Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2025

Computer Science

Sections A & B

Ordinary Level

Wednesday 21 May   Morning 9:30 – 11:00

130 marks

Examination Number

Date of Birth

For example, 3rd February
2005 is entered as 03 02 05

For Examiner use only								
Section	Question	Mark	Section	Question	Mark	Section	Question	Mark
A	1		A	7		B	13	
	2			8			14	
	3			9			15	
	4			10		Section B Total:		
	5			11		P1 Total (A+B):		
	6			12		C	16	
						P2 (Sec C) Total:		
Section A Total:						Total:		

Instructions

There are **three** sections in this examination. Section A and B appear in this booklet. Section C is in a separate booklet that will be provided for the computer-based element.

Section A	Short Answer Questions	Attempt any nine questions All questions carry equal marks	54 marks
Section B	Long Questions	Attempt any two questions All questions carry equal marks	76 marks
Section C	Programming	Answer all question parts	80 marks

Calculators may **not** be used during this section of the examination.

The superintendent will give you a copy of page 78 (Logic Gates) of the *Formulae and Tables* booklet on request. You are not allowed to bring your own copy into the examination.

Write your answers for Section A and Section B in the spaces provided in this booklet. There is space for extra work at the end of the booklet. Label any such extra work clearly with the question number and part.

Answer any **nine** questions.

Question 1

The Python program below takes a person's age as an input and stores it in the variable named `age`. It then prints out A, B, or C, depending on the value entered for the person's age.

```
1  age = int(input("Please enter your age:"))
2  if age > 16:
3    print("A")
4  elif age < 16:
5    print("B")
6  else:
7    print("C")
```

For each value in Column A, write the letter output by the program in Column B.

Column A Value entered for age	Column B Program output (A, B, or C)
21	
-1	
0	
16	
100	
15	

Question 2

It is common for people to store files in the cloud. State **two** reasons why you might want to use cloud storage rather than local storage.

1.
2.

Question 3

(a) Choose the appropriate number system from the list below and place it in Column B to match the correct base value in Column A.

Hexadecimal   **Binary**   **Decimal**

Column A Base value	Column B Number system
2	
10	
16	

(b) Explain why computers use the binary number system rather than the decimal number system.

Question 4

Unicode has largely replaced ASCII worldwide as the encoding method for character sets. Suggest **one** reason for this.

Question 5

There are a number of variable declarations in the Python program below.

```
1  name = "John"
2  age = 17
3  student = True
4  exam_marks = [71, 82, 75, 93, 65]
5  average_mark = 77.2
```

Choose the appropriate Python data type from the list below and place it in Column B to match the variable from the Python program in Column A.

integer   **float**   **bool**   **list**   **string**

Column A Variable	Column B Python data type
name	
age	
student	
exam_marks	
average_mark	

Question 6

The Apple Vision Pro is a new augmented reality (AR) headset that blends the digital world with the real world. It allows users to interact with virtual objects, play games, and work in a fully immersive digital environment.

As technology such as Apple Vision Pro becomes more advanced and popular, it raises social and ethical concerns. Outline **two** such concerns that this device may raise.

Concern 1:
Concern 2:

Question 7

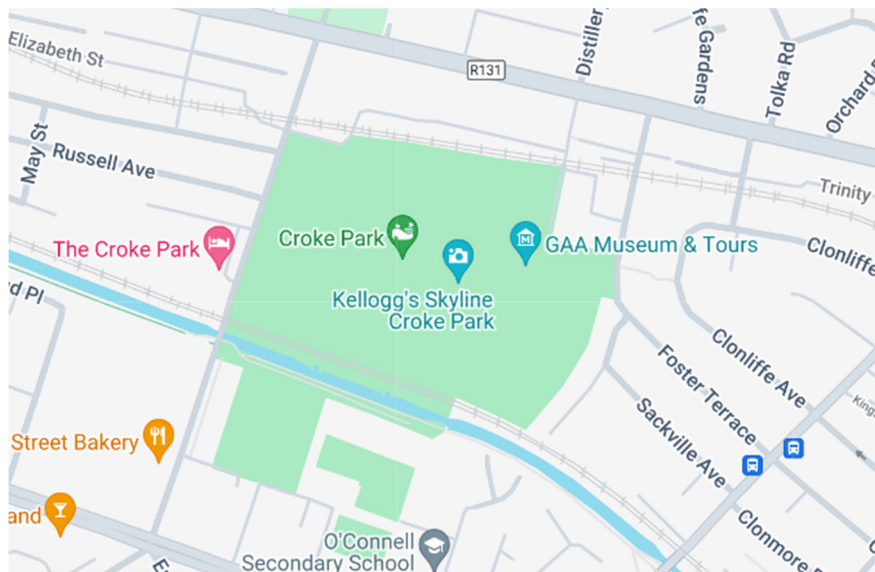Abstraction is used in maps, such as that in **Figure 1** below, to help users read them with more ease.

Figure 1

(a) List **two** ways in which abstraction has been used in the map in **Figure 1**.

1.
2.

(b) What is meant by the term 'abstraction' in relation to computer science?

Question 8

Jeremy is building a desktop computer, such as that in **Figure 2**, using various pieces of hardware.

Outline the purpose of the following components of a desktop computer:

Figure 2

    (i)   Central Processing Unit (CPU)
    (ii)   Input devices
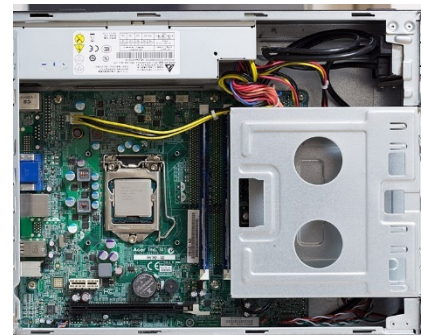
CPU:
Input devices:

Question 9

State whether each of the following statements is true or false by putting a tick (✓) in the appropriate box.

	True	False
The Internet and the World Wide Web are the same thing	☐	☐
HTTP is a mark-up language for making web pages	☐	☐
A URL is an address for a web page	☐	☐
Data is communicated over the World Wide Web using HTTP	☐	☐
HTTPS is more secure than HTTP	☐	☐
The server sends the first communication in the client-server model	☐	☐

Question 10

The flowchart, in **Figure 3** below, is a representation of an algorithm. Examine the flowchart and answer the question that follows.
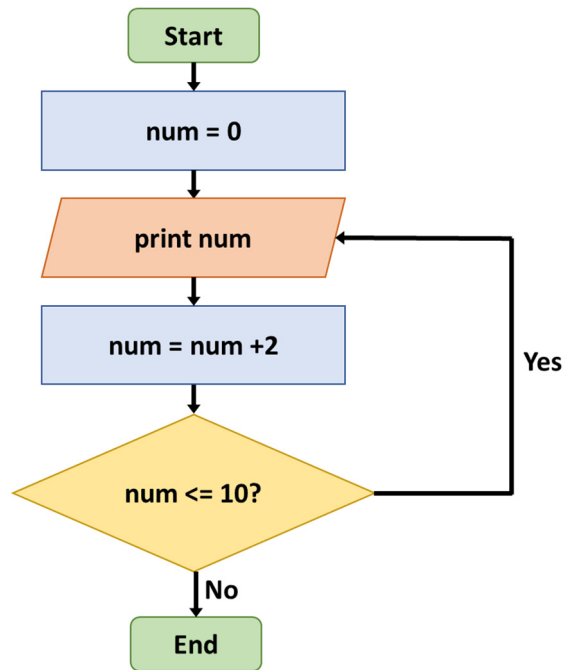

Figure 3

Calculate the output of the algorithm.

Question 11

A selection sort (simple sort), which repeatedly selects the smallest unsorted number, is to be used to sort the list of numbers below into ascending order. Use the boxes below to show the state of the list after each swap. The initial state and the final state of the list have been completed.

List = [13, 54, 4, 81, 92, 26]

Initial state	13	54	4	81	92	26
Swap 1						
Swap 2						
Swap 3						
Swap 4						
Swap 5 (Final state)	4	13	26	54	81	92

Question 12

A piece of Python code is displayed below.

```
1  myNum = "6"
2  result = myNum + 3
3  print (result)
```

When the code is run in an integrated development environment (IDE), it produces the following error:

```
TypeError: can only concatenate string (not "integer") to string
```

Explain why this error has occurred and how it could be fixed.

Section B	Long Questions	76 marks

Answer any **two** questions.

Question 13

(a) The development of the world's first computer, ENIAC (electronic numerical integrator and computer) in 1945, is a major milestone in computing.

Figure 4

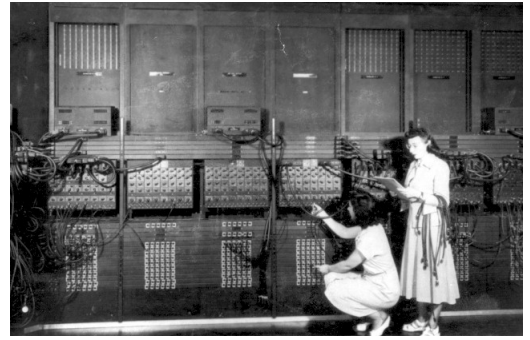**(i)** List **three** other important computing developments that have taken place in the last 100 years.

1.
2.
3.

(ii) Choose **one** of the developments from **part (i)** and explain its importance.

Development:
Explain:

(iii) Artificial intelligence and machine learning are major trends in computing that have emerged over the last decade. Name and explain **one** other emerging trend in computing.

Name:
Explain:

(b) Modern computer systems consist of the four layers shown in **Figure 5** below.
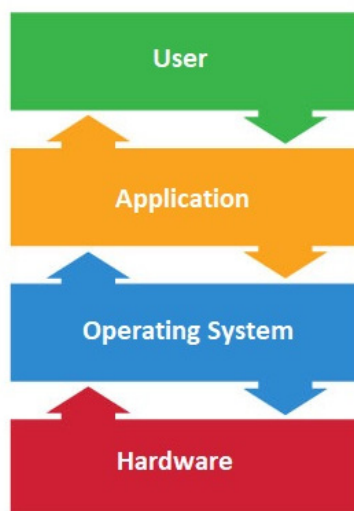
Figure 5

(i) Explain the purpose of the application and hardware layers.

Application:
Hardware:

(ii) Apple iOS, Microsoft Windows, and Android OS are all examples of operating systems. List **three** functions of an operating system.

1.
2.
3.

This question continues on the next page.

(iii) The enhancement of computers over the last few decades has allowed for the development of specific-purpose computers such as embedded systems. Describe **two** examples of embedded systems in our everyday lives.

1.
2.

(c) Name **two** computer-related careers and for each, list **two** activities that the person would undertake.

Career 1:
Activity 1:
Activity 2:

Career 2:
Activity 1:
Activity 2:

Question 14

A vending machine, such as that in **Figure 6**, has the following options available for users.

Item code	Item name	Price (€)
A1	Water, flavoured	1.5
A2	Water	1.2
B1	Oreos	2.5
C1	Crisps, Salt & Vinegar	2
C2	Crisps, Cheese & Onion	2

Figure 6

Customers deposit coins into the vending machine and input the two-character item code (for example, A2 for water) for their desired selection. If the customer has deposited enough funds, the vending machine dispenses the chosen item and returns any necessary change.

(a) A section of the Python code for the vending machine program is shown below.

```python
1  if money >= price:
2      dispenseItem
3      giveChange(money - price)
4  else:
5      print("Error - not enough money inserted")
```

(i) Line 1 of the code has a conditional statement. Explain the purpose of this conditional statement.

(ii) State a suitable data type for the variable `price`.

This question continues on the next page.

(b) The vending machine needs to be tested before it is released.

    (i) Describe a unit test that should take place for the vending machine.

    (ii) The table below shows a test plan for the vending machine. Some of the entries have been left blank. Complete the test plan by filling in the correct information in the blank spaces.

Code entered	Money inserted (€)	Expected result
B1	3	Oreos dispensed, €0.50 change given
	1.2	Water dispensed, no change given
C1		Error – not enough money inserted
C2	0.75	

    (iii) Name and explain a stage of software testing, other than unit testing, that should take place to ensure the vending machine works as intended when it is released.

Name:
Explain:

(iv) Describe **two** design features that could be incorporated into the vending machine to make it accessible to as many different types of users as possible.

1.
2.

(c) When the user inserts the correct amount of money and enters the code of an item, the vending machine will perform a number of checks. Create an algorithm or flowchart to describe the process outlined in the following bullet points:
- The vending machine checks if there are any of that particular item available.
- If there are any items available, one is dispensed to the user.
- If there are no items available, the user is asked to enter another code.
- If there are less than three of that particular item remaining a message is sent to head office to order more stock for the vending machine.

Question 15

(a)   A museum has an information point, such
as that shown in **Figure 7**, to inform visitors
about the museum's art collection.

There is only one information point at the
entrance to the museum and it provides
users with images and text about the
artwork.

However, there have been a number of
complaints relating to the user experience,
particularly in how the information from
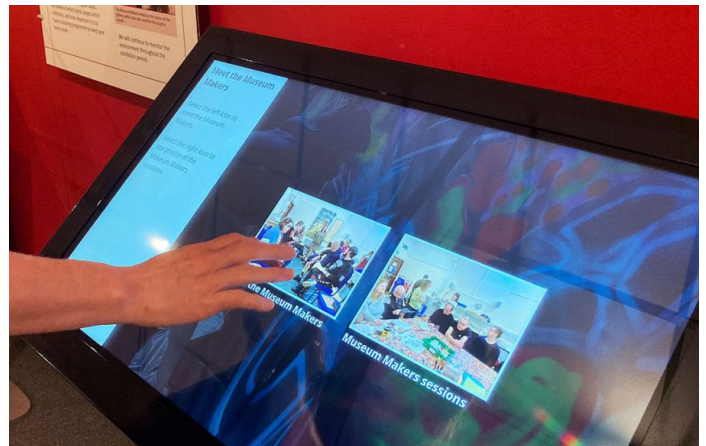the information point is delivered to users.

Figure 7

You are part of a design team working on redeveloping the visitor information point so that
it allows users to access the information using an app on their own smart device.

(i)   Identify **three** potential stakeholders for this app. For each stakeholder, identify **one**
requirement they have for the app.

Stakeholder 1:
Requirement:
Stakeholder 2:
Requirement:
Stakeholder 3:
Requirement:

(ii) Describe **two** adaptive or assistive technology features that the design team should focus on for the project.

Technology 1:
Technology 2:

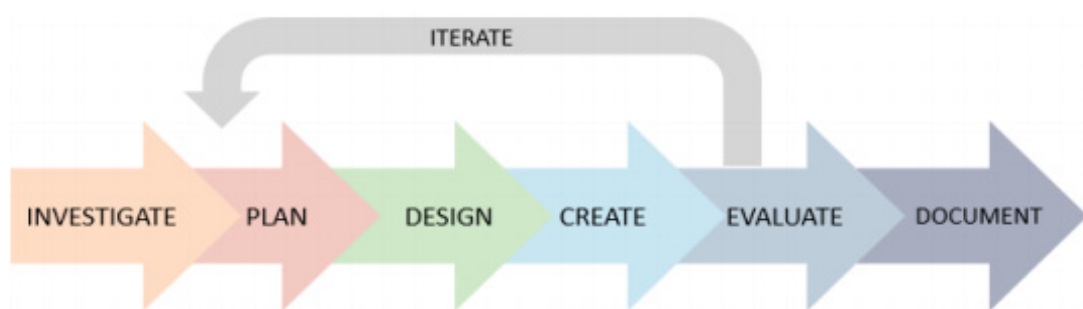**(b)** The diagram in **Figure 8** below illustrates the typical stages in a software development design process.

Figure 8

(i) Outline **one** activity that your team will undertake at each of the four stages listed in the answer box below.

Investigate:
Plan:
Evaluate:
Document:

This question continues on the next page.

(ii) One of the team has suggested using a staged software development process rather than the iterative development process shown in **Figure 8**. Put forward **two** arguments for retaining the iterative development process.

1.
2.

(c) One of the designers wants to build location tracking into the app to see exactly where visitors go in the museum.

(i) Describe **one** benefit of including this technology.

(ii) Describe **one** ethical concern of including this technology.

Space for extra work.

Indicate clearly the number and part of the question(s) you are answering.

Space for extra work.

Indicate clearly the number and part of the question(s) you are answering.

Space for extra work.

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Leaving Certificate – Ordinary Level

Computer Science – Sections A & B

Wednesday 21 May
Morning 9:30 – 11:00

Coimisiún na Scrúduithe Stáit
State Examinations Commission

Leaving Certificate Examination 2025

Computer Science

Section C

Ordinary Level

Wednesday 21 May   Morning 11:30 – 12:30

80 marks

Instructions

There is one section in this paper.

Section C   Programming   One question   80 marks

                                            Answer all question parts

Answer all parts of the question on your digital device.

Calculators may be used during this section of the examination.

The *Formulae and Tables* booklet cannot be used for this section of the examination.

The superintendent will give you a copy of the *Python Reference Guide*.

Ensure that you save your work regularly and when you complete each question part.

Save your files using the naming structure described at the beginning of each question part.

If you are unable to get some code to work correctly, you can comment out the code so that you can proceed. The code that has been commented out will be reviewed by the examiner.

Rough work pages are provided at the end of this booklet. Please note that this booklet is not to be handed up and will **not** be reviewed by an examiner.

At the end of the examination it is your responsibility to ensure that you have saved all of your files onto your external media.

You will be provided with a brown envelope for your external media. Write your examination number on this envelope and place your external media into it before sealing. Place this envelope in the pouch at the front of the red envelope that contains your examination booklet from Section A and B.

There is no examination material on this page

Answer all question parts.

Question 16

(a) Open the program called **Question16_A.py** from your device. The source code is shown and described briefly below.

Before making any changes, you should save your working copy of the file using the format **ExaminationNumberQuestion16_A.py**. For example, you would save the file as **123456Question16_A.py** if your examination number was 123456.

Enter your examination number in the space provided on **line 2** in your Python file**.**

The program below is the start of a program to help floor tilers calculate the total cost of tiles. The program allows the user to enter the length of a room and then calculates and outputs the total area of the floor.

```
1  # Question 16(a)
2  # Examination Number:
3
4  print("The program")
5
6  length = float(input("What length is the room?: "))
7  width = 20
8
9  area = length * width
10
11 print("The area of the floor is:", area)
```

Make the following changes to the program:

(i) Modify the program so that it first prints out "Welcome to the Tilers Mate" instead of "The program". When the program is run the output should now look as follows:

```
Welcome to the Tilers Mate
What length is the room?: 10
The area of the floor is: 200.0
```

(ii) Modify the program to display a message stating the length that the user entered in metres. When the program is run the output should now look as follows:

```
Welcome to the Tilers Mate
What length is the room?: 10
You entered a length of: 10.0 metres
The area of the floor is: 200.0
```

(iii) Currently, the width of the room is "hard-coded" into the program. Modify the program so that the user is asked to enter the width of the room. The program should then display a message stating the width that the user entered, in metres.

When the program is run the output may now look as follows:

```
Welcome to the Tilers Mate
What length is the room?: 5
What width is the room?: 6
You entered a length of: 5.0 metres
You entered a width of: 6.0 metres
The area of the floor is: 30.0
```

(iv) Add a new variable with a suitable name for the cost per square metre and assign it the value of 15. This value should be printed to the screen in an appropriate sentence.

When the program is run the output may now look as follows:

```
Welcome to the Tilers Mate
What length is the room?: 5
What width is the room?: 6
You entered a length of: 5.0 metres
You entered a width of: 6.0 metres
The area of the floor is: 30.0
The cost per square metre is: 15
```

(v) The total cost for tiling the floor can be found by multiplying the cost per square metre by the area of the floor. Modify the program to print out the total cost in an appropriate sentence.

When the program is run the output may now look as follows:

```
What length is the room?: 5
What width is the room?: 6
You entered a length of: 5.0 metres
You entered a width of: 6.0 metres
The area of the floor is: 30.0
The cost per square metre is: 15
The total cost is: 450.0
```

This question continues on the next page.

(vi) If the total cost is greater than 1000 then a discount will apply. However, if the total cost is less than 100 then the tiler will not take on the job. Modify the program to output a message based on the following table:

Condition	Output
Cost is more than 1000	You are entitled to a 10% discount
Cost is between 100 and 1000 inclusive	You are not entitled to a 10% discount
Cost is less than 100	Sorry, job is too small

When the program is run the output may now look as follows:

```
What length is the room?: 5
What width is the room?: 6
You entered a length of: 5.0 metres
You entered a width of: 6.0 metres
The area of the floor is: 30.0
The cost per square metre is: 15
The total cost is: 450.0
You are not entitled to a 10% discount
```

Save your file using the format **ExaminationNumberQuestion16_A.py**. For example, you would save the file as **123456Question16_A.py** if your examination number was 123456.

(b) Open the program called **Question16_B.py** from your device. This file contains two comments on lines 1 and 2.

Before making any changes, you should use the format **ExaminationNumberQuestion16_B.py** to save your file. For example, you would save the file as **123456Question16_B.py** if your examination number was 123456.

Enter your examination number in the space provided on **line 2.**

Write a Python program that will calculate the total cost of tiles for a new house.

You should use comments throughout your program to explain your code. You may wish to reuse some of the code you used in **part (a)** as part of your solution.

Your program should meet the following requirements:

1. A message should be printed to the screen stating the following: "Tile Cost Calculator"

2. The user should be asked to enter the price of tiles per square metre. This amount can be a decimal number.

3. The user should be asked for the number of rooms to be tiled.

4. For each room, the number of the room should be printed and the user should be asked to enter the length and width of the room. The length and width can be a decimal number.

5. The total cost of the tiles should be printed to the screen. The amount should be rounded to 2 decimal places.

A sample output is shown below:

```
Tile Cost Calculator
How much do the tiles cost per square metre? 19.75
How many rooms do you want to tile? 3
Room  1
What width is the room?: 12
What length is the room?: 8
Room  2
What width is the room?: 9
What length is the room?: 6
Room  3
What width is the room?: 8.5
What length is the room?: 6.5
The total cost is EUR 4053.69
```

Save your file using the format **ExaminationNumberQuestion16_B.py**. For example, you would save the file as **123456Question16_B.py** if your examination number was 123456.

Space for rough work.

This page will not be reviewed by an examiner.

Space for rough work.

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Space for rough work.

This page will not be reviewed by an examiner.

Leaving Certificate – Ordinary Level

Computer Science – Section C

Wednesday 21 May
Morning 11:30 – 12:30