INFORMATION TECHNOLOGY	**9626/13**
Paper 1 Theory	**May/June 2023**
MARK SCHEME	
Maximum Mark: 70	

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

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This document consists of **9** printed pages.

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

GENERIC MARKING PRINCIPLE 6:

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks
1	**Four** from: • **Automatic** collection/storing of data (1) • Using a **computer** and **sensors** to collect data (1) • This data is **analysed/processed** (1) • The results are **output** in the form of graphs/charts/tables (1) • Data is collected **over a period of time** ... (1) ... continuously/at regular intervals (1) • The analysis/processing usually requires special software (1) • Two of the following examples of physical variables logged: temperature sound light pressure (1)	**4**

Question	Answer	Marks
2	**Five** from: • ONE of: SSL is Secure Socket Layer OR TLS is Transfer Layer Security (1) • Enable encryption in order to protect data (1) • To protect data whilst being transferred (accept close alternatives to 'transferred') (1) • To encrypt and decrypt data sent/received by web users (1) • Provides secure connection between web browser and website/client and server (1) • Authenticate the people/companies/users exchanging data (1) • Ensure the integrity of the data to make sure it has not been corrupted/altered (1) • Enable credit/bank card payments to be made securely ... (1) ... by setting standards for the storage/transmission/processing of bank card data (1) • Improve customer trust/more likely to do business with a company using SSL/TLS protocol on its website (1) • Enable users to securely complete online transactions (1) • Enable the creation of a secure connection between a web server and a browser (1) • Prevent eavesdroppers from trying to intercept data (1) • To provide security of communication in a network/secure transmission/sharing of data (1) • Encryption protocols enable credit card payments to be made securely (1)	**5**

Question	Answer	Marks
3(a)	**Three** from: • Data is **grouped** (1) • A group of data is processed all at once//in one go (1) • Jobs/batches are set up so they can **be run to completion** without human interaction (1) • Data is processed at a set time (1) • **Takes place** when the computing resources are **less busy** (1) • With batch processing there is a delay between the collection of data and the actual processing (1)	**3**
3(b)	**Three** from: • The response time of the computer must be **immediate** (1) • Real-time responses are in the order of milliseconds, and sometimes microseconds (must be more than 'is fast', but this can be expanded upon)//real time processing is immediate (1) • Real time means that the inputs are processed and produce an output which in turn affects the input (1) • The processing involved in a rocket guidance system has to be **continuous**, so the process is **never ending** (1) • An example of consequences (1) • An example of benefit (1)	**3**

Question	Answer	Marks
4	**Eight** from: • **Manages/operates/controls** computer **hardware** resources (1) • Manages software resources (1) • Interacts with device drivers (1) • Responds to **input** devices/recognises **inputs** (1) • Sends data/instructions to printers/output devices (1) • Manages files/directories (1) • Responds to inputs (1)// interface between the user and the computer (1) • Allocates **memory** to software (1) • In multi-tasking/multi-programming systems allocates equitable processing time to each task/program (1) • Supplies utilities for managing the computer – (may state or exemplify) (1) • Outputs to hardware//interface **between** an application program and the computer hardware (1) • Knows the names of each file and (exactly) where they are stored (on the storage media) (1) • It keeps a record of any empty spaces on the medium to know where new files can be stored (1) • Displays error messages to the user if an error occurs (1) • Opens and closes **files** (on storage devices) (1) • Allows **communication** between attached hardware (1)	**8**

Question	Answer	Marks
5	**Eight** from: • Computers are able to take readings at **more frequent intervals** … (1st) … as humans take time writing down readings (1) • Computers can read **several** physical variables at the same time … (1st) … whereas humans would only be able to read one at a time (1) • Computers **continuously** take readings … (1st) … whereas humans take breaks (accept any reason why an individual human would not take readings continuously) (1) • Computers take readings as planned (as planned is an example) … (1st) … whereas humans may forget (1) • **Readings** taken by computers tend to be **more** accurate (1) • Computers can produce **accurate** graphs **automatically/ instantaneously** … (1st) … whereas humans take time to draw them (1) • Tables of results are produced **automatically** after the readings are received by the computer … (1st) … unlike a human who would take a lot of time to write them down neatly (1) • Computers can work in dangerous conditions (1st) plus one mark for an example of a dangerous condition (1) **Max 6 marks for just bullet points**	8

Question	Answer	Marks
6	**Eight** from: *Inputs (accept device OR data) (Candidate has to be clear they are discussing input)* • A button for a pedestrian to press//to indicate they wish to cross (1) • Signal from button (1) • Preset value(s) for delay between request and light change ('how long a light stays on' on its own is TV) (1) *Processing* • System waits for a **preset** time (or similar description (not 'when time is up')) (1) • **Computer sends a signal** to the actuator/control box… (1st) …to change the traffic lights from green to red (1) • **Computer sends signal** to actuator to change pedestrian control light to safe (1) • Computer **initiates** count down (1) • After another pre-set time **sends signal to actuator** to change pedestrian control light to unsafe (1) • **Computer sends a signal** to the actuator/control box to change the traffic lights from red to green (1) *Outputs – (Candidate has to be clear they are discussing outputs)* • Display above pedestrian button indicating don't cross/red man/indicating safe to cross/green man (1) • Beeping sound (1) • Red/amber/green light that drivers can see (1) • Count down (1) **Must have at least one from each group to get full marks**	8

Question	Answer	Marks
7	**Six** from: e.g. • Young people have grown up with the technology/have only ever known the use of smart phones/internet //its seen as part of their everyday life (1) • Older people may feel they are too old to learn about new technology (1) • Younger people are more likely to take risks/older people are more risk averse (1) therefore young buy new technology/old do not buy new technology (1) • Many older people already have established means of communication and so do not see the need to explore new technology (1) • IT businesses tend to aim new technologies at younger people ... (1) ... companies make few modifications to help older people use them more easily (1) • Technology seen as something for the young (1) • Older people can be awkward with their hands and fingers making the use of smartphones a problem (1) • Elderly people also find it difficult to read text on a screen or use a keyboard (due to visual impairments) (1)	**6**

Question	Answer	Marks
8	**Four** from: • Spyware enables hackers to gain/steal **personal information** (1) • One mark for **TWO** items of information that could be gained, E.g. bank account **number**, date of birth, email address and password User ID Spyware can identify patterns of computer use (1) • Spyware can access computer camera (1) • The individual's computer system can slow down (1) • Personal data can be used to commit identity theft// for fraud (1) • Login details used to withdraw//transfer money from the bank account (1) • Login details to make unauthorised purchases (1) • Target computers for specific marketing purposes/ can send pop-up adverts (1) • Can use data to blackmail users (1)	**4**

Question	Answer	Marks

9	**Eight** from:
	
	Advantages of GBI/disadvantages of GUI
	• Can be advantageous to disabled users … (1)
	  … who maybe cannot control their hands accurately//have limited mobility (1)
	  … could make gestures using their limbs/eyes (1)
	• For reasons of hygiene a doctor/food worker may not be allowed to touch a display or device … (1)
	  … gestures control the device/ allow them to control devices without touching anything (1)
	• Gestures may be a quicker way of initiating a response from a device (1)
	• Some gestures may be unintentional but still initiate a reaction from the device (1)
	• Gesture based interface does not require person to be sat in front of computer/device so can operate computer/device from a distance (1)
	• Enhanced gaming experience (1)
	
	Disadvantages of GBI/advantages of GUI
	• GUIs tend to be more accurate than gestures (1)
	• Certain gestures may not be socially acceptable/user could feel uncomfortable making gestures//reduced privacy (1)
	• Some gestures may be unintentional but still initiate a reaction from the device//GUIs require actions to be deliberate (1)
	• Gesture based is less effective when several users/background movement involved (1)
	• **In certain lighting conditions** gesture-based interface may misinterpret/fail to register a gesture (1)
	• GUIs can be used in any **lighting/dark situations** (1)
	• Increased danger of injury (1)
	
	Max. six marks if bullets/list of points
		8

Question	Answer	Marks
10(a)	Forward chaining	**1**
10(b)	**Four** from: • An inference engine searched the rules until it found one where the IF statement was true (1) • An inference **engine rejects** any rule that is not TRUE (1) • The IF Hortense is an Ostrich is NOT TRUE (1) • The IF Hortense sings and Hortense is 15 cm is TRUE (1) • The **'THEN'** part caused the addition of new information (1) • Inference engine looked for another matching IF... (1) • The IF X is a canary - THEN X is yellow is TRUE (1) • Inference engine stopped because the goal was reached (1)	**4**

Question	Answer	Marks
11		**8**