) ∨ (B∧¬C)  	4	Accept alternative notation: AND // ^ // · OR // v // + NOT // ¬ // ‾ DNA incorrect ¬ shape Allow either order e.g.: B^¬C // ¬C^B
6	(a)		1 mark for each to max 4. ● Reduces **development/debugging** time. ● Reduced programming knowledge is needed. ● Libraries will already be tested. ● Libraries are often optimised for performance. ● Libraries are designed to work across multiple platforms. ● Consistency between applications ● Reduces file sizes (DLLs)	4	Allow: 'saves developers time' DNA 'saves time' on its own
6	(b)	(i)	1 mark for each correct match to max 4. **C** **D** **A** **B**		

6	**(b)**	**(ii)**	1 mark for each to max 2. ● Easier/faster to debug/fix errors/maintain ● Easier/faster to test code **line by line** ● Code will still run until the first error ● Code is portable across different architectures	2	
		(iii)	1 mark for each to max 2. ● Do not need to distribute source code // protects intellectual property ● Do not need run-time environment // code is not re-translated each time it runs ● Faster run-time (once compiled) ● Produces an executable file ● Code is optimised	2	
6	**(c)**	**(i)**	1 mark for each to max 3. ● `INSERT INTO TblSoftware (ProductID, Name, Type, Price)` ● `VALUES` ● **(**`"DCC07", "DCCCast", "Sound", 89.99`**)**	3	Field and table names must be in the correct case as given. MP1 does **not** require field names. Allow Price in speech marks e.g.: "89.99" or "£89.99". For full marks a fully correct working answer must be provided. Max 2 if the order of MP1/2/3 is not correct.

6	**(c)**	**(ii)**	1 mark for each correct line to max 5. • `SELECT Name FROM TblSoftware` • `WHERE Price < (` • `SELECT Price` • `FROM TblSoftware` • `WHERE Name = 'DCCDraw')`	5	Field and table names must be in the correct case as given. Allow FT for missing brackets. Allow == for comparison.
7	**(a)**		**Mark Band 3 – High level (7-9 marks)** The candidate demonstrates a thorough knowledge and understanding of the moral and legal implications of AI. The material is generally accurate and detailed. The candidate is able to apply their knowledge and understanding directly and consistently to the context provided. Evidence/examples will be explicitly relevant to the explanation. The candidate provides a thorough discussion which is well balanced. Evaluative comments are consistently relevant and well-considered. There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated. **Mark Band 2 – Mid level (4-6 marks)** The candidate demonstrates reasonable knowledge and understanding of the moral and legal implications of AI. The material is generally accurate but at times underdeveloped. The candidate is able to apply their knowledge and understanding directly to the context provided although one or two opportunities are missed. Evidence/examples are for the most part implicitly relevant to the explanation.	9	Answers may include, but are not limited to, some of the points below: **AO1 Knowledge** AI behaves and performs tasks that normally require human intelligence. AI needs to learn by understanding languages, recognising patterns, solving problems and learning from experience. They can be trained to complete specific tasks or can be used to complete a wide range of different tasks. **AO2 Application** Moral • Individuals may not know that their images are being used to train the AI. • Individuals are entitled to privacy and they may not want their photograph to be used by the AI. They may think that this is an invasion of privacy. • The AI is searching the internet randomly and therefore, it needs to ensure that it uses a complete range of diverse photographs such

			The candidate provides a sound discussion, the majority of which is focused. Evaluative comments are for the most part appropriate, although one or two opportunities for development are missed. There is a line of reasoning presented with some structure. The information presented is in the most part relevant and supported by some evidence. **Mark Band 1 – Low Level (1-3 marks)** The candidate demonstrates a basic knowledge of some aspects of the moral or legal implications of AI. The material is basic and contains some inaccuracies. The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides a limited discussion which is narrow in focus. Judgments if made are weak and unsubstantiated. The information is basic and communicated in an unstructured way. The information is supported by limited evidence and the relationship to the evidence may not be clear. **0 marks** No attempt to answer the question or response is not worthy of credit.		as people from different cultures and diversity of scenes to represent reality and ensure fairness. Legal • It needs to ensure that the photographs are accessed legally without criminal activity to ensure this does not breach the **Computer Misuse Act**. • Organisations must ensure that they keep personal data safe under the **Data Protection Act**. This includes photos and therefore they need to ensure these cannot be accessed by the AI. • Some images will be protected by the **Copyright, Design and Patents Act** which includes people's intellectual property. These therefore cannot be accessed without permission from the author. **A03 Evaluation** • AI provides many benefits, however, for it to be effective it needs to learn and be trained. • Learning from paired photos and descriptions is a good approach to use to allow the AI to learn, however they should consider: o ensuring that all relevant computer laws and other non-computer laws are followed. o only using royalty free images to avoid copyright

					infringements. ○ ensuring individuals have given their consent before their photographs are used. ○ ensuring that a wide range of photographs are used to ensure the AI is not biassed.
7	**(b)**		1 mark for each correct row to max 4.  	4	Allow shading, or letters or words etc to show understanding of each run.
8	**(a)**		1 mark each to max 4. ● Lots of repeated / redundant data ● Can lead to data being inconsistent ● Increases the size of the database ● Data access speed is slow ● Searches are slow/hard ● They are difficult to manage/maintain ● It is difficult to add additional functionality ● Difficult to apply ACID principles	4	DNA 'information' for 'data' – penalise once and then FT.

8	**(b)**		1 mark for each correct relationship: ● One to many TblCandidate to TblResponse ● One to Many TblQuiz to TblResponse ● One to Many TblSubject to TblQuiz 	3	MAX 2 if any extra relationships added. DNA: words should not be used to describe relationships. Accept: relationship symbol from specification only: 
	(c)	**i**	1 mark each to max 2 ● Data is in 1st normal form ● All non-key fields depend on key field(s)/no partial dependencies	2	
	(c)	**ii**	1 mark each to max 2 ● Data is in 2nd normal form ● All non-key fields don't depend on another non-key field/ no transitive dependencies	2	
8	**(d)**		1 mark for each missing statement to max 5. ● `answers` ● `score` ● `qCount` ● `score + 1` ● `return`	5	Allow: for MP5 return via function call e.g. `checkAnswers=`

```
function checkAnswers(responses, feedbacks, answers)
{
        var score = 0;
        for(var qCount = 0; qCount < responses.length; qCount++)
        {
                response = document.getElementById(responses[qCount]).innerHTML;
                answer = answers[qCount];
                feedbackElement = document.getElementById(feedbacks[qCount]);
                if (response == answer)
                {
                        score = score + 1;
                        feedbackElement.innerHTML = "Correct";
                }
        }
        return score;
}
```

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