



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

General Certificate of Education

Information and Communication Technology

5521/652

ICT5

Mark Scheme

2006 examination – January series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

Unit 5 Information: Policy, Strategy and Systems

Examiners: the answers given in this mark scheme are exemplars. Credit must be given for other correct answers not given in the mark scheme. Please refer to Team Leaders where there is any doubt.

1	<p><i>The management of a large chain of garages has decided to obtain new software to help it run the company. Their own developers could write a bespoke solution in-house, or the garage chain might obtain the software in other ways.</i></p> <p><i>State two other ways in which the company might obtain the software, and for each one, give a benefit to the company.</i></p>	<i>(4 marks)</i>
	<p>Naming a way to obtain (1), relevant benefit of this way (1)</p> <ul style="list-style-type: none"> • external consultancy/ development/ IT solutions (1) no need to employ specialist staff (1) • purchasing pre-written/ off-the-shelf software (1) cheaper than bespoke/ timescale advantage / economies of scale (1) • leasing pre-written/off-the-shelf software (1) lease cheaper than purchase / upgrade advantages (1) <p style="text-align: right;">Max 2 x (0,1,2)</p>	<i>(4 marks)</i>

<p>2</p>	<p><i>Graphical User Interfaces (GUIs) are easy to use, but have implications for the demands made on system resources.</i></p> <p><i>Name two system resources and, for each one, explain why a GUI increases the demands made on it.</i></p>	<p><i>(4 marks)</i></p>
	<p>naming a resource (1) why increased use (1)</p> <ul style="list-style-type: none"> • hard disk drive/ backing store (1) a GUI requires a large program / many images which need to be stored (1) • ram/memory/ immediate access store (1) large amounts of code/images need to be held in memory for execution (1) • processor time (1) to display visual interface details/ track mouse movements/ identify selections • graphics card (1) to process / store images (1) • monitor / pointing device (1) more visual interface / colour / high resolution/ rapid, accurate selection of options(1) <p>do not give second mark for last bullet except for strong expansion</p> <p style="text-align: right;">Max 2 x (2,1,0)</p>	<p><i>(4 marks)</i></p>

<p>3</p>	<p><i>New software should be thoroughly tested.</i></p> <p><i>(a) Describe what is meant by alpha and beta testing.</i></p> <p><i>(b) Explain two reasons why the new software may fail to operate correctly, even if the developer has followed an extensive testing programme.</i></p>	<p><i>(4 marks)</i></p> <p><i>(4 marks)</i></p>
	<p>a)</p> <p>One mark per point. Up to 3 marks from either beta or alpha list.</p> <p>Alpha</p> <ul style="list-style-type: none"> • carried out by developer / designer / in house (1) • systematic testing (any good description / terminology) (1) • against expected outcomes / test plan (1) • ensures that system performs correctly before release outside the company (1) • ensures that product meets requirements specification (1) <p>Beta</p> <ul style="list-style-type: none"> • carried out by potential end users (1) • who have volunteered / been invited (1) • who are likely to use the system in unpredicted ways (1) • live data used (1) • in a variety of operating environments / platforms / hardware / software (1) • a wider variety of issues with the system are likely to be highlighted (1) • acts as a useful marketing tool / by letting reviewers test the system, is a source of relatively cheap advertising (1) • to provide developer with feedback on software (1) <p style="text-align: right;">Max 4 x 1</p> <p>b)</p> <p>Reason for failing (1) description / expansion (1)</p> <ul style="list-style-type: none"> • cannot be tested with every combination of hardware/ software available (1) so new software may cause established systems to fail or vice versa (1) • hardware specification inadequate (1) insufficient RAM / processor speed (1) • software tends to be complex (1) so every single part of a system will not have been tested with every other part (1) • new software may not be able to use old file formats / data (1) causing the company to have to re-enter data (1) • user uses the software in a way that has not been considered (1) causing the software to behave in an unusual way/ unexpected results (1) <p>Not inadequate testing (no detail) / errors / bugs / viruses / hardware failure</p> <p style="text-align: right;">Max 2 x (2, 1, 0)</p>	<p><i>(4 marks)</i></p> <p><i>(4 marks)</i></p>

<p>4</p>	<p>(a) Explain what is meant by data normalisation.</p> <p>(b) With reference to Relational Database Management Systems, explain the following terms:</p> <p>(i) data consistency;</p> <p>(ii) data integrity;</p> <p>(iii) data independence.</p>	<p>(4 marks)</p> <p>(2 marks)</p> <p>(2 marks)</p> <p>(2 marks)</p>
	<p>a)</p> <p>Any four:</p> <ul style="list-style-type: none"> • naming First Normal Form, Second Normal Form and Third Normal Form (1) • (1NF) Removal of repeating fields/ attributes/ ensure that values are atomic (1) • (2NF) Removal of composite keys/partial key dependencies/ ensure that non-key fields are functionally dependent on the whole primary key (1) • (3NF) Removal of non-key/transitive dependencies (1) • process for making the structure of a relational database more efficient (1) • by defining tables, fields, and relationships/ appropriate terminology (1) • to enable complex queries (1) <p style="text-align: right;">Max 4 x 1</p> <p>b)</p> <p>appropriate generic statement (1) example / expansion (1)</p> <p>(i) data consistency: Data is stored as one value, and not stored again as another (1) comes with reduced redundancy (1) (2,1,0) marks</p> <p>(ii) data integrity: Correctness/ how trustworthy the data is. (1) free from corruption / validated (1) (2,1,0) marks</p> <p>(iii) data independence: Data is separate from programs that use it (1) same table may enable delivery function to see customer as name and address only, credit control function to see customer as income, credit history, etc (1) (2,1,0) marks</p>	<p>4 marks</p> <p>2 marks</p> <p>2 marks</p> <p>2 marks</p>

<p>5</p>	<p><i>Companies make use of networked systems for various applications.</i></p> <p><i>Using examples of four different applications, explain the benefits that a company gains from the use of networked systems.</i></p>	<p><i>(8 marks)</i></p>
	<p>a)</p> <p>use of networked systems (1) benefit to company (1)</p> <ul style="list-style-type: none"> • internal e-mail (1) instant communication with all staff (1) • distributed databases (1) sharing data across company (1) • collaborative software (1) sharing software across company (1) • sharing printers (1) few printers between many workstations (1) • backup (1) backup centrally coordinated (1) • video conferencing (1) saving travel time and cost (1) <p>There are very many other examples. Do not look just for words in examples such as “e-mail”, or “printers”,</p> <p>They are acceptable, but look for <u>any corporate use of networks</u></p> <p style="text-align: right;">4 x (2,1,0) marks</p>	<p><i>8 marks</i></p>

<p>6</p>	<p><i>Designers of Human Computer Interfaces (HCIs) have to consider the psychology of interaction between humans and the computer system. One psychological factor they need to consider is making the interface user friendly. For example, the designer chooses a beep to alert the user of the error condition “printer out of paper”.</i></p> <p><i>State three other psychological factors an HCI designer should consider and for each one, use an example to show how this factor has been considered.</i></p>	<p><i>(9 marks)</i></p>
	<p>factor (1) example of how considered (1) description/ explanation/ expansion(1)</p> <ul style="list-style-type: none"> • give help to novices (1) cash machine/ATM/ bank “hole in wall” has clear instructions on screen (1) for card insertion, use of buttons (1) • provide short cuts for experts (1) pc/pc application has hot keys (1) to enable expert to access functions quickly (1) • make use of human memory (1) mobile phone has menu-driven interface (1) user can remember how to navigate menus (1) • make use of human perception (1) calculator has colour coded function buttons (1) to help user remember (1) <p>Do not credit PHYSIOLOGICAL answers: touch, hearing, sight, ergonomic issues</p> <p style="text-align: right;">Max 3 x (3, 2, 1, 0)</p>	<p><i>9 marks</i></p>

<p>7</p>	<p><i>Protocols and standards are vital for the operation of the Internet.</i></p> <p>(a) <i>What is meant by the term protocol?</i></p> <p>(b) <i>Give two reasons why protocols are necessary.</i></p> <p>(c) <i>Give two reasons for having standards.</i></p> <p>(d) <i>Explain what is meant by a de facto standard.</i></p> <p>(e) <i>A Unique Resource Locator (URL), for example http://www.aqa.org.uk, can be entered into a browser in order to view that particular web site.</i> <i>Explain why URLs are used.</i></p>	<p>(1 mark)</p> <p>(2 marks)</p> <p>(2 marks)</p> <p>(2 marks)</p> <p>(3 marks)</p>
	<p>a)</p> <p>a standard set of rules used to ensure communication / the proper transfer of data between devices (1)</p> <p>b) any two:</p> <ul style="list-style-type: none"> • enable communication / the proper transfer of data between devices (1) • facilitate open systems (1) • specify data formats (1) • specify control signals (1) • minimise communication errors (1) <p style="text-align: right;">2 x 1 marks</p> <p>c) any two:</p> <ul style="list-style-type: none"> • so devices are configured the same (1) • enable communication (1) (not if given in b) • enable open systems / different manufacturers devices compatible (1) (not if given in b) • different software can read data (1) • different hardware can read data (1) • provide error detection/correction (1) (not if given in b) <p style="text-align: right;">2 x 1 marks</p> <p>d)</p> <ul style="list-style-type: none"> • arise through historic precedent / sales success / popular choice (1) adopted without formal acceptance by professional / official bodies / appropriate example (1) <p style="text-align: right;">(2, 1, 0) marks</p> <p>e) 1 mark per point</p> <ul style="list-style-type: none"> • Points to a specific website/ unique website identifier (1) • Maps to an IP address for a target device (1) • Is in human readable form/ is understandable for humans (1) • Is more memorable/ more likely to be remembered (1) • Can be redirected to map to changing IP addresses (1) <p style="text-align: right;">3 x 1 marks</p>	<p>1 mark</p> <p>2 marks</p> <p>2 marks</p> <p>2 marks</p> <p>3 marks</p>

8	<p>The ICT manager of a chain of high street opticians thinks that the software they are using may need to be upgraded or replaced, and is preparing a report.</p> <p>(a) Explain four reasons why the ICT manager might want to upgrade or replace their software.</p> <p>(b) The ICT manager decides to set evaluation criteria to assess alternative software packages.</p> <p>(i) Explain why the ICT manager needs to use evaluation criteria.</p> <p>(ii) Name four criteria that the ICT manager might use.</p> <p>(c) State three topics that the ICT manager should include in her evaluation report.</p>	<p>(8 marks)</p> <p>(2 marks)</p> <p>(4 marks)</p> <p>(3 marks)</p>
	<p>a)</p> <p>reason (1) explanation / expansion (1)</p> <ul style="list-style-type: none"> • perfective maintenance (1) customer service goals may enforce change, e.g. provide new glasses in less time (1) • corrective maintenance (1) rectify underperformance of operational tasks (1) • adaptive maintenance / legal / standards changes (1) new DP provisions may require increased network security (1) • Cost benefit (1) cost of upgrade / replacement against projected increase in market share (1) • Compatibility with hardware (1) new optometric device may require new interface with system (1) • Compatibility with software (1) standardisation (1) • Software development (1) new version of software may offer new functions / better performance (1) • Organisation ethos (1) achieve mission statement (1) <p style="text-align: right;">4 x (2, 1, 0)</p>	<p>8 marks</p>
	<p>b)</p> <p>i) to provide a framework to enable comparison (1) against specified requirements (1)</p> <p style="text-align: right;">(2, 1, 0) marks</p> <p>ii)</p> <p>Any four:</p> <ul style="list-style-type: none"> • agreed problem specification (1) • functionality (1) • performance (1) • usability (1) user friendly (0) ease of use (0) • compatibility with existing software base (1) • compatibility with hardware (1) 	<p>2 marks</p>

	<ul style="list-style-type: none"> • portability of software (1) • transferability of data (1) • user support / quality documentation (1) • robustness (1) • training (1) • resource requirements (1) • upgradability (1) • cost benefit (1) cost (0) <p style="text-align: right;">Max 4 x 1</p>	<i>4 marks</i>
	<p>c)</p> <p>any 3:</p> <ul style="list-style-type: none"> • methodology / how report developed (1) • results / actual software comparison (1) • recommendations / conclusions / decision (1) • justification / reasons for decision (1) <p style="text-align: right;">Max 3 x 1</p>	<i>3 marks</i>

<p>9</p>	<p><i>You are in charge of ICT in a large secondary school that has to be rebuilt. The head teacher wants all the computers in the new buildings to be networked.</i></p> <p><i>Write a report for the head teacher on the issues involved. Pay particular attention to:</i></p> <ul style="list-style-type: none"> • <i>security measures for the network;</i> • <i>network auditing;</i> • <i>network accounting.</i> <p><i>The Quality Of Written Communication will be assessed in your answer.</i></p>	<p>(20 marks)</p>
	<p>The solution for this question is intended to provide a framework of key concepts rather than a definitive solution. The aim is to establish an agreed standard that can be applied consistently, by all examiners, taking account of the many alternative answers to this type of question.</p> <p>The question asks for a report. Do not penalize the candidate if the answer is not presented as a report.</p> <p>Allocation of marks:</p> <p><u>S</u>ecurity measures for the network (code as S) - 6 marks maximum <u>N</u>etwork <u>a</u>uditing (code as U) - 6 marks maximum <u>N</u>etwork <u>a</u>ccounting (code as C) - 6 marks maximum</p> <p>Maximum mark for content is 16/20</p> <p>Quality of Written Communication (code as Q) - 4 marks maximum</p> <p>Security measures for the network (S marks) Marks are for what the measure is or for threat/how this is effective/other expansion. Don't give same expansion twice.</p> <ul style="list-style-type: none"> • Use firewall (1) protect system from attack/hackers (1) • Set access rights/levels (1) so only authorised users have access to sensitive data/need login and password (1) • Install anti-virus software (1) protect from viruses (1) • Use audit trails (1) detect misuse (1) (not here <u>and</u> in U) • Use physical measures/locks/security officers (1) prevent physical access/theft (1) • Backup server / fit UPS(1) protect from natural disaster/power failure (1) • Code of conduct / company rules (1) example of security procedure (1) • Credit any sensible network answer (1) <p style="text-align: right;">[max 6 x 1 marks]</p>	

Network auditing (U marks)

- Use of operating system/other software (1)
- To make a log/record/trail (1)
- To detect/deter misuse (1)

To track:

- Identity of user/who logged on (1)
- how long logged on for / what time logged on and logged off (1)
- At what workstation/network address (1) where (0)
- Number of logon attempts/attempts at unauthorized accesses (1)
- What applications run (1)
- What files opened/ web pages/ what reads/writes/activities (1)
- What systems failures/ crashes / error messages (1)

[max 6 x 1 marks]

Network accounting (C marks)

- Use of operating system/other software (1)
(not here and in U)
- To make a log/record/trail (1) **(not here and in U)**
- Of network traffic / throughput (1)
- Of network resource use (1)
- To plan for network flow peaks (1)
- To enable upgrade strategies (1)
- To charge e.g. departments appropriately (1)

To track:

- Use of processor time (1)
- Use of memory / disk space (1)
- Use of printer consumables / ink/ toner/ paper (1)
- Use of applications (1) **(not here and in U)**
- Use of application licenses (1)
- What files opened/ web pages/ what reads/writes/activities (1)
(not here and in U)

[max 6 x 1 marks]

Quality of Written Communication Marks (Q marks)

- 4 marks The candidate has expressed complex ideas clearly and fluently. Sentences and paragraphs follow on from one another smoothly and logically. Arguments will be consistently relevant and well structured. There will be few, if any, errors of grammar, punctuation and spelling.
- 3 marks The candidate has expressed moderately complex ideas clearly and reasonably fluently through well-linked sentences and paragraphs. Arguments will be generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.
- 2 marks The candidate has expressed straightforward ideas clearly, if not always fluently. Sentences and paragraphs may not always be well connected. Arguments may sometimes stray from the point or be weakly presented. There may be some errors of grammar, punctuation and spelling, but not such as to suggest a weakness in these areas.
- 1 mark The candidate has expressed simple ideas clearly, but may be imprecise and awkward in dealing with complex or subtle concepts. Arguments may be of doubtful relevance or obscurely presented. Errors in grammar, punctuation and spelling may be noticeable and intrusive, suggesting weaknesses in these areas.

With this type of criteria candidates are given a mark on the basis of a “best-fit” approach.

20 marks

TOTAL MARKS

90