Cambridge International AS & A Level

INFORMATION TECHNOLOGY	**9626/33**
Paper 3 Advanced 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.

Cambridge International is publishing the mark schemes for the May/June 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

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	**Six from, e.g.:** • Can empower individuals by attracting large numbers of others to ideas/views/discussions that are brought to the attention of governments • Can allow access to government by marginalised individuals/organisations to raise awareness by government • Can overcome social divides in access to government because social media is used across social/ethnic/minority/income/gender groups • Can be used to deliver advice/information quickly and to direct users to sources of more information/help • Enables/encourages/forces governments to be more responsive to public opinions/polls/views/organised interest groups of people by active listening/monitoring of • Encourages government transparency and accountability by providing easy/open access to government policies/departments/information • Can provide more responsive/agile/iterative delivery of public services by enabling real-time participation/feedback in situations/discussions • Can help to reduce costs in providing information/carrying out transactions by government leading to increase in accessibility for individuals • Enables users to be involved in the design/implementation/monitoring of government policies by e.g. government data mining of social media trends.	6

Question	Answer	Marks
2	**Seven from:** • It provides feedback to the clerk about the status of their input/how far they have got in entering data/the next step in entering data • It ensures that the wording/language of questions/instructions are appropriate for/to the clerk • It ensures that the wording/language is consistent throughout the data entry process • It provides means for correcting mistakes/errors/go back without repeating the whole process • It provides means for preventing errors/validation checks to ensure data is reasonable • It provides sensible/understandable error messages to users when errors occur • It provides mechanisms for users to (easily) recover from mistakes/errors/correct errors/suggest corrections • It provides information where it is needed to reduce need for users to recall/remember/instructions for other areas of the form • It provides shortcuts/customisation experienced users to maximise their performance • It reduces unnecessary/irrelevant/rarely needed information on the form to a minimum to reduce user confusion/inattention to detail • It provides documentation where additional explanation/help is required.	7

Question	Answer	Marks
3	**Eight from:** *Similarities:* • Both use magnetic strip/chip/RFID chip • Cards carry identification text/symbols/images of issuer • Cards carry unique (account/card number/security) numbers • Cards may carry holographic information to deter fraud • Stored data includes PIN • Used in same way for contactless • Both used for in person payments *Differences:* • Stored value cards may not always carry name of owner/may be anonymous whereas credit cards always carry name of account holder • Stored value cards carry the amount of money available (as data stored on card) whereas credit card monetary value is set by issuer/stored at issuer of card/bank • Stored value cards used in low-value transactions whereas credit cards subject only to issuer limits • Stored value cards usually have a limited amount of money whereas credit cards may not/can have extended limits • (When used for payment) stored value cards may not require connection to issuer bank whereas credit cards often/usually do require connection to issuer bank/account • Stored value cards may be discarded when money used up/may be topped up with more money whereas credit cards must be kept safe because value is stored in (connected) account • Stored value cards can be used by anyone (in physical possession of card) in the same way as physical currency whereas credit cards require authentication of user before transaction is carried out • No fees are payable to merchant when accepting stored value cards whereas credit card use incurs a (percentage/fixed) fee payable to issuer by merchant when used • Stored value cards are not accepted for online/telephone/mail order/card not physically present transactions unlike credit cards which are readily accepted/preferred • Credit cards can help build up a credit rating for the user whereas stored cards do not. ***Must be at least two similarities and at least two differences for full marks.***	8

Question	Answer	Marks
4(a)	**Three from:** • Collection/group/number of internet-connected devices/smartphones • (One or more) bot/malware is running on each/every (connected) device • Security of (each/every) device has been taken over by third party • Controlled by third party/controller/bot herder via internet links • Use of digital signatures to ensure that bot herder is only one able to direct/control bot/botnet • Connection uses standard/usual internet protocols.	3
4(b)	**Six from:** *Setup:* • Device(s) has/have malware/bot installed without knowledge of owner/user • Bots set up as clients on devices • Bots can be set up as peer-to-peer with controller device • Bots connect together using internet communication systems/protocols • Bot herder/controller at remote location directs/sends commands to bots using a device as a server/Command and Control (C&C) • Use of Internet Relay Chat (IRC)/websites/telnet/domain/social media platforms to communicate with remote server • Bots can automatically scan their computing environment to discover ways of propagating themselves to other devices *Use:* • Bot herder/controller directs bot(s) to gather keystrokes to discover login credentials • Bots can execute/run other malware to access files/gather data and send back to controller • Botnets can carry out Denial-of-Serve (DoS) attacks on servers preventing legitimate use of files/data/services • Botnets can send (spam/unwanted/fraudulent) disguised emails from infected devices/zombie computing devices with attached data/files/request for login credentials/financial details • Botnets can distribute/direct spyware to gather user credentials/details/data and send to controller • Botnets use computing resources without knowledge/permission of user ('scrumping') and can compromise legitimate file/data storage.	6

Question	Answer	Marks
5	**Five from:** • Use of source file/database/spreadsheet of names/mailing list/managers linked to master document • Master document with body of invitation has fields placed in appropriate locations • Use of IF field/nested IF to match names/managers with (condition)/ valid example e.g. { IF {MERGEFIELD Manager_Type } = "Month" } • Use SKIPIF/SKIP RECORD IF field to skip/move over records that are not managers/valid example e.g. {SKIPIF «Manager_Type»}<> {=«Month»}} • Use NEXT RECORD IF field to compare manager type and move if not Month/valid example • Can be selected with SQL SELECT from source file/database/spreadsheet of names.	5

Question	Answer	Marks
6	**Six from, e.g.:** • CAD is used to design/analyse/optimise devices with greater precision/customisation for individuals • CAM used to create multiple/iterative prototypes during development so better customisation • 3D modelling used during design/development of devices resulting in better designs • CAM used to create devices with greater accuracy/more quickly/in quantity than hand-crafted devices for testing/use • 3D scanners used to measure/quantify areas for implanting/attaching prosthetics to body location/residual limb so fit better • Use of electronic devices with computer/microprocessor-controlled feedback loops to enhance performance/better mobility/use • Connections to nerve supplies via microprocessor systems to allow control/movement/feedback of devices by brain/nerve supply for better control • Myo-electric prostheses capturing muscle electric signals through skin and used to control artificial/prosthetic device/fingers/hand/leg/foot for more precision • Microprocessor systems used to interpret/analyse data from sensors in device for better control • Microprocessor systems used to send signals to actuators in prosthetic/control actuators in prosthetic to mimic the natural movements more closely • Sensors used as synthetic nerve system to detect touch/read Braille/respond to environment changes.	6

Question	Answer	Marks
7	***Analyse: examine in detail to show meaning, identify elements and the relationship between them.*** **One from, description of UHD:** • Digital TV with (approximately) four thousand /4000/eight thousand /8000 horizontal pixels Digital TV with four/4/sixteen/16 times the number of pixels compared to HD TV • (Available native) aspect ratio of screen must include 16:9 (to avoid distortion when displaying video). **Five from e.g.:** • Increase in enjoyment of TV/media content because images are more realistic/engaging • Increase in time spent watching TV • Increase in use of streaming services because these have more UHD content leading to increased use of internet • Need to upgrade routers/telecommunication connections lines • Enhanced gaming experience • Images in computer games appear more realistic • Increase costs/financial constraints/issues for access to streaming services/internet/power requirements • UHD TVs are usually much larger physically than other types of device so infringe on living space/reduction in enjoyment of home environment • Increase in 'binge-watching' of content can affect health of individuals as a result of physical inactivity/'snacking' while watching • Results in weight increase/social isolation/poor sleep patterns • Lack of UHD content can lead to feelings of disappointment/disillusionment with technology. ***Max 4 marks if bullets/list of points/characteristics.***	6

Question	Answer	Marks
8	***Discuss: write about issue(s) or topic(s) in depth in a structured way.*** **Eight from:** *Benefits:* • Can increase business/add new business if content is relevant/meaningful/honest/trustworthy • Can encourage feedback from existing customers • Repeat visitors/users can update their views/experiences with products • Can analyse the data from blog to learn more about customer base to target with sales offers • Ensure that alerts/notifications to customers are sent regularly • Blogs are quick/easy/need no technical knowledge to set up • Can be started by almost anyone to almost anything *Drawbacks:* • Blogs have to be continually updated/amended • Content/advertising copy is often poorly written and difficult to follow/so may not be easily understood • Can be inconsistent in details/views/feedback/may be confusing to customers • Relevant content/advertised items/services/goods can be difficult to find/does not turn up in search results/can be overlooked • Blogs are often written alone/by one person/no-co-workers/nobody to help with wording/content/accuracy/content may not attract customers • May be misleading to customers • If blogger is ill/unable to work/away from home/on vacation then the blog is not updated/ • Income/revenue may fall • Negative feedback can deter customers/difficult to refute/remove/appears first in blog. ***Must be at least two benefits and at least two drawbacks for full marks. Max 6 marks if bullets/list of points/characteristic.***	8

Question	Answer	Marks
9	***Analyse: examine in detail to show meaning, identify elements and the relationship between them.*** ***Seven from e.g.:*** • Use of regularly updated/up-to-date anti-malware/anti-virus/anti-spyware software to protect against malware… • … provides real-time monitoring/alerts to continually protect data/isolate/delete/remove infections/compromised files/data • Use of encryption to make data unintelligible/not understood by unauthorised users/viewers… • … prevents theft/misuse of personal/financial/confidential <u>information</u> • Encryption of hard disks/USB devices/removable storage so that if lost the content of data is unusable/inaccessible … • … requires user to remember the password else data is lost • Biometrics used to compare existing/stored unique ID data with newly presented ID data for authentication of user ID… • …allowing access only to authorised users to areas/devices/laptops/tablets/smartphones storing data • Use of access rights/permissions on files/folders to control user access with Access Control Lists/ACLs … • … which have allow/deny entries • Use of passwords on individual files… • … to control user access • … encrypt documents • …control editing rights to prevent unauthorised viewing/reading/alteration of content • Use of steganography/hide data within other data/text in JPEG images/MP3 files requiring the use of secret key/public/private key encryption … • … that unauthorised users are unaware of the data/cannot access the <u>information</u> in the data • Use of automatic backup schedules to ensure that (copies of) data is regularly stored elsewhere… • … can restored/retrieved if original lost/damaged. • Use of regular software updates/updates to applications/apps … • … ensure that security issues are addressed/corrected as soon as possible. ***Max 5 marks if bullets/list of points/characteristics.***	7

Question	Answer	Marks
10(a)(i)	**One from:** • (data destruction) is the deleting/removing of data *One example:* • Valid example of e.g. deleting a record from a database.	**2**
10(a)(ii)	**One from:** • (data modification) is changing data to a different value • Changed value is stored in the same location as the original/overwriting the original value *One example:* • Valid example of e.g. change value in cell/cell ref of spreadsheet from e.g. 100 to 101.	**2**
10(b)	**Four from:** • Security measures to detect/prevent unauthorised access to network/network connections • Segmenting/zoning network sections/servers to prevent/reduce access by intruders • Use of firewalls to prevent unauthorised access/intrusion to networks/network storage • Use of VPN/secure connections to cloud storage systems • Use of authorisation/authentication techniques for gaining access to data • Regular/automatic check on data integrity with automatic alters/alarms/notifications (if data change is not authorised) • Use of (high-level/256-bit) encryption techniques to restrict access/understanding or data so amendment of data is more difficult.	**4**