Mark Scheme – 2022 Sec 4E Computing Prelim Paper 1

Qn	Answer	Marks
1a	1 m for name, 1 m for function	
1ai	ALU – Arithmetic Logic Unit Processes data by **performing basic mathematical and logical operations** such as addition, subtraction, multiplication and division. This unit **performs the actual work of performing calculations and transforming data**.	**2**
1aii	CU – Control unit **Follows instructions and decides when data should be stored, received or transmitted by different parts of the computer** (including the ALU). This unit makes sure that data is transported to where it needs to be, and that it is processed in the correct order.	**2**
1b	1 m for working, 1 m for answer	
1bi	$124_{10} = 7C_{16}$ $124 / 16 = 7$ R 12	**2**
1bii	$1101_2 = D_{16}$ $2^3 + 2^2 + 1 = 13_{10}$	**2**
1biii	$177_{16} = 375$ $16^2 + 7(16) + 7$	**2**
		10

Qn	Answer	Marks
2a	1m for each correct line	

Term

Media Access Control (MAC) address

Server

Port number

Ethernet

Network Interface Controller

Description

Device that connects multiple LANs that uses the same protocol

A 32-byte string that identifies a wireless access point (WAP) and all the devices connected to it.

Used together with an Internet Protocol (IP) address to identify a program running on a network

Hardware interface to enable the transfer of data between a device and network

Computer that shares resources with and responds to requests on the network

Sequence of bytes (usually permanent in nature) that is used to identify a particular physical network device.

The most commonly used wired network protocol for local and metropolitan area networks.

| | | **5** |

Qn	Answer	Marks
3ai		1

0	1	1	1	1	0	1	1

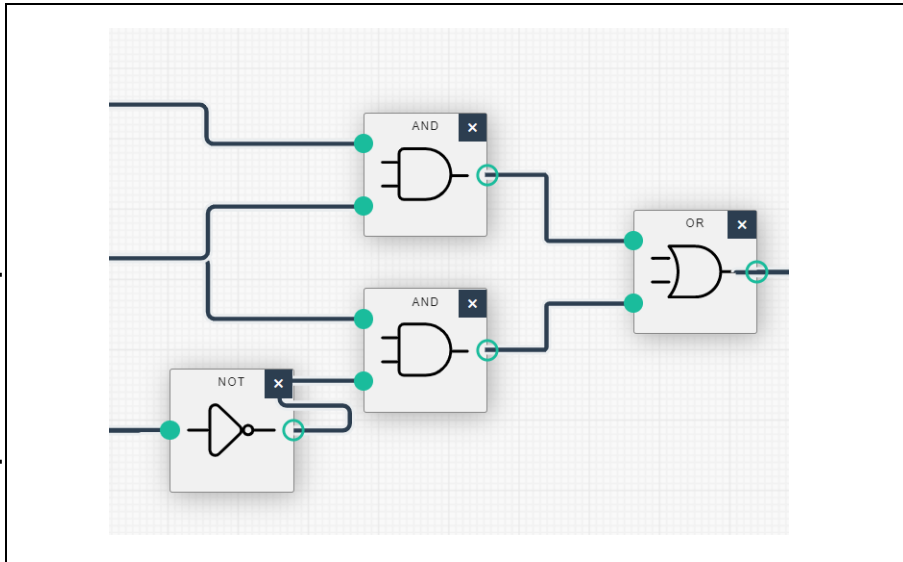| Qn	Answer	Marks
3aii	**A checksum is a calculated value that is used to determine the integrity of transmitted data.** The data and the checksum are sent together. At the destination, the **checksum is recalculated and compared to the sent checksum value**. If the checksum value of the received data matches the sent checksum value, the data was transmitted correctly. **If they differ, an error has occurred.**	3
3bi	Star	1
3bii	1 m for each reason, any two	2
	Due to data confidentiality, ▪ Data and resources are shared using one or more dedicated servers; each computer has a distinct role – client or server ▪ High security as access rights can be controlled centrally at a server ▪ Centralised and carried out only at the server; usually managed by a network administrator	
		7

Qn	Answer	Marks
4	1 m for each blank Access control or authorization is the ability of a computer to control the access of data and resources by an **authenticated** user. Below are three ways computers provide access control. Most operating systems can control the ability of users to view or make changes to specific files or folders by setting **file permissions**. However, these settings do not prevent unauthorized physical access to the storage device. To prevent this, it is necessary to use **encryption**, which is the process of encoding data so that a **secret key** is required to read the data. If the data is not decoded, it appears meaningless. Computers connected to a network require another layer of access control called a **firewall.** This can be a device or a program that monitors every data transmission and prevents unauthorized access from a private network.	5
		5

Qn	Answer	Marks
5a	**1m** for each measure, any two	
	▪ Avoid giving your email address to unfamiliar contacts or untrusted websites. If it really is necessary to provide one, some sites can help generate a temporary email address that will automatically expire after a short period of time. Alternatively, set up and use a secondary email address that is dedicated to unimportant emails. ▪ Read and understand the privacy policy of any website, trusted or untrusted, that requests an email address before providing it. Some websites, even those run by reputable companies, share email addresses with advertisers who may be guilty of spamming. The way such websites claim to use email addresses is usually communicated in full via the privacy policy. ▪ Look out for options to turn off email updates or participation in mailing lists when signing up for or changing the settings of an online account. Many sites leave such options turned on by default and additional effort is needed to turn them off. ▪ Most email services have a filter feature that allow users to block specific senders or to only allow emails from specific senders through. Some filtering systems also have advanced spam detection algorithms that can be trained by having the user identify examples of spam that the filter is not yet able to detect. This lets the filter become more effective in detecting spam over time.	**2**
5b	1 m for each row with correct ticks	**3**

Scenario	Copyright Infringement	Plagiarism
Alif installs a computer game on two different computers even though the licence he purchased allows for one installation only.	✔	
Betty takes her friend's artwork and submits it for a contest as her own artwork without her friend's permission.	✔	✔
Tao purchases an educational licence for a spreadsheet program and installs the program on his home laptop for school projects.		

		5

Qn	Answer	Marks
6a	**1 m** for each error and corresponding correction Error 1 — Line 3 Correction — `alive == False` Error 2 — Line 4 Correction — `ELIF (health < 20 and weapon == 0) or (hydration < 20 and weapon == 0) THEN` Error 3 — Line 7 Correction — `ELIF health < 10 and hydration < 10 and weapon < 10    THEN`	6
6b	Boolean	1
6c	1 Syntax error	1
	2 Run-time error	1
		9

Qn	Answer	Marks
7a	1 m for each column	4

count	sum	number	OUTPUT
		7	
		12	
	12		
1			
		2	
	14		
2			
		4	
	18		
3			
		1	
		6	
	24		
4			
		-8	
			6

Qn	Answer	Marks
7b	Find the average of even numbers that were input.	2
7c	No processing will take place, nothing	1
7d	Range check	1
7e	Line 4	1
	Line 12	1
	`WHILE number is digit and number <= 100`	1
		11

Qn	Answer	Marks
8a		**10**
8b	Plan solutions	**1**
8c	Decomposition	**1**
		12

Qn	Answer	Marks
9a	**X** = (**A** AND **B**) OR (**B** AND (NOT **C**))	4

Qn	Answer	Marks
9b	**Four** marks for 8 correct rows, **Three** marks for 6 or 7 correct rows **Two** marks for 4 or 5 correct rows,**One** mark for 2 or 3 correct rows	4

Input			Working space			Output
A	B	C	A AND B	NOT C	B AND NOT C	X
0	0	0	0	1	0	0
0	0	1	0	0	0	0
0	1	0	0	1	1	1
0	1	1	0	0	0	0
1	0	0	0	1	0	0
1	0	1	0	0	0	0
1	1	0	1	1	1	1
1	1	1	1	0	0	0

		Marks
		8

Qn	Answer	Marks
10	Marking points:	
	▪ Initialise total hours for summation	**1**
	▪ Asks for start and end time	**2**
	▪ Calculate total hours worked per week	**1**
	▪ Loop for seven days for each employee	**1**
	▪ Calculate weekly pay and prints it	**2**
	▪ Loop for three employees	**1**
| | ```
hourly_rate = 9
total_hours = 0
FOR employee = 1 to 3
    FOR day = 1 to 7
        INPUT time_in, time_out
        hours_worked = time_out – time_in
        #round hours_worked down to nearest whole number
        total_hours = total_hours + hours_worked
    NEXT
    OUTPUT total_hours*hourly_rate
``` | |
| | Note: #optional | **8** |