



Name:

Index:

Reg.no.:

Class:

Date:

4.1 Types of software and interrupts

Candidates should be able to:

- 1 Describe the difference between system software and application software and provide examples of each
- 2 Describe the role and basic functions of an operating system
- 3 Understand how hardware, firmware and an operating system are required to run applications software
- 4 Describe the role and operation of interrupts

Notes and guidance

- System software provides the services that the computer requires, including operating system and utility software
- Application software provides the services that the user requires
- Including:
 - managing files
 - handling interrupts
 - providing an interface
 - managing peripherals and drivers
 - managing memory
 - managing multitasking
 - providing a platform for running applications
 - providing system security
 - managing user accounts
- Applications are run on the operating system
- The operating system is run on the firmware
- The bootloader (firmware) is run on the hardware
- Including:
 - how an interrupt is generated
 - how it is handled using an interrupt service routine
 - what happens as a result of the interrupts
- Software interrupts include division by zero and two processes trying to access the same memory location
- Hardware interrupts include pressing a key on the keyboard and moving the mouse

0478/13 – JUNE 2019

(c) The computer has an operating system.

(i) A signal causes the operating system to stop and assess what to do next.

Identify the name of this signal.

..... [1]

(ii) State **two** functions of an operating system.

1

2 [2]

0478/13 – NOVEMBER 2019

(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		

[5]

0478/12 – JUNE 2020

(c) An interrupt signal is sent from the printer to the computer.

(i) Give **two** examples of when a printer would generate an interrupt signal.

Example 1

Example 2 [2]

(ii) Many devices send interrupt signals.

Identify the software in the computer that will receive and manage all interrupt signals.

..... [1]



- (c) Computers based on the Von Neumann model, for a computer system, use interrupts.

Explain why interrupts are needed.

.....

.....

.....

..... [2]

NOVEMBER 2021 (2)

- 9 Padma opens an application on her computer.

An interrupt is generated to inform the Central Processing Unit (CPU) that the application has been opened.

- (a) Give **three** other examples of when an interrupt signal could be generated.

1

2

3 [3]

- (b) State what would happen if interrupt signals were **not** used in a computer.

.....

..... [1]

NOVEMBER 2021 (3)

- 4 Frederick prints a document that he has typed.

The printer begins to print the document, but then a message is displayed on Frederick's computer to say that the paper has jammed.

- (a) Describe the role of an interrupt in generating a message on the computer that the paper has jammed.

.....

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.....

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.....

.....

..... [4]

JUNE 2023

- 4 Complete the statements about different types of software.

Use the terms from the list.

Some of the terms in the list will **not** be used. You should only use a term once.

application assembly language bootloader central processing unit (CPU)

firmware hardware operating output system user

..... software provides the services that the computer requires; an example is utility software.

..... software is run on the operating system.

The system is run on the firmware, which is run on the

[4]



JUNE 2023 (2)

10 A user has both system software and application software installed on their computer.

(a) Describe the difference between system software and application software.

Give an example of each software in your answer.

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) State which component in the computer would store both types of software when the power is turned off.

..... [1]

JUNE 2023 (3)

11 Software is installed on a computer to manage files, memory and multitasking.

(a) State the name of the software that can do these tasks.

..... [1]

(b) Give **one** task that the software allows the user to do to manage files.

..... [1]

(c) Describe what is meant by managing memory.

.....

.....

.....

..... [2]

(d) A signal is sent within the computer to allow multitasking to occur.

State the name of this type of signal.

..... [1]



- 3 The table contains **four** descriptions about a computer system.

Complete the table by writing the correct term for each description.

Term	Description
.....	A collective term for the physical components of the computer system.
.....	A type of software that provides services that the user requires and allows the user to perform tasks on the computer.
.....	A type of software that manages the main functions of the computer, including managing files and managing memory.
.....	A type of software that is stored in the read only memory (ROM). It includes the basic input output system (BIOS) and the bootloader.

[4]

- (c) Interrupts can be hardware based or software based.

A key press is one example of a hardware interrupt.

- (i) Give **two** other examples of a hardware interrupt.

- 1
-
- 2
-

[2]

- (ii) Give **two** examples of a software interrupt.

- 1
-
- 2
-

[2]

- (d) The mobile telephone has an operating system.

Describe the purpose of the operating system.

.....

.....

.....

.....

.....

..... [3]

MJ2024/11

- 6** A computer needs firmware and system software to operate.

- (a) State the purpose of firmware.

.....

..... [1]

- (b) Give **one** example of firmware.

..... [1]

- (c) Give **two** examples of system software.

1

2 [2]

- 9 A printer runs out of ink and needs a new ink cartridge. An interrupt is sent and a message is generated to notify the user that the ink cartridge is empty.

(a) Complete the paragraph about the use of an interrupt in this process.

Use the terms from the list.

Some of the terms in the list will **not** be used. You should only use a term once.

binary	clock	computer	data	error
fetch–decode–execute cycle	hexadecimal	higher	interrupt queue	
interrupt service routine (ISR)	lower	printer	priority level	
secondary storage	sorting	transmission		

The sends an interrupt to the
 The interrupt is given a
 The processor completes its current
 and checks the
 to see if there is an interrupt with
 priority than the current task. If there is, it stores
 the current task and fetches the interrupt. It then calls the
, which is a sequence of instructions that
 handles the interrupt. The interrupt is handled, which generates a message to the user to
 notify them that the ink cartridge is empty.

[7]

(b) Handling interrupts is one function of an operating system.

Give **two** functions of an operating system that relate to memory.

1

2

[2]

- 9 An interrupt is a type of signal that is used in a computer.

(a) State the name of the type of software that manages interrupts.

..... [1]

[5]

3 A computer has an operating system (OS).

Function name	Description
managing memory	
..... 	allows application software to run on the computer
managing peripherals	



MILANDHOO SCHOOL
Enter to Learn - Leave to Serve

(b) The OS handles interrupts.

(i) State the purpose of an interrupt.

.....
..... [1]

(ii) Identify **one** input device and **one** example of an interrupt that it can generate.

Input device
Interrupt [1]

(ii) Describe how the compiler reports errors.

.....
.....
.....
..... [2]

(iii) A processor is currently executing a program. The processor receives an interrupt.

Explain how the processor manages the current program and the interrupt.

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
..... [5]

MJ2024/12

(c) Describe the difference between system software and application software.

.....

.....

.....

.....

..... [2]

ON2024/12

1 Different types of software can be run on a computer.

(a) State what is meant by software.

.....

..... [1]

(b) Utility software is one type of software that can be run on a computer.

Tick (✓) **one** box to show which software is an example of utility software.

- | | |
|----------------------|--------------------------|
| A spreadsheet | ☐ |
| B anti-virus | ☐ |
| C web browser | ☐ |
| D database | ☐ |

[1]

(c) Identify the type of software that manages inputs and outputs for the computer.

..... [1]

MJ2025/11

(b) The robot has firmware.

State what is meant by firmware.

.....

..... [1]



(c) Interrupts are generated when the robot is operating in the factory.

Give **two** examples of interrupts that may be generated when the robot is in operation.

- 1
- 2

[2]

9 Each employee in a finance company has a computer and an electronic account.

(a) Each computer has an operating system. One function of the operating system is to manage memory.

Describe the role of the operating system in managing memory.

.....

.....

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.....

.....

.....

[3]

4.2 Types of programming language, translators and integrated development environments (IDEs)

Candidates should be able to:

- 1 Explain what is meant by a high-level language and a low-level language, including the advantages and disadvantages of each
- 2 Understand that assembly language is a form of low-level language that uses mnemonics, and that an assembler is needed to translate an assembly language program into machine code
- 3 Describe the operation of a compiler and an interpreter, including how high-level language is translated by each and how errors are reported

Notes and guidance

- Advantages and disadvantages include:
 - ease of reading and writing code, e.g. low-level is hard to read
 - ease of debugging code
 - machine independence
 - direct manipulation of hardware
- A compiler translates the whole code at once before executing it, producing an executable file
- An interpreter translates and executes the code line-by-line
- A compiler provides an error report for the whole code if errors are detected
- An interpreter stops execution when an error is found



- 4 Explain the advantages and disadvantages of a compiler and an interpreter
- 5 Explain the role of an IDE in writing program code and the common functions IDEs provide
 - Including an understanding that an interpreter is mostly used when developing a program and a compiler is used to translate the final program
 - Including:
 - code editors
 - run-time environment
 - translators
 - error diagnostics
 - auto-completion
 - auto-correction
 - prettyprint

0478/11 – June 2019

- 7** Annie writes a paragraph of text as an answer to an examination question about programming languages.

Using the list given, complete Annie's answer by inserting the correct **six** missing terms. Not all terms will be used.

- Assembly
- Converter
- Denary
- Hexadecimal
- High-level language
- Low-level language
- Machine Code
- Source Code
- Syntax
- Translator

The structure of language statements in a computer program is called the

..... . A programming language that uses natural

language statements is called a When programs

are written in this type of language they need a to

convert them into

A programming language that is written using mnemonic codes is called a

..... . An example of this type of language is

..... language.

[6]



- 6 Ishan is a member of a software community that develops computer games. He has programmed 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]

- 2 A programmer uses a high-level language to write a computer program.

(a) **Four** statements are given about high-level programming languages.

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

Statement	True (✓)	False (✓)
High-level languages need to be translated into machine code to run on a computer		
High-level languages are written using mnemonic codes		
High-level languages are specific to the computer's hardware		
High-level languages are portable languages		

[4]

(b) Tick (✓) to show which of the following is an example of a high-level language program.

Example program	Tick (✓)
1011100000110000 0000011011100010	
INP STA ONE INP STA TWO ADD ONE	
a = input() b = input() if a == b: print("Correct") else: print("Incorrect")	

[1]

- 4 Assemblers, compilers and interpreters are types of translators.

Tick (✓) to show which statements apply to each translator. Each statement may apply to more than one type of translator.

Statement	Assembler (✓)	Compiler (✓)	Interpreter (✓)
Translates low-level language to machine code			
Translates high-level language to machine code			
Produces error messages			
Translates high-level language one line at a time			
Produces an executable file			

[5]

- 2 Both an interpreter and a compiler can be used when writing a program in a high-level language.

(a) Explain why a programmer would make use of both an interpreter and a compiler.

.....

.....

.....

.....

.....

.....

.....

.....

.....

[4]

(b) Give **three** reasons why a programmer would choose to write a program in a high-level language, instead of a low-level language.

Reason 1

.....

Reason 2

.....

Reason 3

.....

[3]

7 Adeel has used a high-level language to program a mobile application.

(a) Describe what is meant by a high-level language.

.....

.....

.....

..... [2]

(b) Adeel uses an interpreter while developing and testing the application.

Adeel uses a compiler when the application is ready to be shared with others.

Compare the features of interpreters and compilers.

.....

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..... [4]

- 5 Six statements are given about programming languages.

Tick (✓) to show whether each statement applies to high-level language, assembly language or machine code. Some statements may apply to more than one type of programming language.

Statement	High-level language (✓)	Assembly language (✓)	Machine code (✓)
it requires a translator to be processed by a computer			
it is an example of low-level language			
it uses mnemonics			
it uses English-like statements			
it can be used to directly manipulate hardware in the computer			
it is portable			

[6]

NOVEMBER 2021 (1)

- 8 Victoria develops a computer game to sell on a gaming website. She writes her program using English-like statements.

(a) State which type of programming language Victoria is using.

..... [1]

- (b) Victoria uses **two** different types of translator when creating the program for the computer game.

State which translator is the most suitable for the given tasks.

Give the benefits of using that translator for the task.

You must choose a different translator for each task.

- (i) To translate the code during development of the game.

Translator

Benefits

.....

[3]

- (ii) To translate the final program and upload to the website for distribution, without the source code.

Translator

Benefits

.....
.....
.....
.....
.....

[3]

NOVEMBER 2021 (2)

- 6 A programmer can use translators, such as an interpreter and a compiler, when developing a computer program.

(a) Give **one** similarity between a compiler and an interpreter.

.....
..... [1]

(c) Identify **one** other type of translator.

..... [1]

MARCH 2022

- 7 Ishani is a software developer who is creating a new computer game.

(a) Ishani uses an interpreter and a compiler at different stages of the game creation.

(i) Explain when it is most appropriate for Ishani to use an interpreter.

.....
.....
.....
.....
.....
..... [3]



(ii) Explain when it is most appropriate for Ishani to use a compiler.

.....

.....

.....

.....

.....

..... [3]

MARCH 2023

2 A programmer has designed a three-dimensional (3D) interactive computer game. They are going to develop a program for the game. The program needs to run efficiently, but it must also be developed as soon as possible.

(a) Tick (✓) **one** box to identify whether the programmer should use a high-level language or a low-level language to develop the program.

Explain the reasons for your choice.

High-level language

☐

Low-level language

☐

Reasons for your choice

.....

.....

.....

.....

.....

.....

.....

..... [4]

JUNE 2023

7 A programmer uses a low-level language to write a computer program for a vending machine.

(a) Describe what is meant by a low-level language.

.....

.....

.....

..... [2]

(b) Give **two** reasons why the programmer would choose to write the computer program in a low-level language instead of a high-level language.

1

.....

2

.....

[2]

JUNE 2023 (2)

(c) The programmer uses an integrated development environment (IDE) to create the computer program.

One function of the IDE is that it has the built-in compiler.

Give **three** other common functions of an IDE.

1

2

3

[3]



4 A programmer writes a computer program in a high-level language.

(a) Tick (✓) **one** box to show which statement is a benefit of writing a program in a high-level language, instead of a low-level language.

A The program can directly manipulate the hardware.

☐

B The program is machine independent.

☐

C The program is more memory efficient.

☐

D The program is quicker to execute.

☐

[1]

(b) Translators are used to translate the high-level language so that it can be processed by the computer.

(i) State what the high-level language is translated into.

..... [1]

(ii) One translator converts and executes the code line by line.

Identify which type of translator would do this.

..... [1]

(iii) One translator creates an error report displaying all the errors in the code before it can be executed.

Identify which type of translator would do this.

..... [1]

(iv) One translator creates an executable file.

Identify which type of translator would do this.

..... [1]

9 Programs can be written in a low-level language.

(a) Identify **three** features of a low-level language.

Feature 1

Feature 2

Feature 3

[3]

(b) Give **two** examples of a low-level language.

Example 1

Example 2

[2]

(c) Give **one** drawback of writing programs in a low-level language, instead of a high-level language.

.....

..... [1]

7 Cameron writes software for coffee machines. He uses assembly language to write his software.

(a) Tick (✓) to show whether assembly language is an example of a high-level language, a low-level language or machine code.

Tick (✓)

High-level language ☐

Low-level language ☐

Machine code ☐

[1]

(b) Identify the translator that is required for assembly language.

..... [1]

(c) Give **two** reasons why Cameron chooses to write the software for the coffee machines in assembly language.

Reason 1

.....

Reason 2

.....

[2]

(d) Give **two** drawbacks of using assembly language to write programs.

Drawback 1

.....

Drawback 2

.....

[2]

Q. Explain what **Interrupt Service Routine (ISR)** is.

An **Interrupt Service Routine (ISR)** is a special program that runs when the computer is interrupted by an event.

- An **interrupt** happens when a device (like a keyboard or printer) needs the CPU's attention.
- The CPU **pauses its current task** and jumps to the ISR to handle the event.
- After completing the ISR, the CPU goes back to the task it was doing.

MJ2023/12

5 A programmer writes a computer program using a high-level language.

(a) Tick (✓) **one** box to show which statement is correct about writing computer programs in a high-level language.

A Mnemonics are used to create instructions.

☐

B The computer program is harder to debug than a low-level language program.

☐

C The computer program is machine independent.

☐

D The hardware of the computer can be directly manipulated.

☐

[1]

ON2024/11

- (e) The programmer uses an integrated development environment (IDE) to write the program.

A built-in translator to convert the program into machine code is one way that the IDE helps the computer programmer.

Describe **three** other ways the IDE can help the programmer.

[6]

ON2024/13

- 7 A computer programmer uses an integrated development environment (IDE) when creating a computer program.

Explain the purpose of the IDE.

[4]

FM2025/11

7 Programs can be written in a high-level language or a low-level language.

(a) Machine code is one type of low-level language.

Identify **one** other type of low-level language.

Identify the translator that is needed for the type of low-level language you have identified.

Type of low-level language

Translator [2]

(b) A high-level language can be translated into a low-level language, using a compiler or an interpreter.

Describe the advantages of using an interpreter instead of a compiler during software development.

.....

.....

.....

.....

.....

.....

.....

..... [4]

MJ2025/12

3 A programmer writes a program to store and sort all the data for the books in her home library.

(a) The programmer uses a high-level language to write the program.

One reason for writing the program using a high-level language is that it is easier to read and write.

Give **two** other reasons why the programmer chose to use a high-level language.

1

.....

2

..... [2]



- (b) The programmer uses an integrated development environment (IDE) to write the program.

One function of the IDE is to provide a translator.

- (i) Complete the statements about translators.

Use the terms from the list. Some of the terms will **not** be used. You should only use a term once.

all together	all	assembler	binary	error
executable file	executing	interrupt	line by line	
partial code	some	translating	whole code	

A compiler translates the at once before
..... it. A compiler produces an error report that displays
..... errors.

An interpreter translates and executes the code

An interpreter stops execution when an is found
and continues once it is corrected.

[5]

- (ii) Give **two** other functions commonly found in an IDE.

State the role of each function.

Function 1

Role

.....

Function 2

Role

.....

[4]