QUESTION 1.

7   **(a)**   One of the key features of von Neumann computer architecture is the use of

Three buses and three descriptions are shown below.

Draw a line to connect each bus to its correct description.

Bus	**Description**

address bus

this bus carries signals used to coordinate the computer's activities

control bus

this bi-directional bus is used to exchange data between processor, memory and input/output devices

data bus

this uni-directional bus carries signals relating to memory addresses between processor and memory

[2]

(b) The seven stages in a von Neumann fetch-execute cycle are shown in the ta

Put each stage in the correct sequence by writing the numbers 1 to 7 in the right ha
The first one has been done for you.

Stage	Sequence number
the instruction is then copied from the memory location contained in the MAR (memory address register) and is placed in the MDR (memory data register)	
the instruction is finally decoded and is then executed	
the PC (program counter) contains the address of the next instruction to be fetched	**1**
the entire instruction is then copied from the MDR (memory data register) and placed in the CIR (current instruction register)	
the address contained in the PC (program counter) is copied to the MAR (memory address register) via the address bus	
the address part of the instruction, if any, is placed in the MAR (memory address register)	
the value in the PC (program counter) is then incremented so that it points to the next instruction to be fetched	

[6]

QUESTION 2.

8 Five computing terms are described below.

Write the name of the term being described.

Software that anyone can download for free from the Internet and then use without having to pay any fees. The usual copyright laws apply and a user license is important.

....

Software that gives the user the chance to try it out free of charge before actually buying it. The software is subject to the usual copyright laws. As a rule, not all the features found in the full version are available at this stage.

....

Software where users have freedom to run, copy, change and adapt it. This is an issue of liberty and not of price since the software guarantees freedom and the right to study and modify the software by having access to the actual source code.

....

Set of principles that regulates the use of computers in everyday life. This covers intellectual property rights, privacy issues and the effects of computers on society in general.

....

The taking of somebody's idea or software and claim that the idea or software code were created by the "taker".

....

[5]

QUESTION 3.

10 **Six** security issues and **six** descriptions are shown below.

Draw a line to link each security issue to its correct description.

Security issue	**Description**

| Pharming | illegal access to a computer system without the owner's consent or knowledge |

| Phishing | software that gathers information by monitoring key presses on a user's keyboard; the data is sent back to the originator of the software |

| Viruses | malicious code installed on the hard drive of a user's computer or on a web server; this code will re-direct the user to a fake website without the user's knowledge |

| Hacking | creator of code sends out a legitimate-looking email in the hope of gathering personal and financial information from the recipient; it requires the user to click on the link in the email or attachment |

| Spyware | a message given to a web browser by a web server; it is stored in a text file; the message is then sent back to the server each time the browser requests a page from the server |

| Cookies | program or code that replicates itself; designed to amend, delete or copy data or files on a user's computer; often causes the computer to crash or run slowly |

[5]

QUESTION 4.

8 **(a)** **Five** statements and **three** types of software are shown below.

Draw lines to connect each statement with the correct type of software.

Statement

Type of software

Users have the freedom to pass on the software to friends and family as they wish.

Free software

Users can download this software free of charge, but they cannot modify the source code in any way.

Users are allowed to try out the software for a trial period only before being charged.

Freeware

Users can study the software source code and modify it, where necessary, to meet their own needs, without breaking copyright laws.

Shareware

Users can obtain a free trial version of the software, but this often does not contain all the features of the full version.

[3]

(b) Describe **three** ethical issues that should be considered when using comput...

1 ....

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2 ....

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3 ....

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[3]

(c) Security of data is very important.

Three security issues are viruses, pharming and spyware.

Explain what is meant by each issue.

Viruses: ....

....

....

....

Pharming: ....

....

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....

Spyware: ....

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....

[6]

(d) Describe **three** tasks carried out by a firewall.

1 ....

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2 ....

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3 ....

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8 A company has a number of offices around the world.

(a) Data is transmitted between the offices over the Internet. In order to keep the data company is using Secure Socket Layer (SSL) protocol and a firewall at each office.

Explain how SSL protocol and a firewall will keep the company's data safe.

SSL protocol ....

....

....

Firewall ....

....

....

[4]

(b) A company stores personal details of its customers on a computer system behind a firewall.

Explain, with reasons, what else the company should do to keep this data safe.

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....[6]

QUESTION 6.

(d) The supermarket uses secondary storage and off-line storage to store data

Explain what is meant by secondary storage and off-line storage.

Secondary storage ....

....

....

....

Off-line storage ....

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....

[4]

9   A business wants to use a biometric security system to control entry to the office.

The system will use a biometric device and a microprocessor.

Explain how the biometric security system will make use of the biometric device and the microprocessor to control entry to the office.

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[6]

4 A company transmits data to external storage at the end of each day.

(a) Parity checks can be used to check for errors during data transmission.

The system uses **odd parity**.

(i) Tick (✓) to show for each of the received bytes whether they have been **transmitted correctly** or **transmitted incorrectly**.

Received byte	Transmitted correctly (✓)	Transmitted incorrectly (✓)
10001011		✓
10101110	✓	
01011101	✓	
00100101	✓	

[4]

(ii) State **one** other method that could be used to check for transmission errors.

.... [1]

(b) Data can be transferred using parallel or serial data transmission.

(i) Describe what is meant by parallel data transmission.

....

....

....

.... [2]

(ii) Give **one** application of parallel data transmission.

....

.... [1]

(iii) Explain why serial data transmission is normally used for transferring ⬡ distance.

....

....

....

.... [2]

(c) Data transferred over a network is encrypted to improve data security.

The system uses 64-bit symmetric encryption.

(i) Explain how encryption improves data security.

....

....

....

.... [2]

(ii) Explain **one** method that could be used to increase the level of security provided by the encryption.

....

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.... [2]

QUESTION 8.

5 **(a)** A clothing shop uses a barcode reader at the checkout.

The checkout is linked to a stock control system. The system monitors stock
automatically keeps them above a minimum level.

Explain how the stock control system automatically keeps the stock levels above a minim
level.

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.... [4]

(b) The software for the stock control system is stored on a central computer. The computer uses
random access memory (RAM), read only memory (ROM) and a hard disk drive (HDD).

The computer is a Von Neumann model computer system with a central processing
unit (CPU).

(i) State the purpose of the RAM, ROM and HDD in the central computer.

RAM ....

....

ROM ....

....

HDD ....

....
[3]

(ii) Identify **four** components that are part of the CPU.

Component 1 ....

Component 2 ....

Component 3 ....

Component 4 ....
[4]

QUESTION 9.

7 (a) Check digits are used to ensure the accuracy of input data.

A 7-digit code number has an extra digit on the right, called the check digit.

Digit position	1	2	3	4	5	6	7	8
Digit	–	–	–	–	–	–	–	–

The check digit is calculated as follows:

- each digit in the number is multiplied by its digit position
- the seven results are then added together
- this total is divided by 11
- the remainder gives the check digit (if the remainder = 10, the check digit is X)

(i) Calculate the check digit for the following code number. Show all your working.

4   2   4   1   5   0   8   …

....

....

....

Check digit ....

[2]

(ii) An operator has just keyed in the following code number:

3   2   4   0   0   4   5   X

Has the operator correctly keyed in the code number?

....

Give a reason for your answer.

....

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....

[3]

(b) When data are transmitted from one device to another, a parity check is ofte
each byte of data. The parity bit is often the leftmost bit in the byte.

(i) If a system uses even parity, give the parity bit for each of the following bytes:

parity bit

	1	1	0	0	1	1	0

parity bit

	0	0	0	0	0	0	1

[2]

(ii) A parity check can often detect corruption of a byte.

Describe a situation in which it **cannot** detect corruption of a byte.

....

(c) A sports events company uses a digital camera attached to a drone (small ⬚) video their events from the sky.

The video is stored as it is captured, on a device that is attached to the drone.

(i) Circle the most suitable type of storage to store the video.

Optical   Magnetic   Solid state

[1]

(ii) Explain the reasons for your choice in **part (c)(i)**.

....

....

....

.... [2]

6 Two examples of output devices are a 3D printer and a 3D cutter.

(a) The table contains **four** statements about 3D printers and 3D cutters.

Tick (✓) to show which statements apply to each output device, some statements may apply to both output devices.

Statement	3D printer (✓)	3D cutter (✓)
Outputs a physical 3D product		
Uses a high powered laser to create the output		
Creates 3D prototypes		
Uses layers of material to create the output		

[4]

(b) Identify the software used to create the computerised designs for 3D printing.

.... [1]

(c) A Digital Light Projector (DLP) is another example of an output device.

Describe how a DLP displays an image.

....

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....

6 Ishan is a member of a software community that develops computer games. He r
a new feature for one of the community's existing games.

(a) Ishan compiles the program before he issues it to the community.

(i) Explain **one** benefit of Ishan compiling the program.

....

.... [1]

(ii) Explain **one** drawback of Ishan compiling the program.

....

.... [1]

(b) Ishan shares the program with community members over the Internet, using Secure Socket Layer (SSL).

(i) Explain how Ishan will know he is on a secure website.

....

.... [1]

(ii) Describe how an SSL connection is established.

....

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.... [5]

(c) The community publishes completed games on the Internet as freeware.

Describe what is meant by freeware.

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.... [4]

(d) The program files for the games are compressed before they are published on the Internet.

(i) Describe **one** benefit of compressing the program files.

....

....

....

.... [2]

(ii) State whether **lossy** or **lossless** compression should be used.

.... [1]

6 Touch screen technologies can be described as resistive or capacitive.

Six statements are given about resistive and capacitive technology.

Tick (✓) to show if the statement applies to **Resistive** or **Capacitive** technology.

Statement	Resistive (✓)	Capacitive (✓)
This touch screen has multi-touch capabilities		
This touch screen cannot be used whilst wearing gloves		
This touch screen is made up of two layers with a small space in between		
This touch screen uses the electrical properties of the human body		
This touch screen is normally cheaper to manufacture		
This touch screen has a quicker response time		

[6]

7 Gerald uses a keyboard to enter a website address into the address bar of his browser.

(a) Describe how Gerald's key presses on his keyboard are processed by the computer.

....

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....

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.... [4]

(b) State **three** functions of a browser.

1 ....

....

2 ....

....

3 ....

....
                                                                                                              [3]

(c) The website Gerald visits uses https.

Explain what is meant by https.

....

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....

....

.... [3]

(d) For the fourth question, he writes the answer:

"This is when a person copies another person's computer program and tries to cl̲...
own."

State what Jesse is describing.

.... [1]

(e) For the fifth question, he writes the answer:

"This is the legal protection that a person can obtain, to provide protection against his work being stolen."

State what Jesse is describing.

.... [1]

7 The Von Neumann model for a computer system has several components that are used in the fetch-execute cycle.

(a) One component is main memory.

(i) Describe what is meant by main memory and how it is used in the Von Neumann model for a computer system.

....

....

....

....

....

.... [3]

(ii) State **two** other components in the Von Neumann model for a computer system.

1 ....

2 ....

[2]

(b) Computer systems often use interrupts.

Five statements are given about interrupts.

Tick (✓) to show if each statement is **True** or **False**.

Statement	True (✓)	False (✓)
Interrupts can be hardware based or software based		
Interrupts are handled by the operating system		
Interrupts allow a computer to multitask		
Interrupts work out which program to give priority to		
Interrupts are vital to a computer and it cannot function without them		