Cambridge Assessment International Education

Cambridge International AS & A Level

INFORMATION TECHNOLOGY **9626/11**

Paper 1 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.

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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)	A touch screen is easier to use than a keyboard for inputting large amounts of text Using a keyboard is the most efficient method of moving a file from one folder to another A scanner is an input device used for inputting hard copy documents ✓ A motor is an input device used for inputting physical variables in a control system	1
1(b)	A sensor is an output device used as an actuator in a control system A dot matrix printer is the quickest printer for outputting large amounts of text A webcam is an output device used to display moving images An inkjet printer can be used to output high quality photographs ✓	1
1(c)	**Four** from: Secondary storage devices store data permanently whereas RAM is volatile Users' data is lost from RAM when the computer is switched off Backups/second copies of data are often needed in case anything happens to the original and this is impossible in RAM RAM/ROM is far more expensive than secondary storage per unit of storage RAM/ROM has limited memory/can be difficult to upgrade so disks are needed to load large amounts of data ROM/RAM store the start-up instructions before secondary storage becomes usable Disks/secondary storage devices are needed to store operating systems/applications	4

Question	Answer	Marks
2(a)	Lossless compression reduces the number of bits by increasing redundant data Some information is lost in lossless compression Lossy compression reduces the number of bits by identifying unnecessary information and removing it ✓ Disk defragmentation organises the contents of the disk into the largest number of contiguous regions	1

Question	Answer	Marks
2(b)	Data access is faster on a hard disk with fragmented files than on a defragmented hard disk: Disk formatting prepares a data storage device for initial use: ✓ The first stage of formatting is high-level formatting followed by low-level formatting: Disk partitioning makes the data storage device invisible to an operating system:	1
2(c)	**Four** from: **Three max** from: Most operating systems keep track of where files are on a hard disk through pointers Each file and folder on a hard disk has a pointer that tells the operating system where the file's data begins and ends/its length When a file is deleted the operating system removes the pointer and marks the sectors containing the file's data as available The file is no longer present on the hard disk as the sectors containing its data are considered free space Uses a file allocation table (FAT) to store the location of files on the disk The delete utility just deletes the reference of the index in the FAT. **Two max** from: Until the operating system writes new data over these sectors the file is still recoverable A file recovery program can scan a hard drive for deleted files and restore them If the file has been partially overwritten, the file recovery program can only recover part of the data A file recovery program works by reinstating pointers/reinstating the index in the FAT as long as it is done before any data is overwritten.	4

Question	Answer	Marks
3(a)	**Five** from: Naming two appropriate physical variables and the sensors/devices used to gather data – 1 mark Sensors are used to feed data back to a computer Analogue data is converted into digital for the computer to process using an analogue to digital converter Computer stores readings/data in a table/database/file/spreadsheet ready for processing Computer calculates/compares differences in temperature/gas content between readings and normal values Computer performs calculations automatically Calculates this at set intervals Plots graph of values against normal values Computer produces graphs <u>automatically</u>	5

Question	Answer	Marks
3(b)	**Four** from: Similarities They both involve the use of sensors They both do not require human input They both require Analogue to Digital Converters to convert input Differences Control systems act in real time Control systems use output devices such as motors/actuators In a monitoring system the output does not affect the input Must have one of each to gain full marks	**4**
4(a)	**Four** from: Allows user to enter problems Questions are output by the system Allows user to input answers to the questions Further questions are output to the user interface based on the previous answers Outputs explanation of findings Outputs suggestions/probabilities of possible solutions	**4**
4(b)	**Two** from: The inference engine compares data with that held in the knowledge base Uses the rules base/set of rules/IF … THEN Produces suggestions/probabilities of possible solutions Uses explanation system to produce explanations as to how solutions were arrived at	**2**
4(c)	**Two** from: Knowledge base holds the database of facts that the inference engine searches Contains the rules base which consists of IF … THEN … constructs	**2**

Question	Answer	Marks
5	**Four** from: Examining the text carefully to find and correct typographical errors and mistakes in grammar, style, punctuation and spelling Print out a copy rather than read on screen Read the chapter out loud When she reads it out loud she will hear other problems that she may not see when reading silently She could use a blank sheet of paper to cover up the lines below the one she is reading This avoids her skipping ahead of possible mistakes Check separately for each kind of error she is likely to have made, moving from the most to the least important Read through once backwards, sentence by sentence Read through again forward to be sure subjects and verbs agree	**4**

Question	Answer	Marks
6	**Six** from: A single Blu-ray disc stores more data than a single DVD Blu-ray stores up to 128 GB against 8.7GB max Blu ray disc drives are more expensive to buy than DVD drives Blu-ray discs cost less to buy per unit memory Blu-ray drives can read DVD DVD drives cannot read Blu-ray discs A single Blu-ray disc costs more to buy than a single DVD Blu-ray discs can store higher quality videos than DVDs	**6**

Question	Answer	Marks
7(a)	**Three** from: A rootkit is software designed to provide continued privileged/administrator access to a computer while actively hiding its presence Root refers to the Admin account on Unix and Linux systems Kit refers to the software components that implement the tool Rootkits can be installed in a number of ways, including phishing attacks/social engineering to trick users into giving the rootkit permission to be installed A rootkit allows someone to maintain command and control over a computer without the computer user/owner knowing about it The controller of the rootkit can remotely execute files The controller of the rootkit can change system configurations on the host machine A rootkit can access log files and spy on the computer owner's usage Rootkits are difficult to detect because they are activated before a computer's operating system has completely booted up	**3**
7(b)	**Three** from: Bots often automate tasks and provide information or services that would otherwise be conducted by a human being Bots are used to gather information (web crawlers)/ interact automatically with instant messaging/Internet Relay Chat/other web interfaces They may also be used to interact dynamically with websites A malicious bot is self-propagating malware designed to infect a host and connect back to a central server or servers Attackers can launch broad-based, 'remote-control,' flood-type attacks against their targets They have the worm-like ability to self-propagate Bots can include the ability to log keystrokes/gather passwords/capture and analyse packets They can launch DDoS attacks/spam attacks/relay spam/open back doors on the infected network They infect networks in a way that escapes immediate notice	**3**

Question	Answer	Marks
7(c)	**Three** from: Ransomware is malicious software that threatens to publish the victim's data/block access to it /to user's computer unless a ransom is paid It encrypts the victim's files making them undecipherable and demands a ransom payment to decrypt them It often infiltrates a PC as a computer worm or Trojan horse Most ransomware attacks are the result of clicking on an infected email attachment or visiting compromised websites Some ransomware allows use of the computer but prevents the opening of certain files	**3**

Question	Answer	Marks
8	**Six** from: A compiler converts the high-level instructions into machine language/object/code/executable code all at once An interpreter converts the high-level instruction into some intermediate form and after that the instruction is executed The entire program is compiled before being executed The interpreter translates one statement at a time, executing the statement before moving on to the next one A list of errors is created by the compiler after the compilation process An interpreter stops translating after the first error/reports an error immediately on encountering it The compiled program is executed directly using the machine code An interpreter does not convert the source code to an object code file before execution Interpreted programs can be modified at runtime by adding/changing functions A compiled program has to be recompiled fully even for small modifications to be made	**6**

Question	Answer	Marks
9	**Six** from: LAN stands for local area network and WAN stands for wide area network LAN covers a small geographic area/ WAN covers a large geographical area LAN is used within a home, office, school, or group of buildings (must have at least two) WAN – communications links cross metropolitan, regional, national boundaries over a long distance (must have at least two) LANs have a high data transfer rate/WANs have a lower data transfer rate compared to LANs WANs tend to use technologies like MPLS/IP/Frame Relay/X.25 LANs use layer 1, layer 2 and layer 3 devices WANs use layer 3 devices As WANs tend to consist of more complex systems, they are less fault tolerant Both make use of ethernet technologies Must refer to LAN and WAN to get full marks	**6**

Question	Answer	Marks
10(a)(i)	**Three max** from: **Two max** from: A primary key is a field in a table which is unique and enables the identification of every record in that table It must not contain null values A table in a relational database must always have one and only one primary key **Two max** from: Studentid would be set as the primary key in the Students table Teacher_code would be set as the primary key in the Teachers table	**3**
10(a)(ii)	**Three** from: A foreign key is a field in one table that links to the primary key in the original table Referential integrity is usually implemented through the use of foreign keys Teacher_code would be set as a foreign key in the Courses table … which links to Teacher_code in the Teachers table Studentid would be set as a foreign key in the Courses table … which links to Studentid in the Students table	**3**
10(a)(iii)	**Three** from: Consists of more than one field, each of which is a simple/foreign keys in its own right … to form a primary key, the fields of which collectively uniquely identify a record Studentid and Teacher_code would form a compound key in the Courses table	**3**
10(b)	**Four** from: Added these three tables in the relationships view/option/use all three tables Studentid in the Students table was selected and dragged on to Studentid in the Courses table/ Studentid in the Students table is linked to Studentid in the Courses table/Studentids dragged/linked to each other Studentids form a one to many relationship Teacher_code in the Teachers table was selected and dragged on to Teacher_code in the Courses table/Teacher_code in the Teachers table is linked to Teacher_code in the Courses table/Teacher_codes are linked together Teacher_codes form a one to many relationship Checked/selected both relationship types are one to many Ensured that relationship was saved Ensured referential integrity	**4**
10(c)	Naming both length check and format check – 1mark Length check – checks that the length of the data is exactly 5 characters – 1 mark Format check – checks that each item of data begins with one letter followed by 4 digits – 1 mark	**3**

Question	Answer	Marks
11	**Six** from: *Advantages* With a static query, every time that the query is run it will search for the same name With a static query, every time Amir wants to look for another name the query needs to be opened in design view With a dynamic parameter query he just has to type in a different name each time/ with a static query the user will need to change the name criteria in the query design to a different name each time Dynamic parameter query is more user friendly as every time the query is run a dialogue box would appear asking the user to type in the required name/users don't have to have much technical knowledge This would save the time of designing the query every time a new name is required *Disadvantages* It takes more technical knowledge to set up a dynamic parameter query It is more likely that mistakes are made when setting up a dynamic parameter query It takes more time initially to set up dynamic parameter queries Must have one of each to gain full marks	**6**

Question	Answer	Marks
12	**Eight** from: Advantages Easier for students to share work in group projects Greater range of information available to students through school intranet School intranet would become available to students Students could access their work from any computer Students can send their work in remotely Teachers can more easily oversee student work and can give feedback more quickly to student Will not have to worry about losing their work/work is automatically backed up Easier to submit classwork to teacher Disadvantages If the server breaks down student work might become inaccessible Easier for other students to access a student's work to plagiarise/damage work Easier for viruses to spread through the network causing student work to become inaccessible/deleted If the network is cabled there can be danger of tripping over loose cables Students could have too much information available through the intranet and may find it difficult to synthesise	**8**