
INFORMATION TECHNOLOGY

9626/32

Paper 3 Advanced Theory

October/November 2018

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.

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This document consists of **8** printed pages.

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)	<p>Eight from:</p> <p>(Unauthorised persons obtain credit card details by various methods): skimming/interception of details/theft of details from website/phishing Use of number generator to create card numbers close to known good one Last four numbers are usually in a sequential range with same expiry date Use of generated card numbers to make transactions Even if customer not present/if card stolen transactions can still be carried out using security numbers Security number obtained by theft/phishing/selling/smishing by unscrupulous merchants Thieves/hacker use credit card for small transaction to see if valid Once small transaction is successful then much larger transactions are made Subscriptions to web services are a common method to test card validity as nothing physical is purchased Repeat billing/invoicing/recurring charges for card holder An uncanceled 'membership' is charged monthly Use of spyware/keylogger software to capture credit card numbers/details as they are typed.</p>	8
1(b)	<p>Five from:</p> <p>Demand for extra security information/PIN or card security code/last three numbers Check location of card holder matches address given for delivery by use of IP lookup of purchaser for geolocation Compare delivery address with credit card billing address Use of third-party services/escrow services to take payment from card account and pass it to merchant Not displaying the full card number (Primary Account Number – PAN truncation) on receipts/email/website confirmations Not storing the whole number/credit card details on computer systems Encrypt stored credit card details so that they are not understood by unauthorised persons.</p>	5

Question	Answer	Marks
2	<p>Six from:</p> <p>Fig. 2 can be scaled/zoomed without loss of quality/clarity Because it is (a vector graphic) made up of instructions/code on how to create the letter When resized/zoomed the graphic is recalculated so no loss of quality Fig. 1 cannot be scaled/zoomed without loss of quality/clarity Because it is (a bitmap image) made of square pixels The rounded appearance is created by pixels of varying density If zoomed/enlarged too much then pixels are visible If zoomed the letter becomes blurred/lacks definition/unreadable.</p>	6

Question	Answer	Marks
3	<p>This question to be marked as a Level of Response.</p> <p>Level 3 (7–8 marks) Candidates will evaluate in detail the impact of the use of robots on the environment. The information will be relevant, clear, organised and presented in a structured and coherent format. There will be a reasoned conclusion/opinion. Subject specific terminology will be used accurately and appropriately.</p> <p>Level 2 (4–6 marks) Candidates will explain the impact of the use of robots on the environment. For the most part, the information will be relevant and presented in a structured and coherent format. There may be a reasoned conclusion/opinion. Subject specific terminology will be used appropriately and for the most part correctly.</p> <p>Level 1 (1–3 marks) Candidates will describe the impact of the use of robots on the environment. Answers may be in the form of a list. There will be little or no use of specialist terms.</p> <p>Level 0 (zero marks) Response with no valid content.</p> <p><i>Answers may make reference to e.g.:</i> More selective/accurate spraying of crops thus diminishing overspray/use of chemicals on crops Remote monitoring of global warming/oil spills/water pollution with use of independent robotic submarines carrying sensors into dangerous areas Autonomous gathering of data in dangerous/hazardous areas to monitor environmental factors Use in food packaging/production by reduction in contamination of product as no human contact Use in industry to reduce environmental waste/resource use... ...e.g. solar panel cleaning robot uses less water than humans ...less energy used in 'dark' factories where heating and lighting are not so important as few humans work in them Leads to reduction in traffic so there is less pollution Negative impacts could include: ...increased use of power over manual labour ...increased use of scarce resources e.g. precious/rare metals to manufacture robots ...environmental damage caused by extraction of precious/rare metals.</p>	8

Question	Answer	Marks
4(a)	<p>Six from:</p> <p>Each packet sent by network A takes a different route through the network</p> <p>Each packet has source/destination address stored in header</p> <p>Each router has a stored lookup table of IP addresses/routes to the destination (if known)</p> <p>Routing table is stored at control plane of router</p> <p>Used to choose next router/router to send packet to</p> <p>Static routes are pre-programmed to show route to destination B to C to E to G</p> <p>Dynamic routing protocols build up table of preferred routes between connected networks B to C to F to G if router E is inefficient/out of action/in heavy demand</p> <p>If destination is unknown router B will send packet to next known router, C or D</p> <p>If C/D router does not know destination to H then packet is sent onto next router, E or F.</p>	6
4(b)	<p>Six from:</p> <p>Router D may be not responding</p> <p>Router D may be in heavy demand</p> <p>Router D may have failed/be offline</p> <p>There may a policy set up in router C to over-ride the routing tables so that the packets are not sent to router D</p> <p>To enforce a QoS for specific services that take precedence over other packets</p> <p>Router C may have more than one set of routing protocols because it is connecting to several different networks at once</p> <p>Alternative routers may respond quicker/before router D/alternative routes are available sooner than via router D.</p>	6

Question	Answer	Marks
5(a)	Eight from: Checking each line of code/statement Ensures that each line of code is executed at least once Ensures that var y and z assign the collected numbers as required Checks that the addition of y and z is correct Ensures that the correct message is displayed when result assigned to A Checking each branch/decision in the code Checks that decisions are carried out correctly So that values put in A can be compared Ensures that result is checked against > 10 Ensures that the correct result is put in var x as required Checks every possible pathway through the code So that test values in var y and z cause each subsequent path to be followed So that test values in x are assigned to A to produce both the messages “is greater than 10” and “is not greater than 10” depending on value in A.	8
5(b)	Six from: Can separate code into different conceptual/functional areas for ease of development/testing/understanding Separating HTML and JavaScript code provides modularity to code Which is easier to read/maintain/update by Quintin/different coders as required Can call the code several times/from different pages/re-use the code No need to rewrite/have several copies/copies on each web page Code only has to be tested once/checked for errors once File/JavaScript is cached by web browser No need to reload it/fetch code repeatedly if need on other pages Reduces network access/reduces cost of fetching data JavaScript code embedded in web pages can slow loading times/reduce browser performance Web page can slow/stop while browser executes code.	6

Question	Answer	Marks
6	Six from: Use of polarised light for encoding data In quantum states for transmission between two parties Initial polarisation/oscillation of first two photons determines 0 and 1 bit of the data Polarisation of subsequent bits is determined at random Recipient measures data using random polarisation until data is as sent Used to establish a shared key between sender/recipients No third party learns/sees the key Key then used to create other keys for use in encryption Called quantum key distribution (QKD) Data state is changed when viewing by others Impossible to copy/eavesdrop on data encoded in quantum state without alerting the sender/recipients.	6

Question	Answer	Marks
7	<p>Eight from:</p> <p>Scanned barcodes contain item code for walking boots/XYP234 Code for walking boots/XYP234 used to look up the items in the database Matching record is found in database 2 pairs of boots sold so value in field holding the number of w/boots in stock is reduced from 16 to 14 new value is less than/below/< re-order level/15 so an order for 10 pairs of boots is generated/alert is generated to request an order be placed for 10 pairs 3 pairs of socks have been sold so value in field holding the number of socks in stock is reduced from 33 to 30 Current Stock level is compared with Minimum Stock level allowed new value is equal to re-order level so an order for 50 pairs is generated/alert is generated to request an order be placed for 50 pairs Number of scarf/scarves sold is deducted from the value in the field holding the number of scarf/scarves in stock... 1 scarf has been sold so value in field is reduced from 16 to 15... ...new value is above/greater than/> the re-order level so no order is generated/alert made Re-orders are generated/alerts created to advise staff to (re-)order 10 pairs of walking boots and 50 pairs of socks Automatic orders are placed for the items/staff respond to alerts and place orders for new stock.</p>	8

Question	Answer	Marks
8	<p>Eight from:</p> <p>Suitable for use in 'free-space' i.e. no physical connection medium such as cable or fibre Infra-red LEDs allow point-to-point optical communications Infra-red LEDs allow high data rates using laser technology Infra-red LEDs allow relatively inexpensive compared to other radio technologies Uses pulsing modulation/on-off signals which can restrict rates to low data rates in free space Suitable for short distance communication between devices (usually only maximum of a few metres) May not work reliably when too close together Line of sight required so objects block the signals Not subject to interference as much as other radio technologies Has low power requirements so suitable for use in small/mobile devices/remote controls Can be more secure than other radio technologies as range is low/easily blocked by objects. <i>Max six for all positives or all negatives.</i> <i>1 mark available for a reasoned conclusion/opinion.</i></p>	8

Question	Answer	Marks
9(a)	<p>One from:</p> <p>To ensure that the system requirements are valid</p> <p>To ensure that the system requirements are understood by all</p> <p>(Can be) quickest method of obtaining feedback from users about (proposed) main features.</p>	1
9(b)	<p>Two from:</p> <p>Developers can be pressured into delivering unfinished product</p> <p>Prototype may not work well enough so final product is never made/produced/required</p> <p>The time spent on the prototype is lost/cannot be used in development of final product.</p>	2

Question	Answer	Marks
10	<p>Six from:</p> <p>Running in one hotel until it is working perfectly</p> <p>When working perfectly it can be installed in the other hotels</p> <p>The method is more effective than installing in all hotels and discovering problems</p> <p>If it does not work only one hotel is affected not the whole chain of hotels</p> <p>Staff at the hotel can be used to train staff at the other hotels</p> <p>Feedback is collected and collating reviews by guests/users in one hotel</p> <p>Will take longer to fully implement all guest access to Wi-Fi in all hotels compared to direct changeover.</p>	6

Question	Answer	Marks
11	<p>Six from:</p> <p>Observation is primary research so is valid/reliable</p> <p>Observer can check the accuracy of the data themselves</p> <p>Observation can be applied to almost any scenario where no verbal responses are possible/obtainable</p> <p>Observation does not require agreement of participants so no need for observer to ask</p> <p>People being observed do not have to give up time to answer questions/give data</p> <p>Observation is not effective for uncertain events as event may take place when observer not present/blinks</p> <p>Some events/phenomena cannot be observed...</p> <p>...feelings/emotions are not observable so observation is ineffective</p> <p>Observation is unreliable for social phenomena as bias by observer is difficult to remove/compensate for</p> <p>Observers need to have the technical knowledge of what they are observing to be able to make valid observations of a process</p> <p>Observation can be a slow method of research</p> <p>Observation results are difficult to validate.</p>	6