



GCSE

3500U10-1

MONDAY, 12 MAY 2025 – AFTERNOON

COMPUTER SCIENCE

Unit 1: Understanding Computer Science

**1 hour 45 minutes plus your additional
time allowance**

Surname _____

First name(s) _____

Centre Number _____

Candidate Number 0 _____

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	12	
2.	7	
3.	9	
4.	16	
5.	6	
6.	8	
7.	6	
8.	10	
9.	6	
10.	8	
11.	12	
Total	100	

INSTRUCTIONS TO CANDIDATES

Use black ink, black ball-point pen or your usual method.

You may use a pencil for graphs and diagrams only.

Write your name, centre number and candidate number in the spaces provided on the front cover.

Answer ALL questions.

Write your answers in the spaces provided in this booklet.

If you run out of space, use the additional page(s) at the back of the booklet, taking care to number the question(s) correctly.

(Turn over)

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the need for good English and orderly, clear presentation in your answers.

The total number of marks is 100.

Some questions will require you to draw on your knowledge from multiple areas of your course of study.

(Turn over)

Description	Control Unit	Arithmetic Logic Unit	RAM	Register
Stores data and instructions that the CPU can quickly access during program execution.				
Manages the execution of instructions, directing data flow within the CPU.				
Performs mathematical operations for executing the instructions in a computer program.				

Answer ALL questions.

1 (a) Tick (✓) ONE box for each component of a CPU that matches the description in the table opposite. [3 marks]

(b) (i) State the purpose of the program counter (PC) in a CPU. [1 mark]

(Turn over)

5

1 (b) (ii)

Name TWO other registers used by a CPU. [2 marks]

REGISTER 1: _____

REGISTER 2: _____

(Turn over)

1 (c) State TWO differences between RISC and CISC types of processor.

[2 marks]

1 (d) Describe an embedded system.
[2 marks]

1 (e) Describe the environmental impacts of the disposal of hardware components. [2 marks]

2 (a) Tick (✓) the statements that are TRUE when comparing the functional characteristics of solid-state and magnetic secondary storage technologies. [3 marks]

☐

Solid state storage technologies offer significantly slower access speeds compared to traditional hard disk drives (HDDs).

☐

Solid state storage retains stored data even when power is removed.

☐

With more moving mechanical parts, solid state storage devices are less durable and reliable than traditional HDDs.

(Turn over)



Solid state storage technologies generally consume less power than other technologies.



Since there are spinning disks and moving parts, solid state storage devices are less suitable for noise-sensitive applications.



Solid state storage devices are typically smaller and lighter than traditional HDDs, making them ideal for tablets.

2 (b) Describe the functional characteristics of optical storage technologies. [4 marks]

KEY: + = OR • = AND ⊕ = XOR ⊖ = NOT

X	Y	$\bar{X}$	$Y \oplus \bar{X}$	$(Y \oplus \bar{X}) + X$

- 3 (a) Complete the truth table on the page opposite. [4 marks]
- (b) Simplify the following Boolean expression using Boolean identities and rules. Clearly show each step. Do not use truth tables to simplify the expression. [5 marks]

$$A.\bar{B} + A.(\bar{A} + B)$$

(Turn over)

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Description	Physical Layer	Network Layer	Transport Layer
This layer is the transceiver that drives the signals on the network.			
This layer creates frames that move across the network.			
This layer establishes the connection between applications on different hosts.			

- 4. The TCP/IP 5-layer model is a conceptual model that characterises the transmission of data on a network.**
- (a) Tick (✓) ONE box for each layer that matches the description opposite.**
- [3 marks]**

4 (b) Complete the name of the following protocols and state their purpose:

(i) H _____

T _____

T _____

P _____

[2 marks]

Purpose:

(Turn over)

4 (b) (ii)

S _____

M _____

T _____

P _____

[2 marks]

Purpose:

(Turn over)

- 4 (c) Complete the diagram to show the missing content of a TCP/IP packet.**
[3 marks]

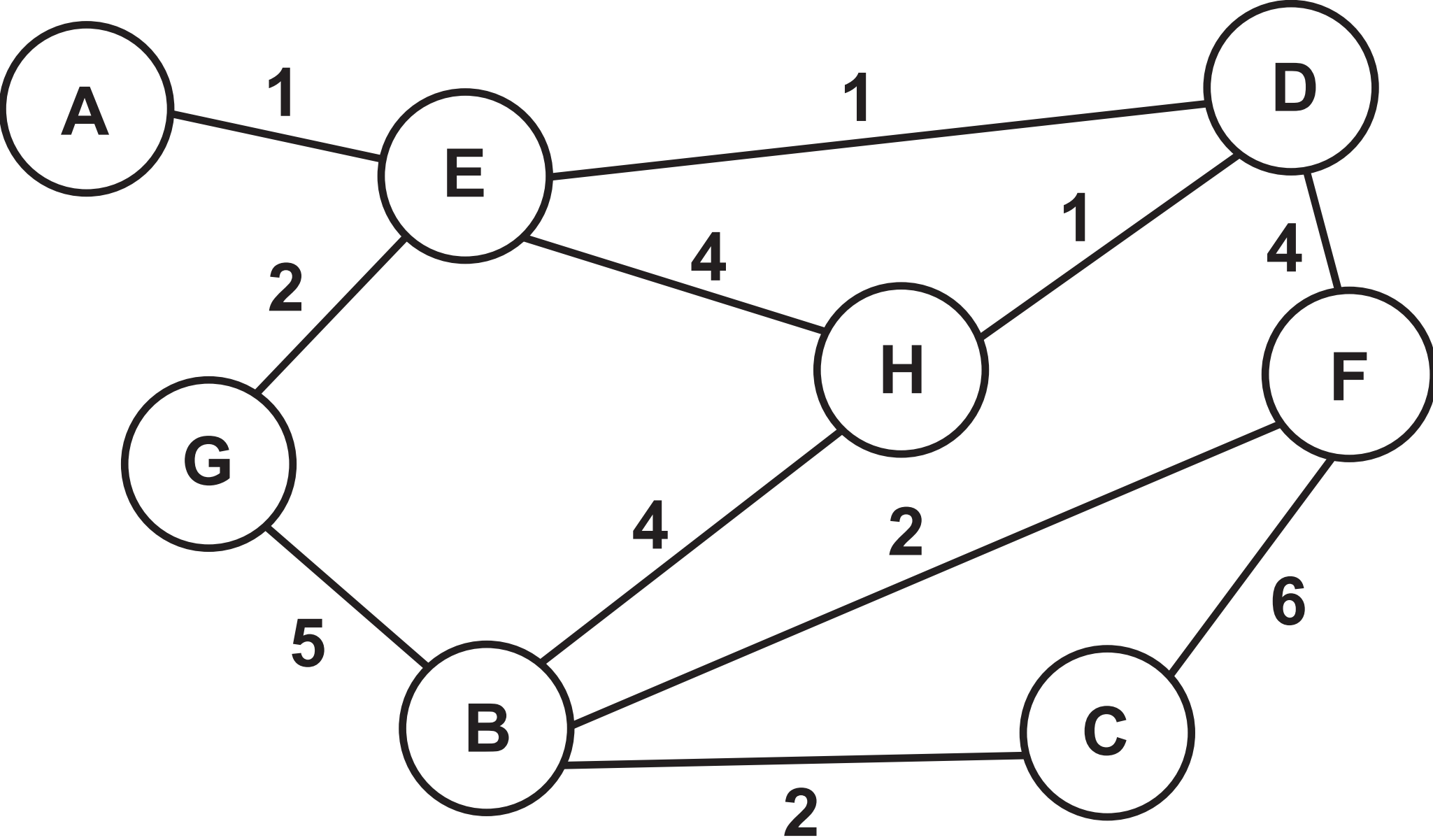
	The destination address
Other tracking information	
	A checksum that authenticates the data

4 (d) Describe the sequence of DNS operations that resolves a URL into an IP address. [6 marks]

[illegible]

(Turn over)

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5. The diagram opposite shows the routing cost between each node for data transmitted on a certain network.

Complete the table to indicate the lowest cost route between each origin and destination node.

[6 marks]

Origin	Destination	Lowest Cost	Route
E	F		
C	D		
A	B		

(Turn over)

6 (a) Showing your workings, determine the largest denary value that can be represented by:

(i) a 6 bit register. [2 marks]

6 (a) (ii)

a 3 digit hexadecimal number.

[2 marks]

6 (b) (i)

CIRCLE the binary addition that will result in an overflow error in a 4 bit register. [1 mark]

A 1011 + 0001

B 1011 + 0011

C 1000 + 1000

D 0100 + 1000

(Turn over)

6 (b) (ii)

State why this is the case. [1 mark]

6 (c) Explain how a computer system divides a number by 4. [2 marks]

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(Turn over)

```
1  length is real
2  width is real
3  perimeter is real
4  area is real
5
6  output "Enter the length of the rectangle: "
7  input length
8  output "Enter the width of the rectangle: "
9  input width
10
11 perimeter = 2 * (length * width)
12 area = length - width
13
14 output "Perimeter of the rectangle = ", perimeter
15 output "Area of the rectangle = ", area
```

7. The program opposite written using a high-level programming language is intended to calculate and output the perimeter and area of a rectangle. The program contains many errors.

Identify the errors and suggest a suitable change to the code to address each error.

- (a) Syntax error 1 [2 marks]

ERROR: _____

7 (a)

CHANGE: _____

30

7 (a) Syntax error 2 [2 marks]

ERROR: _____

CHANGE: _____

(Turn over)

7 (b) Logical error [2 marks]

ERROR: _____

CHANGE: _____

[illegible]

8. A Customer Relationship Management (CRM) software platform stores customer details.

The platform is designed to help businesses manage and analyse customer interactions, store contact information, track sales, and facilitate communication with customers.

(a) Create a draft CUSTOMER data structure using the table opposite.

Your design should include at least:

- THREE DIFFERENT data types**
- THREE DIFFERENT methods of validation. [6 marks]**

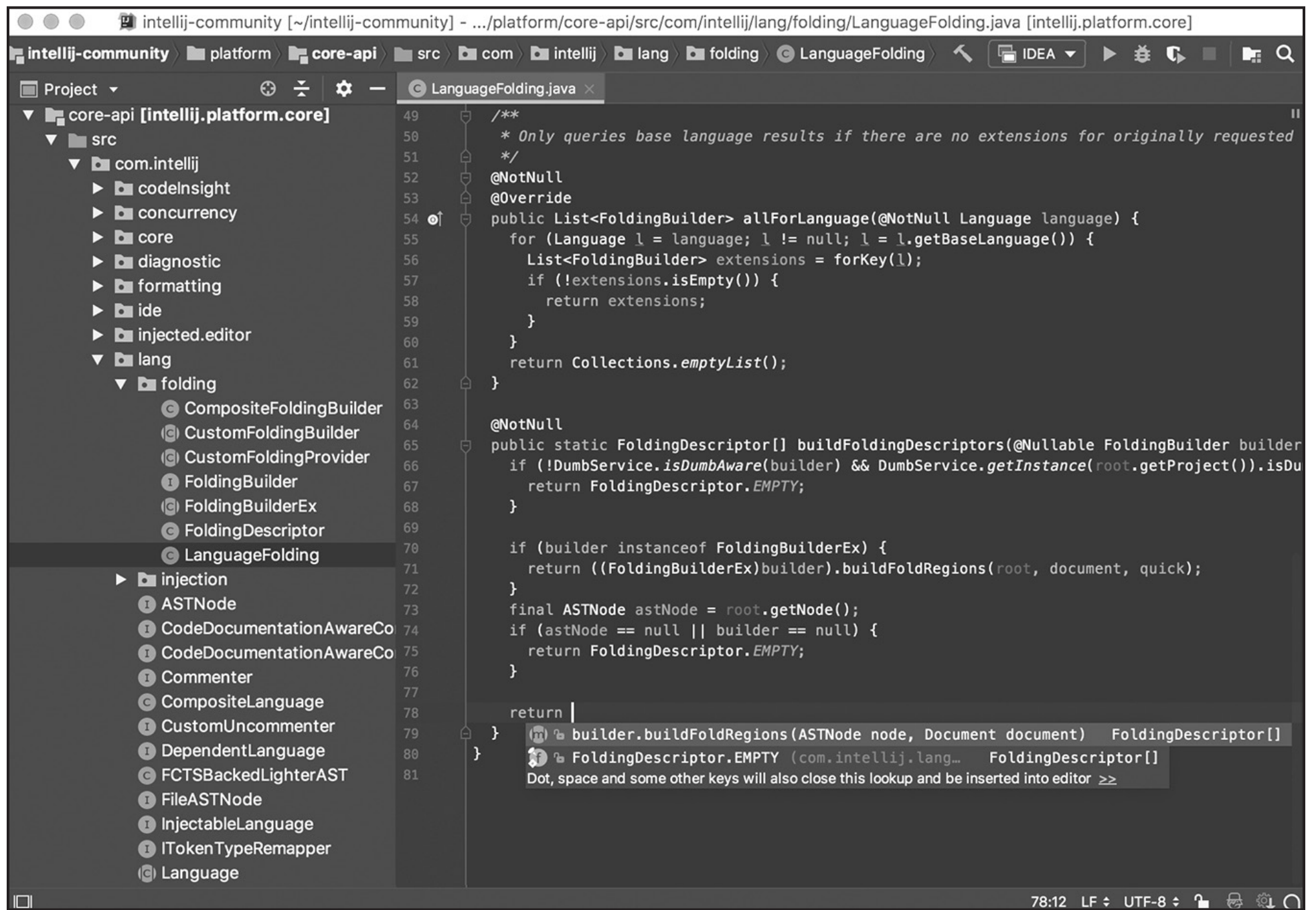
(Turn over)

8 (b) Describe the following methods that could be used to protect data security.

(i) Access levels. [2 marks]

8 (b) (ii)

Encryption techniques. [2 marks]



9. **An Integrated Development Environment (IDE) shown opposite provides programmers with facilities to develop software.**

Other than line numbers, identify THREE facilities used in an IDE, and state the use of each. [6 marks]

FACILITY 1

(Turn over)

9.

FACILITY 2

9.

FACILITY 3

- 10. Computer systems all present vulnerabilities that could lead to a cyberattack.**
- (a) Complete the sentences on pages 39 and 40 about different forms of cyberattack, using only the terms given below.**

VIRUS

ENCRYPTION

SPYWARE

HASH

CACHE

WORM

TROJAN

BRUTE FORCE

(Turn over)

10 (a) (i)

installs malicious software without consent, letting cybercriminals secretly gather sensitive information like keystrokes, browsing habits, and personal data. [1 mark]

(ii)

A

attack involves repeatedly guessing passwords until the correct one is found by trying all possible combinations. [1 mark]

(Turn over)

10 (a) (iii)

A _____
is a harmful program that lays dormant in your system until you execute it or take some other required action, such as enabling macros on an infected file. [1 mark]

(iv) A _____
attack involves deceptive software that disguises itself as legitimate, providing unauthorised access for activities like data theft or remote control. [1 mark]

10 (b)

Describe the following methods of identifying vulnerabilities through penetration testing.

(i) Targeted testing. [2 marks]

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10 (b) (ii)

Blind testing. [2 marks]

- 11. Explain how text, graphics and sound are stored in computer systems.**

Discuss how these can be compressed. [12 marks]

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45

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END OF PAPER

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[illegible]

(Turn over)

[illegible]

(Turn over)

[illegible]

(Turn over)

[illegible]