# BCS HIGHER EDUCATION QUALIFICATIONS
# BCS Level 4 Certificate in IT

## April 2011

## EXAMINERS' REPORT

## Information Systems

### General Comments

Some improvement in the standard of candidates was noticed, particularly those who have been taught well or have researched the subjects, although the percentage of overall pass for Section A is still low. There are still many candidates who do not seem to understand what Information System is about. They have no idea about the concept of analysis and design. Candidates are advised to use previous exam papers and answer points which are available on the BCS website.

## Section A

A1. Estate agents handle the sale of dwelling properties (houses, bungalows, flats, etc) within a specific geographical area. Business has been poor and so several estate agents have agreed to work together to sell properties covering a larger area. They require a new web site to be designed. Your software house has been approached to provide this service. The web site should be accessible by both buyers and sellers. It will need to provide an on-line search facility containing the chosen geographical area, type of property required, number of bedrooms, minimum and maximum prices. The house details will need to be displayed including photographs and location maps.

a) Describe how you would investigate this request using a methodology with which you are familiar. Include possible tools and techniques you would use.

**(15 marks)**

b) Draft a set of screens, which you can use to present to the companies.

**(10 marks)**

c) Briefly describe FIVE aspects of screen/dialogue design you should take into account when developing the web site.

**(5 marks)**

### Answer Pointers

Those who failed this question did not understand what was required and could not answer the question, because of lack of knowledge. For those who did, the results were reasonable. Part a) was a very typical question, expecting candidates to describe a suitable method, which could be used to investigate their requirements. It did not mean the solution was required, but some marks were given for this. The screen designs were on the whole much improved, but did include some unusual fields, including payments. Most candidates could identify HCI aspects.

a) Several methods could be described, but the most common will be the software design life cycle (the waterfall method) often referred by candidates (wrongly) as SSADM. The main stages are feasibility study, requirements/systems analysis, systems design, development, testing and implementation.
Tools and techniques will include dataflow diagrams, relationship/object modelling, normalisation etc. Prototyping methods were also acceptable but this scenario was not really suitable for soft systems but is acceptable.

b) The screens will need to show good functionality, basic screen design and consistency. It will be expected that the screens will navigate from the search to a list (with photographs). The actual details will then be displayed with maps and local information.

c) Typical answers: use of simple and natural language, consistency, provision of feedback, exit/return facilities, shortcuts, good error messages etc

A2. a) There are several methods used when analysing an existing system. Identify the advantages and disadvantages of the following:

i) Interviews
ii) Questionnaires
iii) Observation

**(9 marks)**

b) Design a short questionnaire, which can be used by the system analyst, to obtain the estate agents' requirements from the outline in question A1.

**(9 marks)**

c) Define what is meant by prototyping and briefly describe THREE different approaches to prototyping.

**(12 marks)**

**Answer Pointers**

Fact finding advantages and disadvantages and prototyping have appeared in many guises on most papers at least once a year. Those who have studied and revised previous papers answered the questions well. Several candidates who failed this question described attending a job interview, with very little evidence of fact finding. Most candidates had difficulty in devising a questionnaire, even if they understood what questionnaires were. Too many answers described the design of the system rather than analysing the requirements. The Information Systems paper always contains some practical exercise. It would be advisable for accredited centres to concentrate on the practical side as well as theoretical.

a) Interviews are one to one discussions useful to obtain individual opinions, problems and facts. They are time consuming and can be reactive and cause resentment. They need to be prepared and structured, although interviewees must be prepared to be flexible. Questionnaires are useful for obtaining facts from a wider variety of staff, especially when there are several locations the facts can be simple. They are difficult to design and are often ignored and the return is poor. Observation is different from interviews as it takes place at the individuals' work place. It is useful for identifying problems, bottlenecks and understanding

processes. However, it can cause disruption and facts can be retained due to fear of redundancy.

b) The reason for the questionnaire should be explained and encouragement provided at the beginning or end for the staff. Typical questions would be factual e.g., House details, required location etc, giving a choice such as background colour, use of logos with a simple Y/N reply, who is allowed access, contact details etc and then an open ended part obtaining important requirements.

c) Prototyping involves constructing a preliminary version of a system using CASE tools or 4GLs to obtain user requirements and to provide the user with an idea of what the system may look like. It can be interactive and incremental. There are several approaches namely dummy, throw away, spiral or evolutionary. There are several commercial applications supporting RAD (Rapid application development) using JAD and JRP session such as Agile, DSDM.

A3. a) Describe and give an example of a PERT chart and a histogram (GANTT chart).

**(9 marks)**

b) Define the following statistical terms:
   i) Mean
   ii) Mode
   iii) Median

**(6 marks)**

c) Compare and contrast the following:
   i) A logical data model and a physical data model
   ii) The role of a systems analyst and a database administrator
   iii) Data in un-normalised form and data in third normal form

**(15 marks)**

**Answer Pointers**

Only 26% of the candidates attempted the question, with the highest pass rate of all questions (35%).
It was surprising that although many who attempted it were aware of the statistics, they did not know what a PERT chart was; most could give an example of a Gantt chart. Many candidates could not differentiate between a logical and physical model, although had they been asked about entity relationship diagrams and databases they would have understood the differences between the models. Most could describe the functions of a systems analyst and a database manager, however it is surprising that many thought DBAs entered the data and designed the database. Those who had revised and read previous papers could describe normalisation.

a) A PERT chart (Project Evaluation and Review Technique) shows the organisation of events and milestones and tasks or activities. An event is a point in time that represents the start or completion of a task or sets of tasks. The chart depicts the tasks and their inter-dependencies and to determine the critical path, which is crucial to completion of the project on time. It can help the project manager identify corrective solutions when a project is running late. A histogram or Gantt chart is a simplified time-charting tool in the form of a bar chart. Each bar represents a task on a vertical axis with dates/times on the horizontal axis. An example of each is expected.

b) Mean – this is a statistical measurement, often referred to as an average. It is the sum of all the values in a series divided by the number of values. Mode – this is the value in the series, which arises more frequently than any other. To find the mode is to look for the commonest value present in a series. Median – this is the middle value of a series. Its position in the series is such that id divides the series in half.

c) A logical data model defines the database in simple terms as seen by the user and developer. It identifies the entities, attributes and relationships between the entities. The most common relationship is one-to-many, but there are also others such as one-to-one and many-to-many (which have to be resolved). Optionality indicates whether a relationship is optional or mandatory. A physical data model is the physical representation of the logical model in terms of the type of database it is implemented in.

It is the internal model, in a relational database this is represented by the form of tables, rows and columns. Data in un-normalised form is the raw set of data items identified from sources such as existing records, forms, reports etc. It is the first stage of data gathering. Normalisation is the process of decomposing the un-normalised data into stable structures removing all repeating items and partial/functional dependencies.

A4. a) Write brief notes on the following:

i) Outsourcing

**(4 marks)**

ii) Facilities management

**(4 marks)**

iii) Business process re-engineering

**(4 marks)**

b) You are an IT manager within a software house. You have been asked to draw up a plan to provide security within the system you are developing. Describe what measures you can take to ensure
(i) The reliability and integrity of your data
(ii) Physical security

**(12 marks)**

c) What is meant by the BCS code of conduct and good practice? Assuming you are employed as an IT manager how does it apply to the company that has employed you?

**(6 marks)**

**Answer Pointers**

This was a poorly attempted question, with only 24% attempting it and 20% passing. Part a) was not answered well, with very few candidates understanding these processes. They need to be reminded to keep up to date with current developments in Information Systems. Part b was disappointing; security issues have been on papers constantly and are normally answered well. The fact that the question was split into two parts seemed to confuse candidates. If this had been asked about in terms of databases, the answers would have improved. Unfortunately not many candidates knew much about the BCS code of conduct.

a) Outsourcing is a mechanism of using external sources for example to develop a system, run a system such as payroll, provide input to a system It saves time and resources and can reduce costs by taking responsibility for employing specialist staff for example. It can also be used as a security measure.

   Facilities management is a mechanism whereby a specialist company carries out the entire running and processing of systems, usually off site. This releases the necessity to employ any specialised technical or development staff.

   Business process re-engineering is a modern trend and is an important area in business analysis. It is a requirement to study fundamental business processes, independent of the organisation units and information systems support, to determine the underlying business processes, which can be streamlined or improved. It is known as a bottom up process. Companies are discovering their existing systems are outdated and can be significantly restructured to improve efficiency regardless of computer automation.

b) Data can be secured using several techniques. Users should be given unique usernames and passwords, which should be changed regularly. They can be assigned roles giving them access to only certain processes. User views can be used again to prevent access to certain data. Data can be encrypted. DBMSs can be used to supply referential integrity, consistency, constraints, encryption etc. Physical security involves backup strategies, disaster recovery plans, fire proof safes, fire alarms, restricted access to servers, virus scanners, firewalls etc

c) The BCS code of conduct and good practice deals with IT professionalism, security, legality, integrity of staff dealing with sensitive data. It provides advice and guidelines and describes standards of good practice relating to IT. Your company would expect you protect confidential data, to ensure that the data is secure and to behave in a professional and competent manner.

## Section B

B5. State the stages that follow analysis in a systems modelling life cycle of your choice. For each stage discuss what documents would be produced and why.

**(12 marks)**

**Answer Pointers**

The typical stages expected were

Development
Implementation
Testing
Handover

One mark for a stage, and then one or two marks for each document and a reason why.

For example, test scripts are required to ensure that testing is performed in a logical structured manner, and also to prove testing was done.

The typical answer for this was a note dump, ignoring the question which asked for the stages after analysis.

The other part of the question that was ignored was the questions about documents. Again the majority of the answers were note dumps.

Where the candidate read the question high marks were generally gained.

B6. a) State the differences between data and information.

**(4 marks)**

b) Discuss the differences between a traditional database and a data warehouse.

**(8 marks)**

**Answer Pointers**

a) Up to 4 marks to show that data is the simply the facts and figures stored, information is meaning produced by analysing data.

b) A database should simply contain data, a warehouse should contain information.

Up to 4 marks for a discussion on each area.

Part A was generally well answered. Most of the answers showed that data was raw, unprocessed facts and that information is used for decision making once the data has been processed

In Part B, some answers showed an understanding that a warehouse is a store of processed information (sales reports, averages, etc.) and that a warehouse can be used for making decision (via data mining for example).

A lot of answers stated that a database is a manual method of entry of data and that a warehouse is a computerised version or that it is simply a backup of a database.

B7. What is represented in the following system development diagrams:

i) Entity Relationship Diagram

**(4 marks)**

ii) Entity Life History

**(4 marks)**

iii) Data Flow Diagram

**(4 marks)**

**Answer Pointers**

Up to 4 marks for highlighting the information shown in each diagram

a) Entities, degree of relationship, optionally, primary and foreign keys, etc.
b) The life of an entity, from its creation to its death (archive), sequence, selection and iteration of process that effect the entity
c) The flow of information, what is stored, how the organisation interactions with outside bodies (external entities) and what processes there are

Part A and C were answered well, with candidates not seeming to know about ELH's

Quite often a context diagram was drawn instead of a DFD, but as this is a level 0 DFD only one mark was deducted (this was due to the lack of Data Stores being mentioned or drawn).

B8. At which stage or stages in the systems development life cycle would you test and why?

**(12 marks)**

**Answer Pointers**

Every stage should have some sort of test; not just the testing phase. The initial requirements need to be tested, a prototype will test screen designs and functionality etc.

Up to two or three for each stage with reasons.

Most answers were a note dump based on testing of code.

Where the answer focused just on code, the mark was limited to 4 or 5.

Where the answer whet into stress testing and customer acceptable testing the mark awarded would have moved up by a couple of marks.

This question was not just about code testing.

The initial specification needs to be validated and tested. The user interface can be tested via prototyping, functionality can also be tested via the use of prototype etc.

B9. When discussing the purchase of a new computer system, what would you expect to be in the contract with the supplier within a business environment?

**(12 marks)**

**Answer Pointers**

A fairly open ended question. Areas such as warranty, liability, support, payment cycle, limitations of what cannot and can be done, who is responsible for what / when etc

The majority of answers assumed that a new computer or PC was being bought and so the answers tended to focus on size of processor, memory, disc etc.

Marks for any reference to an SLA (Service Level Agreement) or warranty.

B10. Discuss the composition and roles of a development team that takes an initial project brief for a computer system through to its implementation.

**(12 marks)**

**Answer Pointers**

Jobs expected to be covered included

Project manager
Team leader
Analyst
Programmer
Tester
Scribe

One mark for each job (up to 4 or 5), and then 1 or 2 marks for each description of what the job does.

A reasonable number of answers were note dumps of the style of software deployment (pilot, phased, big band etc). These answers mainly were awarded a very low mark as they did not really map to the question.

Where the candidate understood the question, high marks were gained.

B11. a) In methodology, what is meant by the following terms and state one methodology that you consider to fit that term and why.

i) Hard

**(3 marks)**

ii) Soft

**(3 marks)**

b) Name one Object Oriented Methodology and outline the tools and techniques that would comprise that methodology

**(6 marks)**

**Answer Pointers**

Hard – Structured approach, strictly defined to engineer a solution, perhaps SSADM

Soft – Semi structured, geared towards finding a solution to a (people) problem, soft systems.

1 mark for naming a methodology, up to 2 marks for discussion.

Rich Pictures was quiet often given as the name of a soft method. It is a technique not a method.

Section A was answered reasonably well; the problem with the question was part B. A lot of the answers were a note dump on what Object Orientation was, not what an Object Orientated method was. Where the answers included references to UML, Use Case diagrams etc credit was given but the components of an OO development language do not equal an OO methodology.

B12. Discuss four typical functions of a Database Management System (DBMS)

**(12 marks)**

**Answer Pointers**

An open ended question. Up to 3 marks for each function discussed.

Storage of data, retrieval of data, security, backup / recovery etc. Any reasonable function was awarded marks

A number of answers stated that the 4 functions of a DBMS were insert, update, delete and query.

A number of answers did reflect that backups, security, access rights etc are key parts of the DBMS.

A number of answers focused on the use of relationship management (Primary Key / Foreign Key, etc) but this is not really a function of the Data Base Management System but more of the design of data. Where the answer focused on creation of PK etc some marks were awarded.