
INFORMATION TECHNOLOGY

9626/31

Paper 3 Advanced Theory

May/June 2017

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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2017 series for most Cambridge IGCSE[®], Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

© IGCSE is a registered trademark.

This document consists of **7** printed pages.

Question	Answer	Marks
1(a)	<p>Four from:</p> <p>Qualitative risk analysis to prioritise risks for analysis Quantitative risk analysis ...of likelihood of occurrence/probabilities ...of consequences of occurrence To identify effect/cost of risks caused by e.g. ...loss of access to premises ...loss of data ...loss of it function ...loss of skills Produce a computer simulation of the disaster Produce a report of the risks.</p>	4
1(b)	<p>Six from:</p> <p>The abc password is too short and does not meet minimum length requirements/number of character requirements Does not meet requirement for different types of characters Passwords must not be easily guessed and this is a simple pattern 1234AAA password has a sequence of characters/numbers ...has repeating characters Neither have a combination of upper/lower case/number/special characters.</p>	6
1(c)	<p>Six from:</p> <p>Backups made and sent off-site at regular intervals Backups made on-site and automatically copied to off-site disk Backups made directly to off-site/remote/'cloud' servers Local mirrors of systems and/or data and use of disk protection technology such as RAID Surge protectors to minimize the effect of power surges on computer systems Using uninterruptible power supply (UPS) and/or backup generator to protect against a power failure Use of fire prevention/mitigation systems such as alarms and fire extinguishers Use of anti-virus software to protect data against corruption/loss/deletion Use of firewalls to prevent unauthorised/control access Use of physical security measures to control access by personnel Important passwords/codes should be held by more than one person/in secure conditions, but accessible in an emergency.</p>	6

Question	Answer	Marks
2	<p>Four from:</p> <p>Desktop PMS set up as a program that runs on the desktop ...single user Web-based accessed using a web browser Use a smartphone or tablet to gain access to the PMS Use a thin client via a web browser Personal PMS one used at home ...manage lifestyle or home projects Single user programmed so only one person will ever need to edit the project plan at once Collaborative system is programmed to support multiple users once ...web-based tools available.</p>	4
3	<p>Six from:</p> <p>Can call the code several times/from different pages/re-use the code No need of re-writing/having several copies/copies on each webpage Code only has to be tested once/checked for errors once File/JavaScript is cached by web browser ...reduces network access time/reduces cost of fetching data JavaScript code embedded in webpages can slow loading times/reduce browser performance ...webpage can slow/stop while browser executes code Can separate code into different conceptual/functional areas ...provides modularity to code ...separate html and JavaScript code so easier to read/maintain.</p>	6
4(a)(i)	<p>Two from:</p> <p><i>(HDLC is):</i> High-Level Data Link Control Layer 2 (data link) protocol Connects point-to-point serial devices/leased lines Uses error correction Routers encapsulate HDLC before putting on LAN.</p>	2
4(a)(ii)	<p>Two from:</p> <p><i>(Frame relay is):</i> Layer 2 and 3/data link/network layer protocol Puts data into variable-sized packets/frames Does not include error-correction/error corrections is done by devices ...can be unreliable Specifies physical and logical link layers Used in packet switching Used on integrated services digital network (ISDN) Used in permanent virtual circuits (PVC) Can provide QoS ...worth constant bitrate/emulation of circuit switching.</p>	2

Question	Answer	Marks
4(b)	<p>Four from:</p> <p>If many people want the OS at once bit torrent is resistant to flash-dot/crowds/website overload/dos/FTP is not resistant to flash-dot/crowds/website overload/dos</p> <p>Bit torrents can be paused/stopped and restarted/FTP cannot restart if paused, so if interrupted the download has to be done again</p> <p>Bit torrent makes many small data requests from different IP connections/addresses/FTP is from one IP connection/address so is quicker to download the large OS file</p> <p>Bit torrent downloads file sections randomly/rarest first/ FTP is sequential download of file sections</p> <p>Bit torrent can be slow to get up to full speed/FTP achieves full speed as soon as it starts download and can achieve very high download speeds.</p>	4
4(c)	<p>Six from:</p> <p>Has two or more connections to different networks</p> <p>Router reads address information in the packet header ...to determine destination of packet ...has a routing table/policy ...contains data on all possible routes to groups of addresses ...priorities for connections for handling data packets ...routing tables are dynamic/can be updated ...directs packet to next router if destination address not known ...direct packets to address if destination is known</p> <p>Router updates 'hop' count every time it forwards a packet ...when 'hop' count limit is reached packet is dropped/discarded ...usually a maximum of 16 hops ...or marked as undeliverable ...so packet does not live forever on network/internet.</p>	6
5	<p>Eight from e.g.:</p> <p>Benefits:</p> <p>Reduced IT support requirements/staff so reduced costs to company</p> <p>Reduced requirements for storage devices reduces costs/maintenance costs</p> <p>Backups are managed by 'cloud' company so reduced costs of media/staff to carry out backups</p> <p>Files can be accessed from anywhere with internet connection allowing collaboration on documents/allows access to documents from home</p> <p>Drawbacks:</p> <p>Security issues are not under business control</p> <p>'Cloud' service suppliers may go out of business so data is lost</p> <p>Need for a reliable internet service to be able to access the data</p> <p>Data may not be stored in same country as business so may be subject to different laws/regulations.</p> <p>Max 6 for all benefits or all drawbacks. 1 mark available for a reasoned conclusion.</p>	8

Question	Answer	Marks
6	<p><i>This question to be marked as a Level of Response.</i></p> <p><i>Analyse requires that candidates explain the main points in detail, explaining their effectiveness and characteristics.</i></p> <p>Level 3 (7–8 marks) Candidates will analyse in detail the differences between white box testing and black box testing. There will be a reasoned statement concerning the effectiveness of both types of testing. The information will be relevant, clear, organised and presented in a structured and coherent format. Subject specific terminology will be used accurately and appropriately.</p> <p>Level 2 (4–6 marks) Candidates will explain the differences between white box testing and black box testing. There will be a reasoned statement concerning the effectiveness of one of the types of testing. For the most part, the information will be relevant and presented in a structured and coherent format. Subject specific terminology will be used appropriately and for the most part correctly.</p> <p>Level 1 (1–3 marks) Candidates will describe the differences between white box testing and black box testing. Answers may be in the form of a list. There will be little or no use of specialist terms.</p> <p>Level 0 (0 marks) Response with no valid content.</p> <p>Answers may make reference to e.g.:</p> <p>White Box Testing is a testing method in which the internal structure/ design/ implementation is known to the tester. Black Box Testing is a testing method in which the internal structure/ design/ implementation is NOT known to the tester. In white box testing, programming knowledge is required; in black box testing it is not. In white box testing, programming knowledge is in-house; in black box testing it is not. White box testing needs access to a detailed design specification, black box testing does not. White box testing needs knowledge of the implementation, black box testing does not.</p>	8

Question	Answer	Marks
7	<p>Eight from:</p> <p><i>Advantages</i> Easier to customise products such as pills to users specific requirements/genetic makeup Printing can be done remotely so no need to transport the final product from factory to destination Prototypes can be produced more rapidly for testing so production is speeded up Manufacturing of product may be faster than traditional methods so product is available sooner Costs may be reduced due to reduction in tooling costs/ less need for specialist machinery No need to store excess inventory/reduced warehouse costs Can produce items/spare parts in harsh environments where traditional methods may not be feasible/possible</p> <p><i>Disadvantages</i> Limited materials available for printing so product range is restricted/materials may not be suitable for product's eventual use Copyright issues arise as easier for anyone to print the product Dangerous items can be more easily created e.g. Knives/guns Useless items produced and thrown away these have an environmental impact Limited size of products due to restrictions on size of printer Printing can be quite slow compared to traditional manufacturing.</p> <p><i>Max 6 for all advantages or all disadvantages. 1 mark available for a reasoned conclusion/opinion.</i></p>	8
8	<p>Six tasks from e.g.:</p> <p>Identification of unusual data records/anomalies in economic data Searching for relationships between variables/dependency detection in the economic data Clustering /discovering 'similar' groups and structures in the economic data Classifying /generalizing known structures to apply to new economic data Finding functions that model the economic data with the least error Summarising the economic data Producing reports on the economic data in a useful format/charts/graphs/tables to show trends in the data.</p>	6

Question	Answer	Marks
9	<p>Four from:</p> <p>PNG images are lossless/do not lose data when edited so have higher quality</p> <p>JPEG (jpg) format is compressed with data being lost/data is lost during editing but images are of lower quality/have artefacts compared to PNG images</p> <p>GIF only allows limited number of colours/256 colours so is not suitable for high quality image publication</p> <p>GIF allows several images in one file so animations are possible, but this is not required.</p>	4
10	<p>Eight from:</p> <p>Pilot running would not be appropriate as it not likely that each department would need similar aspects of the system</p> <p>Phased implementation would be possible because one department could have their part system implemented...</p> <p>...when working another part of system could be tried in another department</p> <p>Parallel running would be possible as there are enough workers available to use both systems at the same time</p> <p>Parallel running would be possible as company can afford to employ two sets of workers if more are needed</p> <p>Parallel running is appropriate as the old system continues while problems are fixed with the new system</p> <p>Direct changeover would not be advisable as it may not work properly first time</p> <p>Direct changeover is a quick method but speed of changeover is not an issue</p> <p>Direct changeover is a cheaper method but the cost is not important to the company.</p>	8
11	<p>Eight from:</p> <p>Video-conferencing is not appropriate as network connectivity would lead to break up of the conference</p> <p>Video-conferencing is not appropriate as the workers are all on the same site so expensive equipment does not need to be purchased</p> <p>Large documents can be more easily shared and worked on</p> <p>Meetings need to regularly held so video conference would need to be set up often which would require technical expertise with recurring costs</p> <p>Inconvenience for technical staff having to be available/on call for video conference each week/regular basis</p> <p>As they are on the same site, the company would not need to pay travel expenses for face-to-face meetings so video-conferencing would not be an advantage</p> <p>As they are on the same site, there is no waste of time travelling to meetings so video-conferencing would not be an advantage</p> <p>The designs would be less likely to be hacked/stolen/copied.</p>	8
	Total:	90