Cambridge International AS & A Level

INFORMATION TECHNOLOGY **9626/32**

Paper 3 Advanced Theory **October/November 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 October/November 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level 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)	**Two** from Used to set up a VPN that allows data to be kept private Allows data to be kept secure when working remotely/sending data to/from their company office network and home Used to circumvent firewall rules to allow access to internal network by data carried in packets Allows the use of 'foreign' protocols on networks that do not support that protocol e.g. use of IPv6 on IPv4 networks.	**2**
1(b)	**Three** from: Data is broken into (small) packets/datagrams for transfer over IP network (IP) packets are encapsulated by Tunneling Protocol/L2TP inside (public) IP packets and sent out over public communication channels (to internet) Data is/may be encrypted using a secure shell (SSH)/IPSec protocol Packets are decapsulated and unencrypted at destination.	**3**

Question	Answer	Marks
2	**Six** from: Identify patterns in large sets of data Data patterns help to determine/predict trends in information Compare and contrast symptoms to analyse disease causes/processes Determine the effectiveness of treatments/drugs for illnesses to determine most effective course of treatment/medicines/actions Repeated analysis (to attempt) to standardise treatment of specific diseases (Repeated analysis) to speed up diagnosis and treatment of diseases Determine (normal) patterns of medical claims by patients/doctors/clinics/hospitals to help reduce costs Determine abnormal patient outcomes from treatments/procedures Determine abnormal/unusual patterns of medical claims by patients/doctors/clinics/hospitals to identify fraudulent claims.	**6**

Question	Answer	Marks
3	**Six** from: Uses <u>file transfer protocol</u> to transfer data across a network between client and server File transfer protocol site/FTP addresses begin with ftp:// to indicate protocol required for transfer/announce their presence/only respond to requests using this protocol Server listens for USER and PASS commands/for username and password from client Server uses control connection on port 21 Active mode uses port 21 for data connection with client Passive mode is used if client is behind firewall/unable to receive incoming TCP connections Passive mode sets up different/arbitrary port for client server data connections USER/PASS are not encrypted/is clear text unless STPS/FTPS (on port 22) is used Server sends acknowledgement to client if credentials accepted and session is opened Anonymous access can be used for downloads from server but not uploads of files Server allows checkpoint/restart support so downloads can be resumed if interrupted.	**6**

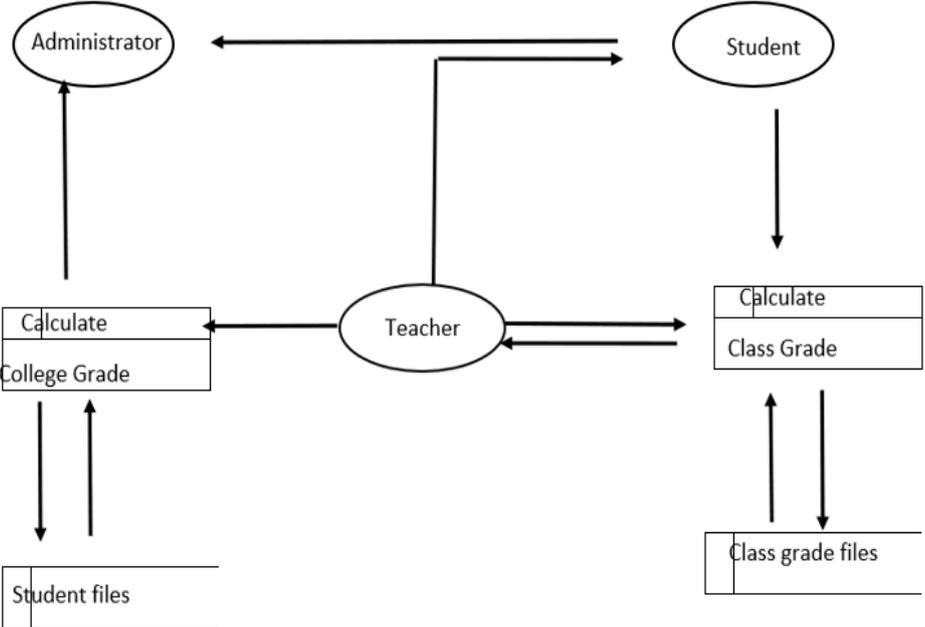| Question	Answer	Marks
4(a)	**Three** from, e.g.: Making/using contactless/mobile payments systems instead of e.g. credit/loyalty cards Identifying user when using transit passes/ticketing systems In social networking for sharing images/contacts/video files (between close devices) Exchange personal details for entering computer games systems/online gaming Unlocking doors with smart locks.	**3**

Question	Answer	Marks
4(b)	**Six** from: NFC max working distance is <20cm whereas Bluetooth is c.100m… …so users/devices have to be (very) close NFC sets up in <0.1 sec whereas Bluetooth can take up to 6 seconds/NFC sets up much quicker than Bluetooth NFC has lower bitrate than Bluetooth/400kps v. 2.1Mbit/s… …so is not suitable for (very) large files Data exchange is slower using NFC …so takes longer to transfer e.g. photos/video files NFC uses (much) less power than Bluetooth NFC can be used to activate passive/unpowered tags whereas Bluetooth cannot NFC connections are automatic whereas Bluetooth connection requires access code/PIN NFC connections are peer-to-peer/one-to-one whereas Bluetooth can have up to seven devices simultaneously NFC is an emerging/new technology so fewer/older devices do not have it/cannot use it. *Max 4 marks if bullets/list of statements/points.*	6

Question	Answer	Marks
5	**Eight** from: *Strengths:* Document analysis is systematic process of reviewing/evaluating/reading printed and computer-based/internet-sourced documents …which provides a large amount of information Data in documents is examined and analysed to gain meaning/interpreted to gain understanding/knowledge ...so requires that analyst be literate/have knowledge/be competent in the topics/system under review Analyst has to/should combine document research with other forms of analysis …so must be proficient in other forms of analysis to reach conclusions that are reliable so must be highly skilled Document analysis uses data that has already been collected ….so only data selection is needed so requires less time than other methods Document analysis costs only include the method of analysing because the cost of collection is not needed/ uses data that has already been collected …so is less costly than other research methods Many documents are freely available/in pubic domain/already published ….so are accessible to analyst Document analysis uses unobtrusive/non-invasive/non-interactive research methods …so does not affect the subject being researched Historical documents are stable/not altered by being researched …so can be examined several times/re-examined by analysts Documents contain references/exact details that can be cross-refenced to other sources …making the research more reliable *Weaknesses:* Documents are produced only as a record of an event …so may lack insufficient detail to be useful in the research Data may be inaccurately recorded …so may not reflect actual events/contain all the data so trends would not be accurate Documents may not be in a form that allows data to be electronically retrievable/searchable …so research can be prolonged/miss important data Researcher may be (unintentionally) biased when selecting documents …so data may be incomplete. *Must be at least 2 strengths and at least 2 weaknesses for full marks.* *Max 6 marks if bullets/list of statements/points.*	8

Question	Answer	Marks
6	**Eight** from: Data/files/applications is/are centralised on a file/database/applications server ..so only one copy has to be maintained/updated/backed up Data/files/applications can be mirrored to other servers for increased performance …without the need to copy to each device in use Disaster recovery is easier/quicker as backups used tor recover data to server …rather than to individual user devices Servers can be updated/upgraded/maintained/relocated …without affecting the user/need to update individual user devices System is easily scalable/more servers can be deployed …without disruption to users/without need to update/upgrade user devices Data/files can be shared across different computing platforms/desktops/laptops/OS/mobile devices Data/files/applications can be accessed from different locations/mobile devices Data/files can be queried using SQL/DBMS systems from any corporate device using same user-interface …regardless of location/device Enhanced security of data/data is not stored locally by user but controlled centrally/setup at time of deployment of client-server system Servers can be set up to carry out different roles/allow different access rights for different client devices.	8

Question	Answer	Marks
7(a)	**Four** from: Problems/issues are detected and corrected during development Users are involved at all stages of the development Allows users to interact with the app/try out the app during development Allows users to make feedback/suggest new features/improvements… …that can be incorporated during the development Users and developers obtain a better understanding of the product/app Use the prototype to investigate the potential market for the app.	4

Question	Answer	Marks
7(b)	**Six** from: *Similarities:* Both develop early prototypes that do not feature the full requirements of the users/require more work to meet all of user requirements Developers and end-users interact frequently during both of the processes of creating prototypes End users can add features to both types of prototype at the time of review Both use interactive reviews to improve the prototypes *Differences:* Throw-away prototypes are discarded at any stage whereas evolutionary prototype become part of the final product Throw-away prototypes are produced quickly and cheaply whereas evolutionary prototypes are developed over time Throw-away prototypes may be non-functional whereas evolutionary prototypes are functional from inception/the start Throw-away prototypes have early/more user involvement than evolutionary prototypes Progress in throw-away prototyping is easier to monitor/measure than in evolutionary prototyping Time scales are easier to set in throw-away prototyping than in evolutionary prototyping	6

Question	Answer	Marks
8	**Three** from: Source symbols on *both* Administrator *and* Student 1 mark Process symbols (calculate) symbols on *both* Calculate College Grade *and* Calculate Class Grade 1 mark Store symbols on *both* Student *and* Class grade files 1 mark *The symbols, as per syllabus, are as shown:* 	**3**

Question	Answer	Marks
9(a)	(Strings are used) to store (and manipulate) characters.	**1**
9(b)	**Four** from: Use of same (type of) quotes causes code to stop executing so string is not displayed Code returns focus to HTML/stops browser from executing the remainder of page code JavaScript strings must be enclosed by matching quotes Quotes inside quotes cannot be the same as the enclosing quotes Inside quotes can be escaped/use of backslash i.e. \ Quotes can be either single(') or double (").	**4**

Question	Answer	Marks
9(c)	**Five** from: *Similarities:* Both are part of the HTML Window object/Document Object Model controlling display of documents/parts of documents/both can be prefixed with window. Both takes/require two parameters inside the () separated by , First parameter in both references the function to be executed Second parameter in both sets is a time in milliseconds Both can be interrupted by clear Interval() function *Differences:* setTimeout() delays the execution of code which runs only once setInterval() allows/provides for repeated execution of the code at (pre-set) intervals clearInterval() can prevent function in setTimeout() from ever being executed/stop the timeout timer setInterval() loop only stops when the window is closed/clear Interval() is invoked/used setTimeout() minimum value is 0/zero (milliseconds) setInterval() minimum value is 10 (milliseconds)/if set to less than 10 then 10 is used.	**5**

Question	Answer	Marks
10(a)	**Three** from: To separate elements of image so that each can be developed/worked on independently of the others To overlay elements onto others so that each element can be positioned/moved independently of the others To allow editing of elements while leaving other elements untouched To allow the reversal/undo of actions on one part of graphic so that errors can be corrected/actions can be carried out to see effect without spoiling other elements To allow different amounts of opacity/transparency (of objects) To insert text so that writing can be placed anywhere on the image.	**3**
10(b)	**Two** from: To combine/merge all layers into one layer To discard any hidden layers so that all layers are visible To fill any transparent areas with white /background colour so they appear as in the background To allow image/creation of pdf so that it is ready for printing To reduce the file size.	**2**