OCR

Oxford Cambridge and RSA

GCE

Computer Science

H046/01: Computing principles

AS Level

Mark Scheme for June 2023

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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.

H046/01 **Mark Scheme** **June 2023**

MARKING INSTRUCTIONS

Question			Answer	Mark	Guidance
1	**(a)**		• Clock Speed … • … The speed at which the fetch decode execute cycle is completed/ the speed a single core can execute instructions • Number of cores/ independent processing units … • …that can fetch decode execute **at the same time** • Cache size… • … memory that contains recently/frequently used instructions/data • …memory that has a faster R/W speed than RAM • …memory that is closer to/onboard the CPU	AO1.1 (2) AO1.2 (2)	One mark for stating the factor, mark for expanding the factor - Accept cycles for "FDE Cycles"
1	**(b)**		• CISC has a larger instruction set • RISC has a smaller instruction set • CISC is difficult to pipeline • RISC is easier to pipeline • CISC tends to have more addressing modes • RISC tends to have fewer addressing modes • CISC **instructions** may take multiple clock cycles to execute • RISC **instructions** take one clock cycle to execute	AO1.2 (2)	Accept any other valid points Mark in pairs

			- CISC has complex circuitry/more transistors. - RISC has less complex/simple circuitry - CISC uses less RAM - RISC uses more RAM		
1	**(c)**		- Parallel processing will allow multiple separate jobs/instructions/FDE cycles to run concurrently. - Longer rendering jobs can be split, shortening the overall time taken. - Different CPUs/cores can tackle different frames/sections/components of the video simultaneously.	AO1.2 (1) AO2.1 (2)	
1	**(d)**		- A piece of software which allows **hardware/device to communicate**… …with the **operating system**	AO1.2 (2)	
1	**(e)**	**(i)**	- Monitor - Speakers//Headphones	AO2.1 (2)	Must be output devices. Must be suitable for video editing.

Question			Answer	Mark	Guidance
1	(e)	(ii)	**Mark Band 3–High Level** **(7-9 marks)** The candidate will provide a range of accurate benefits and drawbacks of both magnetic and flash devices. 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 will come to a clear conclusion that must be justified by their comments *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 will provide drawbacks or benefits about both magnetic and flash methods. These will be for the most part relevant. 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 will attempt to come to a conclusion, although it may not be fully justified by their answer, *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 has provided some drawbacks or benefits of magnetic or flash methods. The material is basic and contains some inaccuracies.	AO1.1 (2) AO1.2 (2) AO2.1 (2) AO3.3 (3)	AO1 Magnetic Benefits: • Lower price per GB • As standard comes in high capacity Magnetic Drawbacks: • Lower R/W speed • Higher power consumption • Moving parts /less durable Flash Benefits: • Higher R/W speed • No moving parts/more durable • Lower power consumption • Can have a higher capacity. Flash Drawbacks: • Higher cost per GB • At higher capacities prices rise exponentially. AO2: Suitability of Magnetic: • Video files are very large, benefiting magnetics low cost per GB • Can be used to archive the different video elements after it's been rendered • Could possibly get damaged while being transported between the different filming sites • Slow R/W speeds may take it longer to load into the software Suitability of flash: • Very fast R/W speeds therefore reducing the amount of loading time during the editing process/giving smoother playback • If money is not a barrier, flash can be bought in sufficient capacities for videos.

			The candidate makes a limited attempt to apply acquired knowledge and understanding to the context provided. The candidate provides nothing more than an unsupported assertion. *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.		AO3: Candidates can conclude either method, but to score in the top MB must have a clear line of reasoning to justify their choice.
2	(a)	(i)	☑ First In First Out	AO1.1 (1)	
2	(a)	(ii)		Ben	Sundip	Tom	Charlie	Ling	Sara			1 Mark: Adding, Charlie, Ling and Sara in correct order 1 Mark: Exclusively removing Alex and Kofi.	AO2.1 (2)	Accept:			Ben	Sundip	Tom	Charlie	Ling	Sara	

2	(b)	(i)		AO3.2 (4)	
| | | | ```
function pop()
    if top == 0 then
        return -1
    else
        item = items[top]
        top = top - 1
        return item
    endif
end function
``` | | |
| 2 | (b) | (ii) | • Correctly declaring the function **reverse** to include passing in **name** as a parameter<br>• Correct logic to calculate the number of pushes required<br>• Correct use of a loop to push all characters onto the stack separately<br>• Creating a local variable **reverseName** to hold the reversed string<br>• Correct use of a loop to pop all characters from the stack (in the reverse order)<br>• Correct logic to add each popped character to the **reverseName** variable<br>• Correctly returning the **reverseName** variable | AO3.1 (3)<br>AO3.2 (4) | Example solution<br>```
function reverse(name)
    reverseName = ""

    for nameCount = 0 to name.Length-1
        theStack.push(name[nameCount])
    next nameCount

    for nameCount = 0 to name.Length-1
        reverseName = reverseName + theStack.pop()
    next nameCount

    return reverseName
end function
```<br><br>Give full marks for alternative solutions that would work fully.<br><br>Allow FT for any duplicate identifiers named incorrectly or using the incorrect case |

Question			Answer	Mark	Guidance
3	(a)		• List/mapping of characters (that can be understood by the hardware/software/computer) • Each character is given a **unique** binary/numeric code that is stored instead of the character.	AO1.2 (2)	Allow a list of letters /symbols
3	(b)	(i)	• 102 (correct answer) • Suitable working out	AO2.2 (2)	
		(ii)	• Hexadecimal values are shorter than binary as 4 bits/nibble can be represented by one hex character. • Hexadecimal values are faster / more reliable to communicate / enter / write down / read.	AO2.2 (2)	Do not accept Hexadecimal is "easy" communicate/enter etc…
3	(c)		• Fixed point is 0110.01 • Mantissa becomes 0.11001 • Exponent of three needed (represented at 011)	AO2.2 (3)	Final Answer 011001 011 Correct answer with any working gets full marks
3	(d)		• Allows for more accuracy/precision from the given number of bits • The representation of each binary value is unique	AO1.1 (1)	

Question			Answer	Mark	Guidance
4	(a)		• Relational data allows for less redundancy of data/less repeated data • Relational databases improve the consistency of data • Relational databases allow for **complex** queries and/or searches to be performed	AO1.2 (2)	
4	(b)		1 mark for each bullet point to max 2 marks: • One customer to many orders • Many orders to many products // One order to many orderLines **and** many orderLines to one product **Solution 1:** **Solution 2:** 	AO3.1 (2)	Ignore any relationship between customer and product. Accept any suitable alternative name for the OrderLine entity. **Additional guidance:** For MP2, candidates may have avoided the use of many-to-many relationships, due to the information in part c). Therefore, allow one product to many orders.
4	(c)	(i)	• A primary key will only appear once in a table/is a unique identifier	AO1.1 (2)	Accept entity for table

			• A foreign key may appear multiple times a table/may not be unique		
4	(c)	(ii)	• <u>CustomerID</u> • <u>ProductID</u>	AO2.2 (1)	Correct answer only
4	(c)	(iii)	• There may be duplicate values.	AO2.2 (1)	
5	(a)		• Stores instructions / programs **currently running** • Stores data currently **in use**	AO1.1 (1)	

Question			Answer	Mark	Guidance
5	(b)		• If the amount of RAM available is insufficient… • …Used to store instructions/data • …Using secondary storage. • Likely to be loading large image files (which may exceed her RAM) • Likely to be loading large programs (which may exceed her RAM)	AO2.1 (2)	
6	(a)	(i)	• In circuit switching dedicated hardware resources are used for each connection • In packet switching hardware is used for multiple different connections. • In circuit switching the data is sent along one route/stream. • In packet switching packets of data may be sent along multiple different routes/packets may not be in order	AO1.2 (2)	Marks answers in pairs

			• Circuit switching is less secure if data is intercepted • Packet switching, data is more secure if intercepted/not all packets will be intercepted		
6	**(a)**	**(ii)**	• Computer networks would involve multiple connections happening concurrently • In packet switching hardware is not tied up with each unique connection // can handle multiple connections simultaneously • Computers pass vast amounts of data which may encounter transmission errors • Packet switching means only resending individual packets instead of the whole data stream • Computers may be transmitting business critical data • Packet switching means any network hardware failures can be mitigated by routing around it.	AO2.1 (2)	
6	**(b)**		**Mark Band 3–High Level** **(7-9 marks)** The candidate demonstrates a thorough knowledge and understanding of both peer to peer and client server and can give valid application of both in this scenario. All detail are generally accurate and relevant 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. *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)**	AO1.1 (2) AO1.2 (2) AO2.1 (2) AO3.3 (3)	AO1 P2P: • Each computer can act independently • Each computer is responsible for it's own security and login • Each computer will maintain and possibly share its own connected hardware (printer/external storage/internet connection) • Each computer will maintain and possibly share its own secondary storage • If a computer is powered down it's shared resources will not be available. • There are no resources not shared by a peer machine • Adding a machine is simple • Very little administration is needed Client Server:

The candidate demonstrates reasonable knowledge and understanding of client server and peer to peer; the material is generally accurate but at times underdeveloped. The candidate may not have applied both to this scenario.
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.

*There is a line of reasoning presented with some structure. The information presented is in the most part r*elevant and supported by some evidence.*

Mark Band 1-Low Level
(1-3 marks)
The candidate demonstrates a basic knowledge of client/server or peer to peer and has made some attempt at applying this knowledge. 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 nothing more than an unsupported assertion.

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.

- All network functionality can be provided by servers.
- A server is a process running on a machine, usually dedicated to providing these services.
- A server machine is designed to never be powered down.
- Login/security is handled centrally
- Shared storage may be managed by a server
- Shared resources (printer/internet connection etc) my be managed by a server
- If a server process or machine fails, network functionality, including the ability login is lost
- Adding a new machine can mean installing specialist client software and setting up OS policies.
- IT skills and a lot of time are needed to administer a client server network

AO2
P2P:
- As Zak is looking to expand his staff, P2P would offer flexibility in adding staff ad hoc.
- Zak's company is still small and may struggle to pay for the IT administrator skills needed for a client server

Client Server:
- As Zak's firm is an accountancy firm it will have sensitive customer data
- Client server would allow stronger centralised security
- As Zak is taking on multiple staff, they may wish to work collaboratively, which shared storage would allow.
- Zak could share a single printer/other hardware with all staff and not worry about an individual computer being switched on.

					AO3: Candidates can conclude either method, but to score in the top MB must have a clear line of reasoning to justify their choice.

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