

Markscheme

November 2021

**Information technology
in a global society**

Higher level

Paper 1

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Critical Thinking – explanation, analysis and evaluation

These trigger words often signal critical thinking. The bold words are the key terms in the various criteria.

Explanation – *Because, as a result of, due to, therefore, consequently, for example*

Analysis – *Furthermore, additionally, however, but, conversely, likewise, in addition, on the other hand, whereas*

Evaluation – *My opinion, overall, although, despite, on balance, weighing up*

Examiners should be aware that in some cases, candidates may take a different approach, which if appropriate should be rewarded. If in doubt, check with your team leader.

In the case of an “identify” question read all answers and mark positively up to the maximum marks. Disregard incorrect answers. In all other cases where a question asks for a certain number of facts eg “describe two kinds”, mark the **first two** correct answers. This could include two descriptions, one description and one identification, or two identifications.

It should be recognized that, given time constraints, answers for part (c) questions are likely to include a much narrower range of issues and concepts than identified in the markband. There is no “correct” answer. Examiners must be prepared to award full marks to answers which synthesize and evaluate even if they do not examine all the stimulus material.

Section A

1. Accessing online media

- (a) (i) Identify **two** hardware devices that Rajesh could use to view his internet protocol television (IPTV) channels. [2]

Answers may include:

- Smart TV.
- Mobile phone/cellphone.
- Tablets.
- PC/laptop.
- IPTV box (such as an Amazon Fire stick, Apple TV, etc).

Award [1] for identifying each hardware device Rajesh could use to view his IPTV channels, up to a maximum of [2].

Do not accept monitor or television.

- (ii) Identify **two** characteristics of an IP address. [2]

Answers may include:

- An address assigned to a computer/device (it must be implicit or explicit in the answer that the device is connected to a network/the Internet).
- Identifies a device.
- It can be used to identify a physical location.
- It is either 32 bits or 128 bits (IP v4 or IP v6).
- It can be static or dynamic, may be changed.

Award [1] for each characteristic of an IP address identified, up to a maximum of [2].

- (iii) Rajesh is downloading a film for offline viewing. The download speed is 80 mbps.

Calculate the amount of data, in megabytes (MB), that will be downloaded in 10 minutes. [2]

Answers may include:

- Convert 80 mbps to MB/s = $80/8 = 10$ MB/s
- Calculation of $10 \text{ MB} \times 60 \text{ (sec)} \times 10 \text{ (min)} = 6000 \text{ MB}$

Award [1] for conversion from megabit to megabyte.

Award [2] for correct answer (if the conversion/calculation process is not shown, award it only if with correct unit).

- (b) (i) Explain why Rajesh downloaded the films rather than streaming them when he was travelling.

[4]

Answers may include:

- Films can be played offline / no internet connection is needed to play downloaded films / device connects to the source file and downloads to the hard drive.
- The downloaded files can be transferred to other devices.
- The film quality is intact.
- The downloaded files can be viewed in countries with restricted internet access.
- Streaming depends on the internet bandwidth, which may fluctuate.
- There may be film pauses due to buffering, especially with slow internet connections when streaming.

Marks	Level descriptor
[0]	No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.
[1–2]	A limited response that indicates very little understanding of the reasons why downloading a video would be preferable to streaming it. Uses little or no appropriate ITGS terminology.
[3–4]	An explanation of the reasons why downloading a video would be preferable to streaming it. There is the appropriate use ITGS terminology.

- (ii) Rajesh has been told that subscribing to an internet protocol television (IPTV) service may compromise his anonymity.

Distinguish between anonymity and privacy.

[2]

Answers may include:

- Anonymity is knowing what activities are being carried out but not knowing who is carrying them out.
- Privacy is knowing who the person carrying out the activities may be but not knowing what these activities are.

Award [1] for each appropriate statement that distinguishes anonymity from privacy, up to a maximum of [2].

- (c) To what extent is it acceptable for Rajesh to use services like a virtual private network (VPN) to access content that may be blocked in the country he is visiting?

[8]

Answers may include:

Reasons why Rajesh could use services like a VPN:

- The service is legitimate and cannot be accessed by any other means.
- Rajesh may believe that the blocking of the service is unlawful / inappropriate / the degree of censorship is draconian.
- There may be technical advantages of using a service like a VPN.
- Through a VPN, Rajesh can browse the web in complete anonymity.
- Rajesh may find media access through a VPN more economical compared with subscribing to the same services in a different country.

Reasons why Rajesh should not use services like a VPN:

- Rajesh should abide by the laws of the country and by circumventing the laws may place himself at risk.
- The content may be deemed to be inappropriate in the host country and has been blocked for religious / security / political reasons.
- The use of a VPN may reduce the speed of downloading or streaming.
- Rajesh may not be able to download or stream films despite having a subscription to a VPN because a few broadcasting apps use anti-VPN technology to restrict content outside a specific region.

In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.

Please see generic markband on page 23.

2. Singapore shipping

- (a) (i) Identify **two** reasons why a spreadsheet would be used to store the information in **Figure 2**. [2]

Answers may include:

- A spreadsheet may require minimal training / is easier to setup.
- Inbuilt functions and formulae can be applied on data, it can perform calculations.
- Data can be arranged in a specific order, eg in ascending order of Shipment_Date.
- Graphs/charts can be created to summarize large amounts of data.
- Users may use dropdown menus for an item from the list, eg Destination column.
- To organize data in a clear manner.

Award [1] for identifying each reason why a spreadsheet has been used to store this information, up to a maximum of [2].

- (ii) State the formula to calculate the total number of containers used in Column C. [1]

Answers may include:

- =SUM(C2:C15)
- =SUMA(C2:C15)
- =ADD(C2:C15)
- =C2 + C3 + C4 ++C15

Award [1] for any one of the above.

N.B. Do not accept responses without =.

Accept the range starting from B1, eg =SUM(C1:C15).

- (iii) State the data type for the column headed **Shipment_Date** (column B). [1]

Answers may include:

- Date / Long Date / Short Date.

- (iv) Outline **one** reason why *SingShip* would use mail merge when producing letters for customers to advise them about their shipments. [2]

Answers may include:

- Mail merge combines the functionality of word-processing software with that of a spreadsheet...
- ...which is a far more efficient process than individually creating a document for each recipient.
- There is less chance of error if the data is stored once and then merged.
- *ShipSing* can use mail merge to create personalized letters for customers by adding spreadsheet data to the template.
- The customized letters can be generated at once for printing / emailing, saving time and effort.

Award [1] for identifying a reason why SingShip would use mail merge when producing letters for customers and [1] for a development of that reason, up to a maximum of [2].

- (b) (i) Distinguish between data validation and data verification. [2]

Answers may include:

- Data validation is about checking the input data to ensure it conforms with the data requirements of the system to avoid data errors. Data validation rules (or check routines) are used to ensure the validity (mostly correctness and meaningfulness) of data.
- Data verification is a way of ensuring the user types what they intend, to ensure they do not make a mistake when inputting data, eg double data entry.

Award [1] for each reason that clearly differentiates between data validation and data verification, up to a maximum of [2].

The product development life cycle (PDLC) was used to develop the database for *SingShip*.

- (ii) Explain **one** advantage for *SingShip* of using a development methodology, such as the product development life cycle (PDLC). [2]

Answers may include:

- Uses a recognized development process.
- Has a series of predefined stages.
- These stages can be allocated to different teams.
- Allows for concurrent working / agile or waterfall methodologies if appropriate.
- Clear roles and responsibilities among analysts, project managers, designers, developers and business analysts.
- Clearly defined inputs and outputs from one step to the next.

Award [1] for identifying a reason why SingShip would use a development methodology such as the product development life cycle (PDLC) and [1] for a development of that reason, up to a maximum of [2].

- (iii) Explain **one** disadvantage for *SingShip* of using a development methodology, such as the product development life cycle (PDLC). [2]

Answers may include:

- May be too rigid.
- ...which may lead to an increased development time.
- It may add a lot of overheads and costs.
- It may be difficult sometimes to define everything before seeing it / requirements may change frequently.

Award [1] for identifying a reason why SingShip would not use a development methodology such as the product development life cycle (PDLC) and [1] for a development of that reason, up to a maximum of [2].

- (c) The head of IT at *SingShip* has recommended that all the information stored by the company in various spreadsheets should be integrated into a single relational database.

Evaluate this decision.

[8]

Advantages of using a relational database:

- Data will only need to be entered once, so problems linked to data redundancy and update anomalies can be removed.
- Use of the database will reduce the amount of time *SingShip* will spend managing or updating data.
- Using a database allows reports to be produced, modified and used more easily than in a spreadsheet.
- Database applications can be shared among many users simultaneously.
- The database administrator may configure different access permissions for different users ensuring security of data.
- Cost efficiency – Despite the initial setup cost, the use of the database may save time in the long run, resulting in a more cost-effective solution.

Disadvantages of using a relational database:

- Substantial hardware and software may require *SingShip* additional start-up costs.
- More expense to hire IT experts to set up and manage the database.
- Data migration from legacy system/spreadsheet to database may not be straightforward, as these systems may not be fully compatible.
- The database may be more complex for employees to understand compared to spreadsheets.
- Employees may require training to use it.
- Database doesn't provide direct ways to generate graphs/charts in the way a spreadsheet does.

In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.

Please see generic markband on page 23.

3. Smart farming

- (a) (i) Identify **two** zip file formats. [2]

Answers may include:

- ZIP
- RAR
- JAR
- WAR
- Open Document Format for Office applications (ODF)

Award [1] for each zip file format identified, up to a maximum of [2].

Do not accept the name of a program (Winzip, Winrar, etc.)

- (ii) Identify **two** characteristics of Bluetooth. [2]

Answers may include:

- A short-range communication technology to connect to devices.
- Allows wireless connections between devices.
- Allows interconnection between devices.
- Uses short-range radio frequency (RF).
- Intended to replace communication that uses cabling.
- Used for building PANs (Personal Area Networks).

Award [1] for each characteristic of Bluetooth identified up to [2].

- (iii) Identify **two** types of data collected by the sensors in the data logger. [2]

Answers may include:

- temperature
- humidity
- wind speed
- climate
- rainfall
- hours of sunlight
- soil moisture content (%)
- pH of the soil.

Award [1] for each type of collected data identified, up to a maximum of [2].

- (b) (i) Explain **one** advantage of using lossless compression to send the data to the university. [2]

Answers may include:

- Lossless compression will not result in the loss of quality of the data sent, so the receiver can reconstruct the original data.
- This will ensure that any vital information is not lost or compromised.

Award [1] for identifying a reason why lossless compression would be used to send the information and [1] for a development of that reason, up to a maximum of [2].

- (ii) Explain **one** disadvantage of using lossless compression to send the data to the university. [2]

Answers may include:

- Lossless compression will take longer to be sent due to large file size – this compression technique cannot achieve high level of compression like lossy compression.
- In countries / situations where there is inadequate bandwidth, this will slow down the transmission of the data.

Award [1] for identifying a disadvantage of the data being sent using lossless compression and [1] for a development of that reason, up to a maximum of [2].

- (iii) Explain why protocols are used when data is sent from one computer to another. [2]

Answers may include:

- Agreed set of rules.
- This allows each device to communicate.
- Enables secure communication.
- Covers authentication, error detection and correction.
- Helps in tracing the source of message.
- Is cross platform.
- Ensures reliable transmission of data.

Award [1] for identifying why a protocol such as TCP/IP is used for the communication of data and [1] for a development of that reason, up to a maximum of [2].

- (c) The scientists who developed the app have received many complaints from farmers who have been unable to use it. They are considering two options:
- Making the existing system more user friendly.
 - Educating the farmers to use the existing system.

Evaluate these two options.

[8]

Answers may include:

Advantages of making the system more user friendly:

- May reduce development costs, as the work can be carried out at the university.
- May only require minimal adjustments to the interface.
- Can probably be done in the short term, so will have a more immediate impact.
- Will require little or no training of farmers, so cheaper than providing training, which may involve the development of online training sites or require farmers to travel to a college.
- May require less testing before the improved interface is introduced.
- Farmers may wish to use it.

Disadvantages of making the system more user friendly:

- Farmers may not like the change.
- It could be costly.

Advantages of educating the farmers to use the existing system:

- Will provide a longer-term solution that will be beneficial over a longer period.
- May provide other benefits, as farmers become more tech savvy.
- May give farmers a greater ownership of the initiative.

Disadvantages of educating the farmers to use the existing system:

- Farmers may not like the process of training.
- Farmers may have difficulty in learning.

In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.

Please see generic markband on page 23.

Section B

4. Smart warehouse

- (a) (i) Identify **two** characteristics of a robot. [2]

Answers may include:

- Can do specific actions/tasks.
- Operates automatically or by remote control.
- Controlled by a computer.
- Can be programmed.
- Requires power.
- Able to move.
- Has sensors.

Award [1] for each characteristic of a robot, up to a maximum of [2].

- (ii) Identify **two** input devices the warehouse robots might have. [2]

Answers may include:

- Barcode scanner.
- RFID scanner.
- Infrared sensors.
- Touch screen.
- Keypad.
- Microphone.
- Camera.

Award [1] for each input device identified, up to a maximum of [2].

- (iii) Identify **two** characteristics of fuzzy logic. [2]

Answers may include:

- Does not use binary probabilities.
- Uses a decision tree to determine the probabilities.
- Flexible, easy to implement.
- Mimics logic of human thinking.
- Suitable for approximate reasoning.
- Allows the building of non-linear functions of arbitrary complexities.

Award [1] for each characteristic of fuzzy logic identified, up to a maximum of [2].

- (b) *Greenwood Industries* is considering using either a direct changeover method or a phased changeover method for the introduction of the next smart system.

Analyse these options.

[6]

Answers may include:

Direct changeover

- There is a faster changeover, which takes less time, so the new system is up and running immediately.
- It may be less confusing for staff, as they have only one system to understand.
- It will remove the issues of compatibility between the two systems that may occur with a phased changeover.
- Training would be needed before the implementation of a new smart system.
- It would be cost effective to run one system only.
- Reliability – assumes there will be no errors with robot technology. If robots fail, then the old system will no longer be running.

Phased changeover

- It may provide time for staff to learn the new system (training) in sections.
- It will give time to appraise the new system as it is implemented, which is not possible with direct changeover as implementation is done in smaller “chunks”.
- It may be possible to revert to the old system, as changes may be fewer.
- Allows closer monitoring of the new system, as each phase of the implementation can be thoroughly evaluated before the next stage.
- It would take longer to implement using a phased changeover method.
- Cost – for a time the robots will be in place, yet staff will still be employed to run the old system.
- Confusing for staff – maintaining the old system while introducing the robots.

Marks	Level descriptor
[0]	No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.
[1–2]	A limited response that indicates very little understanding of the topic or the reason is not clear. Uses little or no appropriate ITGS terminology. No reference is made to the scenario in the stimulus material. The response is theoretical
[3–4]	A description or limited analysis of the advantages and disadvantages of either a direct changeover or a phased changeover. There is some use of appropriate ITGS terminology in the response.
[5–6]	A balanced analysis that addresses the advantages and disadvantages of either a direct changeover or a phased changeover. Explicit and relevant references are made to the scenario in the stimulus material. There is appropriate ITGS terminology throughout the response.

- (c) *Greenwood Industries* is considering introducing artificial intelligence (AI) in the warehouse, rather than using the existing expert system, to select the most appropriate route for picking products.

Discuss the implications of introducing an AI system to select the most appropriate route for picking products.

[8]

Answers may include:

- May provide greater flexibility in the decision-making process.
- If fuzzy logic is used, this may add more flexibility than a system based solely on 0 or 1.
- The AI system may be able to learn.
- The AI system may be more flexible than using an expert system, as the changes to the knowledge base (or equivalent) will be easier to effect.
- It will be harder to implement a new system – so AI will require support (hardware, software, training).
- It will require development costs to introduce a new system.
- *Greenwood Industries* will need to recoup the costs of implementing a new system.
- Automates decision making – will make the warehouse more efficient.
- Learns to recognize patterns – adapts to new situations – increase efficiency.
- Make decisions in seconds – due to efficient data collection.
- Increased accuracy – takes into account external factors.

In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.

Please see generic markband on page 23.

5. Airport expert systems

- (a) (i) Identify **two** user requirements for the flight information screens. **[2]**

Answers may include:

- The text is large enough to be read by most people.
- It should not require knowledge of a specific language.
- It can toggle between commonly used languages, such as English, Russian and Chinese.

Award [1] for each user requirements identified, up to a maximum of [2].

- (ii) Identify **two** features of the expert system's user interface that make it easy to use. **[2]**

Answers may include:

- Question mode.
- Fields to enter plane size/weight/location.
- Diagram of the airport gates/terminals.
- Use of drop-down menus.
- Interactive diagram of airport and gates.
- Is intuitive.

Award [1] for each feature of the user interface of the expert system that would make it easier to use, up to a maximum of [2].

- (iii) Outline the relationship between the knowledge base and the inference engine in an expert system. **[2]**

Answers may include:

- An inference engine is a computer program that tries to derive answers from a knowledge base.
- The inference engine enables the expert system to draw deductions from the knowledge base using logical rules.
- The knowledge base is a database of facts on a particular subject that are interpreted by the inference engine.

Award [1] for each appropriate comment that outlines the relationship between the knowledge base and the inference engine, up to a maximum of [2].

- (b) (i) Assigning a gate for each airplane requires consideration of the following factors:
- Is there an airplane currently at the gate?
 - Can the gate accommodate the size of the airplane?
 - Is there a ground crew available to manage the arrival of the plane?

Using the information above, copy and construct a decision tree that can be used as part of an expert system to determine if a gate is available for an incoming airplane.

[2]

Answers may include:

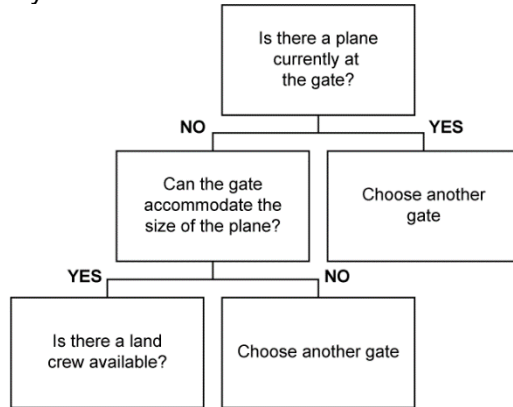


Diagram may include:

- checking gate occupancy
- checking plane size
- checking crew availability.

Award [1] for appropriate questions/instructions in the boxes.

Award [1] for labelling YES/NO on the right places [2].

- (ii) Distinguish between machine learning and neural networks. [4]

Answers may include:

Neural networks:

- are based on the model of the human brain
- work by creating connections between processing elements
- are used to predict events
- are a subset of machine learning
- determine outcomes without intervention
- composed of nodes.

Machine learning:

- learns from new data/input
- can perform new tasks after processing the data
- can react to new inputs it has not encountered before
- searches through data for patterns and adjusts accordingly
- is not explicitly programmed to perform the task.

Marks	Level descriptor
[0]	No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.
[1–2]	A limited response that indicates very little understanding of the differences between neural networks and machine learning. Uses little or no appropriate ITGS terminology.
[3–4]	An explanation of the differences between neural networks and machine learning. There is appropriate use ITGS terminology.

- (c) Discuss the advantages **and** disadvantages of using expert systems to select or change the gates assigned to flights.

[8]

Advantages:

- More efficient than a manual system (time).
- Will ensure a logical and predictable sequence of ordering, as the underpinning algorithms are transparent.
- The known sequence will allow for associated services, such as fuel tankers or ground support staff, to be able to predict the sequence that will increase their efficiency.
- Probably cheaper to implement than an AI-based solution.
- Avoids human error – eg an accident resulting from directing two planes to the same gate would result in a huge loss of life.

Disadvantages:

- Not updated frequently, so changing patterns of airplane arrivals and departures may not be taken into account.
- May not be able to take into account gates that are under repair.
- New parameters will have to be incorporated into the knowledge base.
- Small changes in the data can lead to a large change in the structure of the decision tree.
- Calculations can get very complex, particularly if many values are uncertain.
- Lack the common sense and creativity of a human expert who is experienced in air traffic control.

In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.

Please see generic markband on page 23.

6. Artificial intelligence (AI) predicts earthquakes

- (a) (i) Identify **two** characteristics of pattern recognition. **[2]**

Answers may include:

- Identifies familiar patterns and objects.
- Recognize shapes and objects from different angles.
- Uses mathematical methods.
- Is a branch of machine learning.

Award [1] for each characteristic of machine learning identified, up to a maximum of [2].

- (ii) Outline **one** reason why it might be difficult to collect accurate data that can be used for predicting earthquakes. **[2]**

Answers may include:

- Data might be limited / not enough data points collected – may reduce the effectiveness of the machine-learning model.
- Reliability of hardware – eg, sensors/software used in collecting the data.

Award [1] for a limitation of collecting data for predicting earthquakes and [1] for a development of that limitation, up to a maximum of [2].

- (iii) Identify **two** characteristics of an algorithm. **[2]**

Answers may include:

- A set of rules...
- ...that are followed by a computer in problem solving.
- A sequence of unambiguous instructions...
- ...with a finite number of steps...
- ...that are clear and essential.

Award [1] for each characteristic of an algorithm identified up to [2].

- (b) The scientists can choose to use either a PERT chart or a Gantt chart as a project management tool to develop the artificial intelligence (AI) system to predict aftershocks.

Analyse these two options.

[6]

Answers may include:

PERT chart:

- Shows the project dependencies – is more complex than a Gantt chart.
- Has many interconnecting or parallel networks of independent tasks – better for complicated tasks.
- Designed for small parts of the project.
- Can be very confusing and complex – harder for clients to understand.
- Underestimates risks inherent to the project – no good for large, expensive jobs.

Gantt chart:

- Can show a simple visualization of a project schedule – easy to show to clients.
- Simple, easy to use – looks like a bar chart.
- Is easier to change than a PERT chart.
- Effective for straightforward projects that do not need any changes mid-stream – not good if changes are required.
- Is unable to represent the dependency of tasks upon each other effectively – not good for complicated tasks.
- Can be used in status reporting – shows how much of the plan has been completed by displaying the progress of an activity.
- Needs information in advance – before the chart can even be drawn up, you need to have your project estimated.

Marks	Level descriptor
[0]	No knowledge or understanding of ITGS issues and concepts. No use of appropriate ITGS terminology.
[1–2]	A limited response that indicates very little understanding of the topic or the reason is not clear. Uses little or no appropriate ITGS terminology. No reference is made to the scenario in the stimulus material. The response is theoretical
[3–4]	A description or limited analysis of the advantages and disadvantages of a Gantt Chart and a PERT Chart. There is some use of appropriate ITGS terminology in the response.
[5–6]	A balanced analysis that addresses the advantages and disadvantages of a Gantt Chart and a PERT Chart. Explicit and relevant references are made to the scenario in the stimulus material. There is appropriate ITGS terminology throughout the response.

- (c) Discuss the advantages **and** disadvantages of using machine learning to predict natural disasters like earthquakes.

[8]

Answers may include:

Reasons why machine learning should be used to predict natural disasters:

- Machine learning learns from previous experiences.
- It can easily analyse patterns from previous experiences.
- AI can be trained to analyse patterns of natural disaster to predict future occurrences.
- Access to vast amounts of data can make predictions more accurate.
- Access to worldwide data will lead to better predictions.
- The system becomes more accurate as more data is collected over time.
- It can analyse large amounts of data, so decisions will be based on greater information.
- It can detect non-linear relationships within data and provide more information.
- It can detect all possible interactions between variables.
- It can eliminate human error – incorrect information.
- It can react faster than a human to incoming data.
- The recommendations are likely to be based on the greatest data set possible.
- They will be updated instantaneously.

Reasons why machine learning should not be used to predict natural disasters:

- The quantity of data collected may be limited – not enough data to make predictions.
- The algorithm may not be accurate – causes errors in predictions.
- Predictions may not be reliable due to geographical differences/locations.
- Prediction cannot take into account new scenarios (for the first time).
- The recommendations may be generic and not be sufficiently customized to each natural disaster.
- There may be particular characteristics of the natural disaster that the AI system may not be able to understand.

In part (c) of this question it is expected there will be a balance in the ITGS terminology between IT technical terminology and the terminology related to social and ethical impacts.

Please see generic markband on page 23.

SL and HL paper 1 part (c) and HL paper 3 question 3 markband

Marks	Level descriptor
No marks	<ul style="list-style-type: none"> • A response with no knowledge or understanding of the relevant ITGS issues and concepts. • A response that includes no appropriate ITGS terminology.
Basic 1–2 marks	<ul style="list-style-type: none"> • A response with minimal knowledge and understanding of the relevant ITGS issues and concepts. • A response that includes minimal use of appropriate ITGS terminology. • A response that has no evidence of judgments and/or conclusions. • No reference is made to the scenario in the stimulus material in the response. • The response may be no more than a list.
Adequate 3–4 marks	<ul style="list-style-type: none"> • A descriptive response with limited knowledge and/or understanding of the relevant ITGS issues and/or concepts. • A response that includes limited use of appropriate ITGS terminology. • A response that has evidence of conclusions and/or judgments that are no more than unsubstantiated statements. The analysis underpinning them may also be partial or unbalanced. • Implicit references are made to the scenario in the stimulus material in the response.
Competent 5–6 marks	<ul style="list-style-type: none"> • A response with knowledge and understanding of the relevant ITGS issues and/or concepts. • A response that uses ITGS terminology appropriately in places. • A response that includes conclusions and/or judgments that have limited support and are underpinned by a balanced analysis. • Explicit references to the scenario in the stimulus material are made at places in the response.
Proficient 7–8 marks	<ul style="list-style-type: none"> • A response with a detailed knowledge and understanding of the relevant ITGS issues and/or concepts. • A response that uses ITGS terminology appropriately throughout. • A response that includes conclusions and/or judgments that are well supported and underpinned by a balanced analysis. • Explicit references are made appropriately to the scenario in the stimulus material throughout the response.