ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme June 2002

GCE

Information and Communication Technology

Unit ICT5

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales 3644723 and a registered charity number 1073334
Registered address: Addleshaw Booth & Co., Sovereign House, PO Box 8, Sovereign Street, Leeds LS1 1HQ
Kathleen Tattersall: *Director General*

Unit 5: Information: Policy, Strategy and Systems

Overall guidelines

1. All examples accepted should be clearly related to the subject area and should not be "generalised".
2. Attention should be paid to ensure that marks are not awarded for simple restating of the question or the stem, often involving the exact same terms.
3. The answers should be providing evidence of more than "man in the streets" knowledge of ICT.
4. It should be remembered that scripts could be seen after they are marked and so consistency of approach and correct mechanics of marking are essential.
5. Rules on positioning of ticks and marks are to aid in checking and remarking of scripts.
6. Do not expect the candidate to use the exact wording given in the mark scheme. If you are in doubt as to the correctness of an answer given by the candidate, consult your Team Leader.
7. From the examinations for 2003 onwards, where one-word answers are acceptable will be indicated on the question paper. (For 2002 the acceptance or otherwise will be determined at standardisation.)

Specific marking guidelines

8. The basic rule is one mark one tick. The tick to be positioned at the point where the mark is gained in the answer and definitely not in the margin.
9. The only figures in the margin should be sub-totals for question parts and a ringed total for the question.
10. Where questions are divided into parts a, b and so on, and a mark is indicated for each on the paper, a mark should be positioned at the end of the appropriate response in the margin.
11. There should in effect be a mark in the margin at every point there is one on the question paper and a number of ringed totals, which relates directly to the number of questions on the paper.
12. Where a question has only one part, the total for that question should be written once and then again and circled. This allows for easy checking that totalling and transcription of marks is correct.
13. All zero values should be crossed through.
14. All blank spaces should be crossed through with a vertical line through the text space – not in the margin.
15. All writing must be marked as read, either by the presence of ticks or by striking through the script.
16. All blank pages must be crossed through.
17. Where candidates have added extra to their answers later in the script, the total mark should be indicated as including × from Page y. The total mark should be in the position where the answer starts.
18. The use of the following symbols/marks is acceptable:
    a. BOD – where the benefit of the doubt is given for the point the candidate is making. This is generally where poor writing or English is an issue. Its widespread use should be avoided.
    b. Underlining of subject specific terminology, which is misused or incorrect e.g. encoding rather than encryption, information rather than data.
    c. Underlining can also be used to highlight clearly incorrect statements or the use of a generalised phrase such as quicker, user friendly and so on.
    d. An omission mark ^ should be used where the candidate has given insufficient information to gain a mark. This is particularly useful when a teacher or student looks at scripts against a mark scheme.
    e. It may be appropriate to indicate where the same point has been covered more than once by an arrow or where a point has been covered in several lines of prose by the use of brackets.
    f. The use of letters associated with ticks **may** be used to indicate different areas being marked in a question, particularly to indicate the different bullet points in an essay. THIS WILL BE OUTLINED AT STANDARDISATION.

    a. **NO** other symbols or comments should be used

Unit 5: Information: Policy, Strategy and Systems

1. *Software houses go through a long testing programme before releasing a product. Despite this, problems still occur with that product.*
*Give **three** reasons why testing may not be completely successful.*

- requirement to keep development cost to defined limits (1)
- requirement to keep development time to deadlines (1)
- in order to gain/maintain edge over competition – get product to market first (1)
- user has used product in a way that no-one has previously done (1)
- new hardware/ software is released the company was not aware of (1)
- inadequate test plan/ data (1)
- etc.

Max. 3 × 1 = **3 marks**

2. *A graphic designer makes use of a particular hardware platform and particular software packages. Her clients often send her files produced on operating systems that are incompatible with hers. One solution for the designer is to use emulation software.*
Describe one advantage and one limitation the designer will have if she pursues this solution.

NB: Second mark is dependent on the first being awarded; however an explanation on its own can be credited.

Advantage:
- access to more file types (1) that might be specific to particular software that is not available on her system (1)
- allows her to use her own existing hardware (1) meaning she does not have to invest in further hardware that may be of limited use(1)
- cheaper in the short term (1) she can decide if she wants to invest in a new system at a later date (1)
- possible access to other hardware (1) which may only be developed for the 'other' platform (1)
- access to both platforms (1) user has advantages of both sets of operating systems available at once/accessible through a simple mouse click (1)
- able to provide a service to a wider client base (1) as she does not have to insist on files being provided in a restricted number of types (1)

Max 1 × (2,1,0)

Limitation:
- lack of functionality (1) there may be functions missing she needs in order to be productive (e.g. lack of printer support) (1)
- speed issues (1) the emulator may run too slowly to be of practical use (1)
- resource issues (1) the software takes up space on the hard disk of her existing system that may reduce the speed of her own system/ will have to buy software licences for applications to run under the emulator(1)
- she may still need to convert the files (1) if suitable software is not available under the emulator(1)

Max 1 × (2,1,0)
4 marks

3. *Networks of computers are rapidly becoming part of everyday life, both for organisations and individuals. Communications over networks involves the use of protocols.*

(a) *Define the term protocol*

Protocol: a standard set of rules that define how communication will take place between computers (1) or any acceptable definition

Max 1

(b) *With the aid of an example, describe one advantage of using protocols.*

Users are not restricted to one manufacturer's equipment/ allows for the existence of open systems (1) meaning several disparate pieces of equipment can be connected together and can be expected to communicate effectively (1)
+ a relevant example (1)

Max (3,2,1,0)

(c) *State one consideration that should be taken into account when setting up a network, and explain why it is important.*

- Previously installed network devices/ software need to be considered (1) to avoid address conflicts (1) OR device addresses need to be unique (1) so that each device is uniquely identified on the network (1)
- Network Operating System has to be considered (1) so that correct protocols are set up (1)
- How devices are connected to the network (1) it may cause a bottleneck and so there may be congestion (1)
- If the devices are set up to access the Internet (1) they will have to use TCP/IP to communicate (1)
- Applications will need to use the correct protocols (1) e.g. different e-mail servers use different settings (or other relevant example) (1)
- Size of network (1) + expansion (1)
- Security issues (1) data on the network may need to be protected/ have restricted access (1)
- Network usage (1) + expansion (1)

Max (2,1,0)
6 marks

4. *A large market research company is considering several different software packages in order to assist with the analysis of data collected on behalf of clients.*

*Give **three** criteria that should be considered when evaluating these software packages. For each criterion, explain why it may be important to this company.*

Give one mark for a relevant criterion and two for a reasonable description up to a maximum of 3 criteria and 3 descriptions. Description marks are dependant upon criterion marks. Description must reflect the context in order to gain the third mark.

Criterion	Reason
Functionality	The software will have to provide statistical functions (1) so that the research company can produce the relevant analysis (1).
Robustness	The company will be dealing with vast quantities of data (1) and the software will have to deal without crashing(1).
Performance	The company will require results to be produced in a reasonable time (1) so the software package must be more efficient than current methods (1).
Support	The company will require access to support initially as training (1), but also in future if things go wrong (1).
Portability	The company may use other software to present the results of their analysis (1), and so this package must have an export function (1).
Transferability	Any existing data the company holds that is useful for analysis should be available to the new software package (1) without the need for re-entering data (1).
Appropriateness/ suitability to end user **(NB not ease of use)**	Can't guarantee ICT literacy level of end user (1) company wants old and new employees alike to use the package quickly (1)
Futureproofing/ upgradability	The software will have to be of use for a significant length of time (1) so the company will not have to have further investment in the same area in the future (1)
Compatability	The company will have systems in place (hardware and/or software) (1) and the new package will have to function effectively with these (1)
Cost benefit **(NB not cost)**	The company may be prepared to pay extra (1) in order to gain extra functionality (1)

Max 3 × (3,2,1,0) **9 marks**

5. *The secretary of a local tennis club is constructing a database to store data on members' personal details and records of attendance. He has been told that a relational database management system can assist him. Having found an article on relational database construction, he does not understand some of the terminology it contains. He asks you for advice.*

(a) *Explain the following terms:*

(i) *normalisation;*
Process of breaking down complex data structures into simpler forms. (1) + expansion/ example (1)

(ii) *data independence;*
Changes in the structure of the data only affects those programs/ functions that are reliant on that part of the structure(1)+ expansion/ example (1)
OR
Data structure is separate from the programs that access it (1) + expansion/ example (1)

(iii) *data consistency;*
Data is only stored once, and this is the sole source of that data. (1) + expansion/ example (1)

(iv) *data integrity;*
Correctness/ how trustworthy the data is. (1) + expansion/ example (1)

4 × (2,1,0) marks

(b) *The secretary constructs his database and asks you to examine his work before he enters any data. You notice that he has not included any validation.*
With the aid of an example, explain why validation is important.

To check that entered data is sensible (1) + relevant example of validation in context (2,1,0), e.g. Date of Birth field (1) using a range check (1)

Max 3 marks

(c) *Give **three** reasons why he should consult with other members of the tennis club committee before finalising the design of the database system.*

- to ensure that the data they require is recorded on the system (1)
- to find out what training/ documentation may be needed by other members in order to make use of the system (1)
- to ensure that the system can create the relevant outputs that different members require (1)
- or any other sensible reasons (1 per reason up to a maximum of three)

3 × 1 mark
14 marks

6(a) *Describe **two** factors that need to be considered when designing for human/ computer interaction.*

Give one mark for a factor, and one mark for a relevant reason. Only credit the reason where it supports the factor and is relevant to the context and is ICT specific.

Do not accept environmental factors. All factors should address issues related to input/ process/ output to an ICT system.

Factor	Reason
User friendly	Making the system accessible to the widest audience
	Use icons in a meaningful way, so that users are not frustrated
	Have easily navigable screen layouts
	Provides a consistent look and feel so that skills are transferable between packages
	So that the system is intuitive so that the user feels comfortable and the system is easy to learn how to use.
Help mechanisms	Using context sensitive help means that the user has a consistent method of getting aid.
	Use of wizards can help users to complete most parts of a complex task by guiding them through the required stages.
	Use of tips/assistants can point out alternative methods of completing a task that may benefit the user.
	Built in demonstrations can show users how to complete complex/unfamiliar tasks
	Error messages provided by the system should not only be of assistance to programmers, but also to end-users so that they can see what has gone wrong and why.
Short cuts	Once a user is familiar with a process/piece of software they want to complete tasks efficiently.
	In order to support productivity, users should have the facility to customise toolbars/menus so that commonly used tasks are easily accessible.
	The ability to use alternative input methods for commands such as ctrl-P for print can aid efficiency
Long-term memory	Use standard menu items/key strokes will help the end-user by reducing the amount of time needed to learn how to use a package

Max 2 × (2,1,0)

(b) *Describe **two** resource implications of providing an effective interface.*

Give one mark for a factor and one for a related reason. Do not credit the same reason twice for different resource requirements, e.g. 'large graphic files…' being given as a reason for two different resources will only gain 1 mark.

Resource	Reason
Capacity of Backing Store/Hard Disk Drive	Operating system (OS) will consist of large graphics files that require storing.
	Comprehensive help systems will have a large number of files to be stored.
	Programs that operate in an environment such as a GUI will tend to be complex in terms of how they have been programmed, and so tend to be large.
	Documents created my users may contain lots of e.g. format information/graphics that may not conveniently be stored on removable media.
Capacity of Immediate Access Store/Main Store/ RAM	Complex graphics will take up a lot of space in IAS when they are being used, due to the bitmapped nature of graphics.
	When help facilities are being accessed (such as wizards/demos/help files), these need to be stored alongside OS, application and data in IAS in order to be of use.
	In order for multi-tasking to take place, as when a task is not being accessed it has to be stored where it can be accessed immediately.
Speed of processor/clock speed	If the processor is slow, graphics will not be produced smoothly.
	Users may get frustrated waiting for systems to complete tasks.
	Multi-tasking involves the processor working at a high rate.

Do not credit terms processing power or memory without qualification

2 × (2,1,0)

(c) *Some users may customise their interface.*
*Describe **one** consequence this may have for support staff when providing technical assistance.*

- More time will be taken up in support (1) as staff will have to identify which icons perform which task/ the position of icons to perform tasks (1)
- Changes made by the users may have other consequences (1) and this may be difficult/ impossible for the support staff to assess without access to the user's system (1)
- Workers that share desks don't recognise the environment (1) and support staff are not aware of what has been changed (1)
- Etc. Max (2,1,0)

10 marks

7. *As an ICT manager in a medium sized company, you have been asked to create a job specification for a database administrator.*

(a) *Describe **three** responsibilities you would include in this specification.*

- Structure of the database (1) e.g. changes to structure in order to alleviate problems (1)
- Keep users informed of changes made to database (1) for example change in field name or field size/introduction or deletion of queries or reports (1)
- Maintenance of the data dictionary (1) including such factors as setting conventions for naming of tables, fields etc (1)
- Controlling/ implementing access rights to the database (1) e.g. so that inexperienced users who need to see data cannot inadvertently delete/change it (1)
- Allocating passwords to users (1) so that one person has overall responsibility for who has any access to the database and can track this (1)
- Provide training and support to users (1) so that new staff are aware of how to use systems, and all staff able to make efficient use of the system (1)
- Backup/ restore (1) + expansion (1)

Credit any other points that are reasonable to include as functions of a DBA. Do not credit any reference to personal features e.g. 'must be trustworthy'

Max 3 × (2,1,0)

(b) *The data base that this person will be in charge of is a client/ server database.*
*Describe **two** advantages of using this type of database over a non-client/ server database.*

- expensive resource is made available to a large user base (1) so this is more cost effective (1)
- consistency of the data is maintained (1) as only one copy of the data is held on the server, rather than copies held on workstations (1)
- processing is done at the server (1) so the client does not need to be so powerful (1)
- communication between client and server is minimal (1) only requests and results are communicated, rather than entire databases (1)
- Department specific report formats or queries can be held on workstations (1) meaning that less room is taken up on the server/these are less likely to be accessed by the 'wrong' people (1)
- Greater control over the data (1) + expansion (1)

Max 2 × (2,1,0)

10 marks

8*(a)* *Describe **two** changes that may be evident to end-users when they change over from using a stand-alone machine to a networked environment.*

- login screen (1) user now has one more stage to complete before they are able to use their system (1)
- more disk drives on screen (1) user now has access to drives that are logical rather than physical (1)
- less control over data (1) user may now find that they have changed/no right to access files they could previously (1)
- physical appearance of workstation/environment (1) for example extra ports on machine/extra cable connected to machine/ability to print to other machines/extra hardware in the form of hubs etc (1)
- access to remote/ shared resources (1) + expansion (1)
- less control over the interface (1) e.g. inability to customise (1)
- increased communication using/ via the machine (1) + example (1)
- **references to 'transfer of personal settings' can be awarded as BOD (1)**

Max 2 × (2,1,0)

(b) *A multinational company has recently created an Intranet, connecting all of its computer systems. All the sites are now connected using high-speed dedicated links.*

(i) *Describe **one** facility that could now be made available to the company which would improve productivity.*

- Video-conferencing (1) managers will be able to see each other without the need for travel costs/long arrangement times (1)
- Group working on projects using productivity (1) work can be completed in a shorter time scale (1)
- Distributed databases (1) meaning that all users have access to the same information all the time/changes are reflected everywhere as soon as they are made (1)
- Electronic sharing of documents (1) means that there is less reliance on physical media (1)
- Ability to share hardware resources (1) means that funds can be devoted to other areas of the business/less hardware needs to be purchased/excess hardware can be sold off (1)
- E-mail (1) which means you have more control over spam/ viruses/ etc. (1) OR internal e-mail (2)

  Do not accept internet access.
  Do not credit brand names.

Max 1 × (2,1,0)

(ii) *Describe **two** possible problems that may arise as a result of using this network of computer systems.*

- Risk of unauthorised access (1) meaning potentially sensitive/confidential information may be accessible (1)
- Risk of viruses (1) all nodes need to have up to date anti-virus software (1)
- Reliance on external agencies (1) e.g. the telecommunications network that the company has little/no control over (1)
- More vulnerable to spurious data (1) if incorrect data is entered into the system, the mistake may not be picked up for a long time (1)
- More difficult to back up (1) as there will be no one centralised control (1)
- Increased management overhead (1) means that more time/money/manpower will need to be dedicated to the computer systems (1)

  Do not credit the term hacker unless it is supported by an explanation

Max 2 × (2,1,0)

(iii) *Describe **two** possible measures that the company can take to combat problems caused by the use of this type of network.*

- Provide user login and password (1) to make it more difficult to enter the system if not authorised (1)
- Set up required procedures (1) so that users know the tasks that need to be carried out to maintain system security/integrity (1)
- Invest in redundant systems for mission critical applications (1) so that if disaster hits, essential business functions can still be carried out (1)
- Ensure validation/verification checks are made on data (1)
- Encryption of data (1) so that intercepted data/ packets cannot be understood (1)
- Use up to date anti-virus software (1) + expansion/ example (1)
- Use a firewall (1) e.g. to provide a filter on traffic coming in/ going out (1)

Max 2 × (2,1,0)
14 marks

9. *A local council has decided to standardise the ICT systems across all its departments. This is due to problems experienced in transferring data and staff between departments.*
Discuss the above statement. Include in your answer:
- *the benefits that the staff may gain from this approach;*
- *the benefits that the council may gain from this approach;*
- *the reasons why staff may not wish to change.*

The quality of language will be assessed in your answer

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.

Allocation of marks:
- Up to 6 marks for benefits to staff (code as **S**)
- Up to 6 marks for benefits to the council (code as **C)**
- Up to 6 marks for why staff may be resistant to change (code as **R**)
- For each section, award marks for up to 3 points, i.e. the second mark each time is gained by expanding upon a specific point. Reasons must relate to points given.
- Maximum mark for content is 16/20. Up to 4 marks are available for the assessment of Quality of Written Communication (code as **Q**).

BENEFITS TO STAFF (**S marks**)
- ease of learning (1) the council can produce standard training documentation that matches the workstation HCI (1)
- easier transfer of skills (1) due to consistency of interface (1)
- user can make use of other workstations (1) so user does not have to be fixed to one work area (1)
- users are able to support each other (1) meaning simple problems can usually be solved without recourse to user support (1)
- standard setting of defaults (1) e.g. word processing package can be set with standard margins to suit the standard printer (1)
- easier distribution/use of standard items (1) such as logos/templates/etc (1)
- etc.

BENEFITS TO COUNCIL (**C marks**)
- less training overhead (1) as everyone can attend the same training (1)
- perceived image of council may improve (1) as anything produced will now definitely be in the required style (1)
- easier quality control (1): fewer things to go wrong if everything is done in a standard way (1)
- easier to manage licensing (1) as all workstations should have identical software content (1)
- upgrades will be easier to administer (1) - there is less management overhead (1)
- security is easier to monitor (1) it will be more obvious is a workstation has had its contents altered (1)
- etc.

RESISTANCE TO CHANGE (**R marks**)
- consideration of skill level of user (1) standard will only suit a certain cohort of users/it may be too low level for experts or too high level for novices (1)
- less control over software (1) user has to wait for software configuration to be changed for them rather than do it themselves (1)
- availability of specific software (1) unless software is standard, may lose necessary functionality (1)
- 'special needs' consideration (1) colour sets may not suit colour blind users/physical workstations may preclude use by those with other disabilities (1)
- original system served user perfectly well (1) so user cannot see the point in changing/sees this as a waste of their time (1)
- etc.

Quality of Written Communication (**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.

Max 4 marks

20 marks

Total for the paper = 90 marks