Cambridge Assessment International Education

Cambridge International AS & A Level

INFORMATION TECHNOLOGY **9626/13**

Paper 1 Theory **May/June 2022**

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 2022 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(a)	Data that is collected for a specific purpose or task/ for that purpose only/gives us data that is often called 'original source data'	**1**
1(b)	**Four** from: Questionnaires could be distributed amongst neighbours/local people asking about the level of noise Interviews could be carried out with neighbours/local people (asking about the level of noise) He could observe traffic, keeping a count of traffic coming down each street He could use sensors to detect the flow of traffic going down each street He could use sensors to measure the level of noise in each street	**4**

Question	Answer	Marks
2	**Four** from: An interpreted program will still be in its original source code so it will work on any system… …but must have an appropriate interpreter Only use high level languages which can be interpreted With languages which are compiled can use a cross compiler… …so programs can run on a computer with a different operating system/target computer… Cross compilers can be a smaller version of the compiler which is normally used on the host computer/native compiler A problem with using a cross compiler is that the compiled program will no longer run on the computer the program was written on/host computer The cross compiled code can run more slowly than if it had been originally compiled on the target machine A cross compiler produces more errors and mistakes than a native compiler	**4**

Question	Answer	Marks
3	**Four** from: Use anti-virus software to scan for malicious content/virus as it enters the computer/detect any unusual behaviour in the computer/system… …anti-virus can remove / quarantine viruses/alert/recommend the user to take action Keep anti-virus software up to date/running continuously/set up frequent scans Only use one anti-virus program as two different programs can fight against each other Use a firewall to filter incoming traffic… … if it detects malicious software trying to enter the system it can prevent it from entering Use anti-spyware software if the anti-virus software does not include it Use a spam filter to minimise the effect of spam if the user's email software does not use one	**4**

Question	Answer	Marks
4(a)	**Four** from: Software that is specially developed for a specific company/business It is made to accommodate that customer's particular preferences and needs Written by programmers to solve specific problems Owned by the business that commissions it It is made from scratch Support is obtained directly from the creators Development costs have to be paid for by client for whom its written/ commissioning company/business	**4**
4(b)	**Four from:** Software that is ready-made/ready for use and already exists/can be used immediately It is available to all businesses and companies/general public/everyone It is owned by the company that created it/users only have a licence Has to be adapted to fit the business that has purchased it Development costs are spread amongst several customers Support is obtained from help desks/call centres/user forums run by the producers of the software	**4**

Question	Answer	Marks
5	**Eight** from: *Advantages* For reasons of hygiene a doctor may not be allowed to touch a display or device... ...speaking into a microphone is a more hygienic way to control the device Dialogue interface allows hands free control / ensures safety when driving... …whereas GUI would need at least one hand to leave the steering wheel Dialogue interface does not require doctor to be sat in front of computer/device so can operate computer/device remotely/allows doctors to be doing other things/tasks at the same time/multitask Users with physical disability may not be able to use a keyboard or mouse… …or control their limbs accurately… …could speak into a microphone to control a device *Disadvantages* Some background conversation may result in a reaction from the device... ...GUIs more likely to require actions to be deliberate Doctors who have a speech impediment may find a dialogue interface too difficult to use Dialogue interface may not operate reliably if there is background noise… …commands might be misinterpreted/misheard Dialogue interface may not operate reliably if doctor has a cold/strong dialect/accent… …while GUI will still be reliable Dialogue interface often requires a training session with user/doctor... ...use of GUI can be taught through manuals Dialogue interface can be more expensive to develop compared with a GUI Dialogue interface is not suitable for safety dependant commands such as 'stop' as it would not be as easily understood as GUI **Must have at least two of each to gain full marks** **Must be a proper discussion to obtain full marks** **Max. six marks if bullets/list of points** **Must have expansions or comparisons to be a proper discussion**	**8**

Question	Answer	Marks
6	**Six** from: Transport Layer Security (TLS) is used for applications that require data to be securely exchanged over a client-server network... ...such as web browsing sessions/ file transfers The server shows/sends its SSL/TLS/digital certificate to the client /the client requests server's SSL/TLS/digital certificate To open a SSL/TLS connection, a client needs to obtain the public key The public key is found in the server's digital certificate The SSL/TLS/digital certificate authenticates the server to the client/identifies the server The client then carries out a number of checks to make sure that the certificate was issued by a trusted CA… …is in date and that the server is the legitimate owner of the public and private keys For the client to access the server the client and server must carry out a SSL/TLS handshake… …the client tells the server what version of SSL/TLS it uses… …and a list of the different types of encryption that it is able to use The client tells the server that it wants to set up a communications channel Handshaking occurs before the transfer of data can take place The server tells the client the type of encryption it has chosen from the client's list	**6**

Question	Answer	Marks
7	**Five** from: Testing nuclear reactor designs using computer models avoids safety problems… …such as explosions/meltdowns Testing nuclear reactor designs using computer models cuts costs… …as don't have to pay as much money for workers/materials to replace damaged reactors Can obtain results in a short period of time regarding reactions that take a long time in real life Re-designing computer models is cheaper than re-building a nuclear reactor Researchers will have the tools to simulate scenarios that are hard to observe in operating reactors It may be too dangerous to modify the actual nuclear reactor You can test predictions more easily/model can make predictions more accurately	**5**

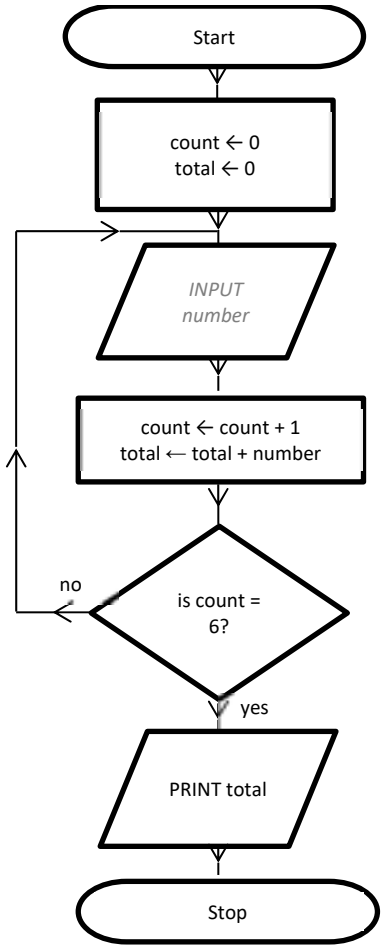
Question	Answer	Marks

8	*REPEAT*
	INPUT reading from induction loop
	IF reading = pre-set value
	THEN
	send signal to raise barrier
	REPEAT
	IF light sensor activated
	THEN
	send signal to lower barrier
	ENDIF
	UNTIL light sensor activated
	ENDIF
	UNTIL system switched off
	
	Seven from:
	
	Appropriate IF statement (comparison of reading)
	Send signal to raise barrier after first IF
	Appropriate other IF statement (checking if light sensor activated)
	Send signal to lower barrier after 2nd IF
	Appropriate position and matching 1st ENDIF
	Appropriate position and matching 2nd ENDIF
	Appropriate UNTIL system switched off statement
	Appropriate loop checking that light sensor has been activated
		7

Question	Answer	Marks
9(a)	**Four** from: The shell contains the explanation system, inference engine, user interface and knowledge base editor (must have 3) The knowledge base editor/knowledge base editing software enables the knowledge engineer uses to edit the rules and facts within the knowledge base Explanation system explains to a user the chain of reasoning used to arrive /why they arrived at a particular conclusion The user interface is how the computer interacts with the user/ allows the user to interact with the expert system The inference engine is the reasoning/decision-making part of the system/ provides the reasoning of an expert system	**4**

Question	Answer	Marks
9(b)	**Four** from: Details of the individual would be entered into the user interface... ...such as the applicant's age, gender, whether they smoke and general health The user interface will ask questions (of the consultant/user) The inference engine will compare the responses... ...with the facts in the knowledge base... ...using the IF...THEN rules The inference engine will produce a recommendation for how much the applicant will pay each month for their policy... ...or recommend whether the application is rejected May inform them of the details of the policy The recommendation is output through the user interface The consultant will use the expert system's recommendations to make a final decision	**4**

Question	Answer	Marks
10	**Eight** from: *Advantages:* Any change to one record which is needed can be instantly made to any related records The database does not have data duplication … …making the file size smaller … …so less money needs to be spent on storage …so there are fewer errors in the data… …so there is less chance of storing incorrect copies of the data Modifying a table is easier as there is less data to modify *Disadvantages:* A larger numbers of tables requires more relationships to be designed… …taking more time Making data atomic may not always be the best solution such as date of birth can be separated into day, month and year… …but this may serve no purpose Data may be stored as codes rather than meaningful data… …making it difficult for humans to intepret/level of detail can be lost With more tables, setting up queries can become more difficult… …the more complex the database queries need to be so can take longer to run You can end up with more tables than an unnormalised database making it difficult to keep track of data May require greater expertise/knowledge and understanding… …which may need to come from outside and be paid for **Must have at least two of each to gain full marks** **Must be a proper discussion to obtain full marks** **Max. six marks if bullets/list of points** **Must have expansions to be a proper discussion**	**8**

Question	Answer	Marks
11		**7**

Initialise count – 1 mark
Initialise total – 1 mark
total ← total + number – 1 mark
count ← count + 1 – 1 mark
is count = 6 – 1 mark
PRINT total – 1 mark
yes and no in correct positions – 1 mark