Cambridge Assessment International Education

Cambridge International AS & A Level

INFORMATION TECHNOLOGY **9626/32**

Paper 3 Advanced Theory **October/November 2020**

MARK SCHEME

Maximum Mark: 90

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 October/November 2020 series for most Cambridge IGCSE™, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

[Turn over

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(a)(i)	Text/characters within double/single quotes.	**1**
1(a)(ii)	**One** from: A variable declared outside a function A variable used throughout the script/program A value assigned to an undeclared variable.	**1**
1(a)(iii)	**One** *from:* Sequence of characters forming a search pattern (Object/character) patterns used with functions to search strings A description of what is being searched for.	**1**
1(a)(iv)	(Arithmetic operators or) signs to compare/assign/calculate values.	**1**
1(a)(v)	Instructions (in the code) that are executed/carried out (in order) by the computer/web browser/interpreter.	**1**
1(b)	**Four** *from:* Writes a message to the browser console Requires later versions of browsers/not all browsers support the console Requires console to be open in browser/f12 to be pressed in browser to see the message Is used for testing purposes Information in brackets will appear in the console **Two** *max from:* Message is a string/object Is mandatory/required Can have more than one object Objects can be variables.	**4**

Question	Answer	Marks
2(a)	**Five** *from:* Routes are entered into a database/routes are decided/controlled by network administrator Entries are fixed/do not change/are not reconfigured automatically Defines fixed routes for packets to take from the router Used by a routing algorithm to create a 'forwarding table' for use when choosing next hop/preferred route Defines route of last resort/exit point from router/route to send packet if no other destination is known Provides fail-safe if dynamic routing does not provide a route Can be used to transfer routing information from one router to another/one routing protocol to another.	**5**

Question	Answer	Marks
2(b)	**Five** *from*: Routing protocols create a table of routing information from real-time logical network layouts/changes/issues/problems Created automatically by algorithms/not created by network administrator Use a number of different protocols/methods to determine 'best' route/next router to use Routing information can be automatically shared with other routers (using same protocol) Routing information can be automatically shared with other routers to discover data about remote networks/changes in networks Can be used to limit the number of 'hops' that a packet can take to its destination Routes have a time-to-live after which the database/table will be updated Packets can be forwarded via different routes depending on network conditions Packets can be routed around network issues/damage/loss of a node/router Allow as many routes as possible to be kept open.	**5**

Question	Answer	Marks
3(a)	**Four** *from:* *Alpha:* Alpha testing is a type of acceptance testing to identify any problems before release to end users Alpha testing can use white and black box techniques to simulate (typical) end user tasks Alpha testers (usually) work for the software developer/in the software developer laboratory/offices *Beta:* Beta testing is carried out by (real) end users Beta testing is carried out in a real/live environment/business Beta testing is the final testing phase before release of product to customer/clients. *Must have at least one of each for full marks.*	**4**
3(b)	**Five** *from:* So that the installer/technician knows what hardware/software is required So that any data structures/inputs/processing/outputs can be amended by (another) programmer/analyst So that any programmer/analyst can understand how the data flows through the system System flowcharts so that any programmer/analyst knows how the system works To provide a basis for technical writers to create user manuals/other documentation To provide a reference for programmer/analyst to update the system.	**5**

Question	Answer	Marks
3(c)	**Four** *from*: To (detect and) correct errors in the program code so that the system works properly (corrective maintenance) To improve the functionality of the system to make it more suited to the needs of the business (perfective maintenance) To remove unwanted functions from the system (perfective maintenance) To modify the system so that it remains compatible with any changes to the technical environment/hardware of the business (adaptive maintenance) To help prevent problems caused by (upcoming/possible/security/functional) vulnerabilities in the system (preventative maintenance) To ensure that the system continues to work for its expected life time/as long as the business requires it.	**4**

Question	Answer	Marks
4(a)	***Six*** *from:* Ensure that management/staff are prepared/aware of/trained for the changeover to determine what needs to be done after/will happen at changeover Train experienced/expert staff beforehand to support other staff Train technicians to maintain the new system Prepare/distribute new user manuals/instructions/help services Ensure that all data is suitably backed up/secured Confirm that the new system hardware/software is compatible with the data from the old system Ensure that the new hardware/software is ready and available for installation Transfer the data from the old system to the new one Test the new system to ensure that it is working/data has transferred correctly Plan/amend details of training for future/new users.	**6**
4(b)	**Two** *from:* Store can change systems when it is most convenient/store is shut Benefits of new system are available to all users immediately Can be carried out (overnight/quickly) with minimal disruption to the store operations	**2**
4(c)	**Two** *from:* If the new system fails, the old system is not available for use in store May lose data as old data/backups cannot be installed/used on new system Staff have very little time to learn the new system so may make errors/mistakes	**2**

Question	Answer	Marks
5(a)	**Four** *from:* Fingerprints are scanned into the system Image is converted into a binary pattern Binary pattern is stored on the system/in database Pattern is compared with existing fingerprint patterns in database If match found access is allowed If no match found error message/access denied/prompts for retry.	**4**

Question	Answer	Marks
5(b)	**Eight** *from:* *Advantages:* Biometric data is unique to/possessed only by one individual so is very secure Biometric data is difficult/impossible to forge so is more secure More than one characteristic can be used to increase accuracy Staff always have biometric data with them/no forgetting passwords/ID cards Staff cannot share biometric data to allow others access so more secure Costs e.g. paperwork/administrative work/password reset costs are reduced *Disadvantages:* Cost of/time taken for enrolment of staff can be high Biometric data can have a high false match rate leading to access by authorised persons Biometric data can have a high error rate leading to entry failures by staff/staff inconvenience/annoyance Authorised sharing of access using biometric data is difficult (unlike user IDs/passwords) Characteristics may alter over time so have to be retaken/staff re-enrolled at intervals Staff may object to having their biometric data stored/used Staff may be identified when they do not need to/should not be/e.g. facial recognition in a crowd/rest area. *Must have at least one of each for full marks.* *One mark is available for a reasoned opinion/conclusion.*	**8**

Question	Answer	Marks
6	**Eight** *from e.g.:* *Advantages:* Useful/helpful for predicting future trends Useful/helpful in keeping track of customer habits/behaviour Useful/helpful in decision making Speeds up the data analysis As people can collect information about marketed products online this eventually reduces the cost of the product and their services With the help of marketing analysis can find out fraudulent/fake products available Can cause the sudden fall in popularity of some films following e.g. 'me-too' campaigns Can influence the rebellion against plastic wrapped goods being identified by data mining of social trends *Disadvantages:* Violates user privacy Can collect additional irrelevant information Highly skilled person is required to carry out the analysis/prepare and understand the data Safety and security measures can be minimal so data can be misused to harm others Results of data mining can be stolen/sold to others without being anonymised so revealing personal details/data Data patterns/results of mining can be misused/used to discriminate against different social/demographic groups Accuracy of data can be in doubt *Must have at least one of each for full marks.* *One mark available for a reasoned conclusion.*	**8**

Question	Answer	Marks
7(a)	**Eight** *from:* WBS/work breakdown structure technique to divide project/activities into smaller activities Use of network/arrow diagrams showing connected activities Used to represent the interdependencies of activities Used to represent the order of activities Show the start date of activity Show the end date of activity Use Program/Project Evaluation and Review Technique/PERT Use estimates of time/optimistic/realistic/pessimistic estimates of time taken for activities (to identify critical path) Use of critical path method to set out monitor/show progress of project Use of critical path analysis to calculate 'floats' for tasks/project Show longest time that will/could be taken for project Allow resources to be allocated efficiently Allow costs to be calculated/allocated Gantt charts can be used to show activities/different colours for activities.	**8**

Question	Answer	Marks
7(b)	**Eight** *from:* *Advantages*: Data is centralised on a company server/storage subsystem not on an individual computer Can be accessed on different devices so team members can work remotely/on site/when mobile Updates to project are shared (immediately) between users/Project Manager and team Status updates are immediate/notifications are immediate when project is updated/altered/amended Project members can collaborate in a project regardless of their physical location Communications and discussions can be in real-time regardless of location Email notifications can be set up to occur automatically/integrated into the software Compatibility with other project management tools tends to be assured Can control access to activities/parts of project using access lists/permission rights Backups can be automatically created at required/set intervals *Disadvantages:* (Some) functionality may be missing/reduced compared to specialised software e.g. resource levelling/Gantt chart creation Internet connection is required so location may be limited Requires compatible device/web browser/software Security/privacy/data integrity issues may arise due to use of internet/public telecommunications systems May not be compatible with off-line software so projects may need updating/modification when transferred Use of internet may be a distraction to project team members. *Must have at least one of each for full marks.* *One mark available for reasoned conclusion.*	**8**

Question	Answer	Marks
8	**Six** *from e.g.:* Can be used to aid/augment/replace humans in space exploration Assist/used for tasks (accept examples) in hazardous conditions e.g. high radiation/extreme temperatures where humans cannot go/work Automatic/autonomous spacecraft for space exploration/research at long distances/time Automatic/autonomous spacecraft for delivery of resources to/return of materials from e.g. ISS Automatic/autonomous machines for repair of space objects/satellites Robotic arms fitted to space craft to move (large) objects Automatic/autonomous vehicles for exploration of other worlds/space objects.	**6**

Question	Answer	Marks
9	**Six** *from:* Use holographic techniques Use of lasers/green laser and red laser to record data as holograms Green laser reads data from the (interference fringes) of the hologram (near top of disk surface) Red laser is the reference beam reading mechanical/ servo/ rotational/ addressing data from aluminium layer at/near bottom Mirror dichroic/thin film/interference) layer is used to prevent interference/ refraction between the layers/green and red reflections Uses collinear holography that can be read by a single optical system Can store terabytes of data on small/10-12 cm disks Use (photo)polymer/monomer as recording substrate/medium … thickness of medium can determine recording capacity Used in Ultra HD Blu-ray for very high definition video.	**6**