OCR
Oxford Cambridge and RSA

Thursday 18 January 2024 – Afternoon

Level 3 Cambridge Technical in Applied Science

05874 Unit 22: Global scientific information

Time allowed: 1 hour 30 minutes
C343/2401

C343/2401

You must have:
- the Insert
- a ruler (cm/mm)

You can use:
- a scientific or graphical calculator
- an HB pencil

0 5 8 7 4 – 2 2

Please write clearly in black ink. **Do not write in the barcodes.**

Centre number | | | | | | Candidate number | | | | |

First name(s) _____

Last name _____

Date of birth | D | D | M | M | Y | Y | Y | Y |

INSTRUCTIONS
- Use black ink. You can use an HB pencil, but only for graphs and diagrams.
- Answer **all** the questions.
- Write your answer to each question in the space provided. If you need extra space use the lined pages at the end of this booklet. The question numbers must be clearly shown.
- Use the Insert to answer the questions in Section A.

INFORMATION
- The total mark for this paper is **60**.
- The marks for each question are shown in brackets **[ ]**.
- This document has **16** pages.

ADVICE
- Read each question carefully before you start your answer.

Section A

This section relates to the case study on the Training Manual on the Detection and Identification of Living Modified Organisms in the Context of the Cartagena Protocol on Biosafety (see Insert).

1 The boxes on the left are some information holders mentioned in the case study.

The boxes on the right are some categories of information holder.

(a) Draw **one** straight line from each information holder to its category.

Each category may be used once, more than once or not at all.

Information holder	Category
	Individual researcher
SSRW Life Sciences	Research department/ company
The Biosafety Clearing-House	Industry trade association
CropLife	Charitable organisation
Stan Walters (Laboratory Manager, SSRW)	International body

[4]

(b) Scientific information is accessed and stored in different locations.

With reference to the case study:

(i) Identify **one** type of standard operating procedure accessed and stored in laboratory management systems in the workplace.

.....

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

(ii) Identify information that is accessed online.

.....

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

(c)

(i) State the purpose of the Cartagena Protocol and identify a phrase in the case study which shows that it is concerned with the transfer of scientific information between countries.

Purpose .....

.....

Phrase .....

[2]

(ii) State **one** access issue raised by the transmission of scientific information between countries.

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

2 The Biosafety Clearing-House:

- facilitates the exchange of information on Living Modified Organisms (LMOs)
- advises on the rules and procedures agreed in the Cartagena Protocol
- assists Parties to the Protocol with compliance.

(a) Three reasons for the transmission of scientific information are: access, ownership and promotion.

With specific reference to the case study discuss:

- the scientific information to which the Parties are given **access**
- rules and procedures Parties must adopt or comply with to demonstrate ownership
- how the goals of international treaties and individual Parties will be achieved by being promoted.

[6]

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(b) What is the correct way of classifying the information provided by the Biosafety Clearing-House?

Tick (✓) **one** box.

Classified ☐

Confidential ☐

Public ☐

Sensitive ☐

[1]

3 The management of scientific information has three characteristics to achieve the level of quality needed.

(a) Two of the characteristics are accuracy and accessibility.

State and explain the **third** characteristic and give an example from the case study.

Characteristic .....

Explanation .....

.....

Example .....

[3]

(b) Information that provides a sound basis for further investigation is important to stakeholders.

For this reason, Stan Walters identifies a priority to ensure that the checklist of information kept in the equipment maintenance logbooks is thorough.

Suggest **six** items that must be included in this checklist.

1 .....

.....

2 .....

.....

3 .....

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4 .....

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5 .....

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6 .....

.....

[6]

(c) As a laboratory manager, Stan Walters is responsible for ensuring that staff understand the consequences of poor-quality information.

These consequences are:

A	Misinformation
B	Bad decision-making
C	Delusion
D	Anxiety
E	Loss of reputation

Stan's priorities are sample tracking, personnel training and reagent quality control.

Identify which consequence listed in the table is **most likely** to occur in the following situations.

Write the correct letter (**A**, **B**, **C**, **D** or **E**) next to each statement.

Each letter can be used **once**, **more than once** or **not at all**.

1 Stan believes that the laboratory staff are qualified to do their work. However, there is no system of formal observation where they demonstrate competency in methods of testing.

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2 The expiry date on a bottle of reagent has been recorded incorrectly.

.....

3 It is not possible to locate a potentially hazardous biological sample in the laboratory due to an incorrectly assigned tracking number.

.....

4 The measurements from an incorrectly calibrated instrument cause an incorrect conclusion to be drawn in a report for an important customer.

.....

5 Important safety information regarding how to deal with reagent spills and their disposal is **not** checked prior to use.

.....

[5]

Section B

You do not need the case study to answer these questions.

4 A list of UK legislation and regulation relating to the storage and use of information is shown.

A – Data Protection Act
B – Protection of Freedoms Act
C – Freedom of Information Act
D – Computer Misuse Act
E – Copyright, Designs and Patents Act
F – Equality Act

(a) Use the letters **A** to **F** to identify the legislation used in each of the scenarios described.

Each letter can be used **once**, **more than once** or **not at all**.

(i) A life sciences company involved in clinical trials appoints a controller who is responsible for, and is able to demonstrate, compliance with principles.

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

(ii) A research laboratory is obliged to consider reasonable adjustments for a newly recruited technician who is a wheelchair user and who would have difficulty negotiating their way around the laboratory.

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

(iii) A scientist discovers that a novel substance added to a material used to make soles of running shoes improves the performance of elite athletes. The scientist wants to protect their discovery.

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

(iv) The security administrator of a company that makes fuel cells suspects a former employee of unauthorised access to the manufacturing operations database.

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

(v) The organiser of a public science conference knows that hearing-impaired delegates are likely to attend. The organiser must therefore consider how to make the conference accessible to them.

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

(vi) An engineer at a company that makes medical implants requests access to patient data so that they can evaluate the long-term performance of a device. The engineer completes an application form to declare that the data is for a specified, explicit and legitimate purpose.

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

(vii) A company wants to restrict access to a new laboratory so that only authorised personnel may enter. They want to install a fingerprint scanner at the door to the laboratory and CCTV inside the entrance.

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

(viii) A local wildlife conservation group is concerned about the amount of algae covering a large pond in a nature reserve. They request data from the Environment Agency about the quality of the water entering the pond from a nearby stream.

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

(b) The UK has an independent authority set up to uphold information rights in the public interest, promote openness by public bodies and data privacy for individuals.

What is the name of this authority?

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

5 Global information and protection legislation and regulation includes the UNCRPD.

(a)

(i) What is the full title of the UNCRPD?

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

(ii) Articles 9 and 21 of this legislation are concerned with access to information, communications and services including the internet.

What justification is given?

.....

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

(b) The principles of articles 9 and 21 are to remove barriers to the accessibility of information.

Some of the barriers to accessing information on the internet are:

A – barriers to navigation

B – barriers to interaction

C – barriers to perception

D – barriers to understanding

Identify which barrier applies in each of the following situations.

Use the letters **A**, **B**, **C** or **D**.

The letters can be used **once**, **more than once** or **not at all**.

Situation	**Letter**
Images and text cannot be re-sized or customised.	
Links on the webpage can only be accessed by using a mouse.	
No alternative text is provided to describe pictures or diagrams.	
The webpage has different sections but there are no headings.	
The website does not convert speech to text.	
There is very little contrast between text and background.	

[4]

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PLEASE DO NOT WRITE ON THIS PAGE

Turn over for the next question

6 Dr Jane Knowsley is Director of Imaging at a large hospital. Dr Knowsley is also a member of a team working with the Computer Science Department of a local university.

Their goal is to develop an artificial intelligence (AI) system to assist with diagnosing the early stages of breast cancer.

The AI system will be programmed to recognise patterns in mammograms (medical images) and doctors' electronic notes to diagnose cancer earlier and avoid overusing invasive treatments.

Dr Knowsley says: "There are some conditions where all patients get surgery. But in almost nine out of ten of these cases the patient didn't need the operation because the condition was benign. With machine learning, we hope to identify the women who don't need the surgery. We'll need access to people's health data, of course, and for that we'll need approval from the review board at the hospital to make sure it's handled according to procedure".

(a) One of the three principles of information security is integrity.

The integrity of data is maintained by keeping it fit for purpose.

(i) Identify **two** purposes for the data in Dr Knowsley's research.

1 .....

2 .....

[2]

(ii) Describe **three** other ways that data integrity is maintained.

1 .....

2 .....

3 .....

[3]

(iii) Explain how using both the mammograms and the doctors' electronic notes improves the integrity of the data used to program the AI.

.....

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.....

.....

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

(b) Complete the following sentences to explain why Dr Knowsley must gain the approval of the hospital review board to access people's health data.

One of the principles of information security is …….. .

This means it can only be accessed by people who are ……... .

It also means that the hospital must be able to demonstrate compliance with

…….. legislation because personal health data is

…….. .

[4]

(c) The data that will be used to teach the topic of AI is located in different hospitals and doctors' surgeries. The data will be combined at the Computer Science Department of the university.

The main risk to this data is accidental loss.

(i) What will be the main impact on the research team from the accidental loss of this data?

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

(ii) What can the research team do to reduce the risk of accidentally losing data?

Suggest **two** ways of reducing this risk.

1 .....

.....

2 .....

.....

[2]

END OF QUESTION PAPER

EXTRA ANSWER SPACE

If you need extra space use these lined pages. You must write the question numbers clearly in the margin.