QUESTION 1.

6 **(a)** Name the **most** suitable input or output device for each of the following uses.

Give a different device in **each** case.

Description of use	Input or output device
input of credit card number into an online form	
selection of an option at an airport information kiosk	
output of a single high-quality photograph	
output of several hundred high-quality leaflets	
input of a hard copy image into a computer	

[5]

(b) All of the uses in **part (a)** involve the input or output of data.

(i) Describe **two** methods of preventing accidental loss of data.

1 .....

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2 .....

.....[2]

(ii) Describe **one** way of ensuring the security of the data against malicious damage.

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.....[1]

QUESTION 2.

3 **(a)** Give the definition of the terms firewall and authentication. Explain how they c
security of data.

Firewall .....

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Authentication .....

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[3]

(b) Describe **two** differences between data integrity and data security.

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..... [2]

(c) Data integrity is required at the input stage and also during transfer of the data.

(i) State **two** ways of maintaining data integrity at the input stage. Use examples to help explain your answer.

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..... [3]

(ii) State **two** ways of maintaining data integrity during data transmission. E
help explain your answer.

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..... [3]

QUESTION 3.

4 Paul works part-time for a large software company. The company sells secu
a number of banks. He also runs his own software company that produces and s
games.

Six statements about computer ethics are shown below.

Draw lines to indicate whether each statement describes ethical or unethical behaviour.

Statement	
To save time, Paul fakes the test results when testing the bank security software.	
Paul uses the software developed in his day job to help write some of the games software routines.	Ethical
To allow him to concentrate on his games software, Paul has frequently turned down job opportunities in his day job.	
To make the games software more realistic, Paul uses password protection code used in the bank security software.	Unethical
Because his work load is increasing, Paul is now using overseas companies to write some of the routines used in his games software.	
Paul carries out training on how to write games software in his spare time.	

[6]

QUESTION 4.

8 A school stores a large amount of data. This includes student attendance, q
contact details. The school's software uses a file-based approach to store this data.

(a) The school is considering changing to a DBMS.

(i) State what DBMS stands for.

.....[1]

(ii) Describe **two** ways in which the Database Administrator (DBA) could use the DBMS software to ensure the security of the student data.

1 .....

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2 .....

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.....[4]

(iii) A feature of the DBMS software is a query processor.

Describe how the school secretary could use this software.

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.....[2]

(iv) The DBMS has replaced software that used a file-based approach with a relational database.

Describe how using a relational database has overcome the previous problems associated with a file-based approach.

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.....[3]

(b) The database design has three tables to store the classes that students atte

STUDENT(StudentID, FirstName, LastName, Year, TutorGroup)

CLASS(ClassID, Subject)

CLASS-GROUP(StudentID, ClassID)

Primary keys are not shown.

There is a one-to-many relationship between **CLASS** and **CLASS-GROUP**.

(i) Describe how this relationship is implemented.

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.....

.....[2]

(ii) Describe the relationship between **CLASS-GROUP** and **STUDENT**.

.....[1]

(iii) Write an SQL script to display the `StudentID` and `FirstName` of all students who are in the tutor group 10B. Display the list in alphabetical order of `LastName`.

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.....[4]

(iv) Write an SQL script to display the `LastName` of all students who attend the class whose `ClassID` is CS1.

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.....[4]

Question 9 begins on page 12.

QUESTION 5.

7 A bank holds personal data about its customers and their financial data.

(a) Describe the difference between security and integrity of data.

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.....[4]

(b) Describe **three** security measures that the bank could implement to protect its electronic data.

Security measure 1 .....

Description .....

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Security measure 2 .....

Description .....

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Security measure 3 .....

Description .....

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.....[6]

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QUESTION 6.

3 A Local Area Network is used by staff in a hospital to access data stored in a Database System (DBMS).

(a) Name **two** security measures to protect computer systems.

1 .....

2 .....

[2]

(b) A frequent task for staff is to key in new patient data from a paper document. The document includes the patient's personal ID number.

(i) The Patient ID is a seven digit number. The database designer decides to use a check digit to verify each foreign key value that a user keys in for a Patient ID.

When a user assigns a primary key value to a Patient ID, the DBMS adds a modulus-11 check digit as an eighth digit. The DBMS uses the weightings 6, 5, 4, 3, 2 and 1 for calculating the check digit. It uses 6 as the multiplier for the most significant (leftmost) digit.

Show the calculation of the check digit for the Patient ID with the first six digits 786531.

Complete Patient ID .....[4]

(ii) Name and describe **two** validation checks that the DBMS could carry out on each primary key value that a user keys in for a Patient ID.

1 Validation check .....

Description .....

.....

2 Validation check .....

Description .....

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[4]

QUESTION 7.

3 A Local Area Network is used by school staff who access data stored in a Databa
System (DBMS).

(a) **(i)** Explain the difference between security and privacy of data.

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.....[3]

(ii) Give an example for this application where privacy of data is a key concern.

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.....[1]

(b) Name and describe **two** security measures the Network Manager has in place to protect the security of the data held in the DBMS.

1 .....

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2 .....

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.....

[4]

(c) A task for staff at the start of the school year is to key in new pupil data from a paper document.

The data is entered to a screen form and includes the data verification of some fields.

Describe what is meant by **verification**.

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.....[2]

QUESTION 8.

4 A software developer works in a team for a large software development company.

(a) Two principles of the ACM/IEEE Software Engineering Code of Ethics are:

- developers must act consistently with the public interest
- developers must act in the best interest of their client and employer.

Name **and** describe **three** other principles in the ACM/IEEE Software Engineering Code of Ethics.

Principle 1 .....

Description .....

.....

.....

Principle 2 .....

Description .....

.....

.....

Principle 3 .....

Description .....

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.....

[6]

(b) The software development company uses data backup and disk-mirroring to keep their data secure.

Explain how data backup and disk-mirroring allow the company to recover from data loss.

Data backup .....

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Disk-mirroring .....

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[4]

QUESTION 9.

5 Moheem is creating a relational database to store data about his customers.

(a) Moheem has been told a relational database addresses some of the limitations of a flat file approach by reducing data redundancy.

(i) State what is meant by the term **data redundancy**.

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..... [1]

(ii) Explain **how** a relational database can help to reduce data redundancy.

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..... [3]

(b) Moheem uses a Database Management System (DBMS) to ensure the security and integrity of the data.

(i) Explain the difference between security and integrity.

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..... [2]

(ii) Name **and** describe **two** security features provided by a DBMS.

Feature 1 .....

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Feature 2 .....

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[4]

(iii) The DBMS provides software tools for the database developer.

Fill in the names of the missing software tools in the following statements.

A ..... allows a developer to extract data f
database.

A ..... enables a developer to create user-friendly forms and reports.

[2]

QUESTION 10.

2 Frankie is a software developer. He is developing a program to manage custom
client with an online retail business. He must ensure that data stored about each
both secure and private.

(a) State the difference between security and privacy.

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..... [2]

(b) Computer systems can be protected by physical methods such as locks.

Describe **two** non-physical methods used to improve the security of computer systems.

1 .....

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2 .....

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[6]

(c) A computer uses parity blocks to check the data that has been received is the same as the data that has been transmitted.

The following is an example of a parity block.

	Parity bit	Data						
	1	1	1	1	0	0	0	1
	0	0	0	0	1	1	1	0
	1	1	0	1	1	0	0	1
Parity byte	**1**	**1**	**0**	**1**	**1**	**0**	**0**	**1**

(i) Describe how a parity block check can identify a bit that has been corrupted during transmission.

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..... [4]

(ii) Give a situation where a parity block check **cannot** identify corrupted bits.

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..... [1]

(d) One principle of the ACM/IEEE Software Engineering Code of Ethics is to a
best interest of the client.

Explain how Frankie can ensure that he is acting in the best interest of his client.

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..... [3]

(e) When the program is complete, Frankie uses a compiler to prepare the program for the client.

Explain why Frankie uses a compiler instead of an interpreter.

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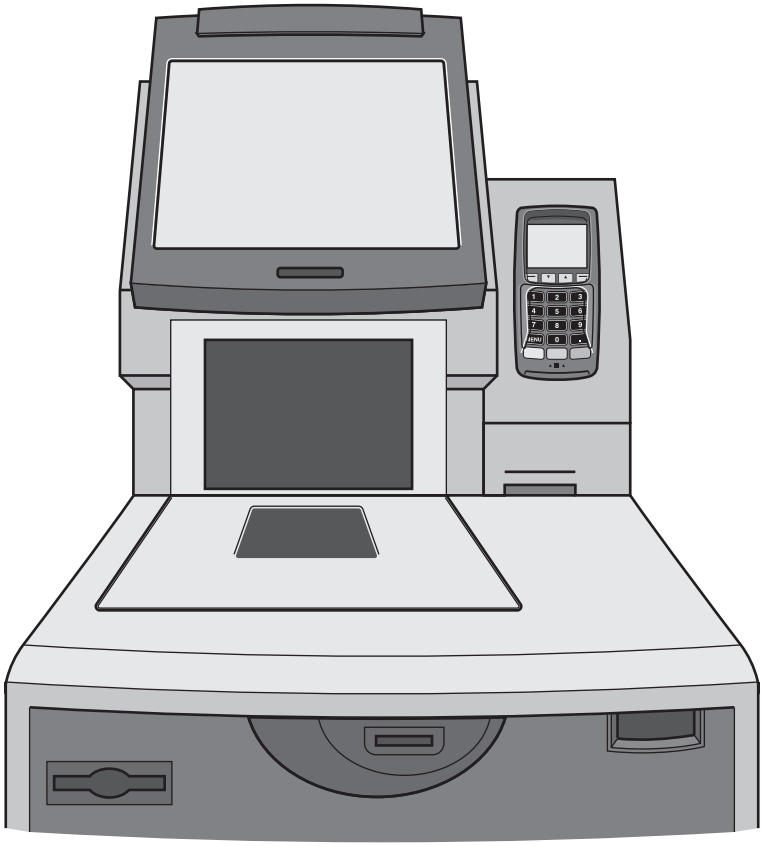
..... [3]

QUESTION 11.

1 In a supermarket, a self-checkout machine allows customers to scan the barcodes
then pay for their shopping. These are an alternative to the traditional cashier-staffe



(a) The self-checkout machine has a touchscreen.

(i) Identify **two** other input devices that self-checkout machines have.

1 .....

2 .....

[2]

(ii) Identify **two** other output devices that self-checkout machines have.

1 .....

2 .....

[2]

(iii) The touchscreen uses capacitive technology.

The sequence of steps 1 to 6 describes the internal operation of the touchsc

The statements **A**, **B**, **C** and **D** are used to complete the sequence.

A	Charge is drawn to the point of contact.
B	The screen has a layer that stores an electrical charge.
C	There is a change in the electrostatic field.
D	The coordinates are sent to the touchscreen driver.

Write **one** of the letters **A** to **D** in each appropriate row to complete the sequence.

1 .....

2 When the user touches the screen

3 .....

4 .....

5 The coordinates of the point of contact can be calculated.

6 .....

[2]

(b) The self-checkout machines have primary storage.

(i) Give **two** reasons why the self-checkout machine needs primary storage.

1 .....

.....

2 .....

.....

[2]

(ii) The self-checkout machines use Static RAM (SRAM) for their cache.

The following table has statements about SRAM or Dynamic RAM (DRAM).

Tick (✓) **one** box in each row to identify whether the statement is about SRAM or DRAM.

Statement	SRAM	DRAM
More expensive to make		
Requires refreshing (recharging)		
Made from flip-flops		

[2]

(c) The self-checkout machines connect to a server that stores all the data for t
This is a client-server network.

(i) Describe, using an example for the supermarket, the client-server network mod

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..... [4]

(ii) The supermarket is concerned about the security and integrity of the data on the server.

Identify **two** methods that can be used to minimise the security risk to the data, and **one** method to protect the integrity of the data.

Security 1 .....

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Security 2 .....

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Integrity .....

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[3]