BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 4 Certificate in IT

October 2010

EXAMINERS' REPORT

Information Systems

General Comment

The pass rate is low mainly because of the large number of students from poor centres. Some students commented that their centre did not cover the subjects in the examination which is very surprising. Previous exam papers are available and centres should be advised to use these as a guideline together with the syllabus. The style of the paper has not changed, however it was apparent that some students did not read the question. Once again, it should be emphasised that the rubric should be explained to the candidates during the course. Exam technique should also be introduced into courses. Too often candidates spent too long answering one question and did not give themselves time for a second. They also spent a page on a 2 mark question and far less on a 10 mark question.

Section A

Question A1

A specialist motor car company needs to upgrade its website. It has decided to hold on-line auction for some of its cars. This auction will only be open to registered enthusiasts, who belong to a recognised motoring club. In order to enter a bid, the enthusiast has to have been registered with the company. The system needs to record the car details, registered enthusiasts, motoring club details, the lots (car to be auctioned) and the bids. Each lot has a minimum reserve price and a specified time span. Enthusiasts can join the bid and make as many offers as required. When the elapsed time has been reached, the auction closes and the successful bidder is contacted to arrange payment, either by debit or credit card.

a) Design a set of screens to:

i) Display car details
ii) Make a bid

(12 marks)

b) The design of the interface is extremely important to the company. Describe the issues that need to be taken into consideration when designing this interface.

(12 marks)

c) Traditionally, professionals carried out the analysis, design and programming phases. Discuss how these roles have changed over the years.

(6 marks)

Answer Pointers

(a) The design needs to be simple. Displaying the car details would use graphics, even a video or rotating picture. It would be important to emphasise the good points of the car, enthusiasts want to know the detail. It is not expected that all this detail be shown on the screen, continuation or further detail facilities would need to be shown. The bid would be a simple data entry screen, checking that the enthusiast had been registered. Payment screens should be secure.

(b) Typical answers would relate to the screens and include understanding the type of user, simplicity, clarity, ease of use, speed of response, commonality, use of colour, font size, simple and clear commands, a good help system, security (with respect to payments) etc.

(c) In the early days of computer systems, most systems were large hence the reason for teams each with differing skills. Structured methods were not used and most systems were analysed in a top down procedural approach using flowcharts. Files were held on magnetic tape prior to the use of discs, repetition was rife as files were completely separate. Designers used to try and prevent this from happening. Coding was at a very low level and a specialist skill. As computers became smaller, the introduction of 4GLs, database management systems, on-line processing, form and report design software, CASE tools, RAD etc enabled the developers to be responsible for the complete process. Specialists such as software engineers, network administrators, database administrator etc have developed over the years.

Examiner's Guidance Notes

It is very apparent that many candidates have not grasped the concept of screen design. HCI is an important area in Information Systems. With all the experience candidates should have of using the internet, they ought to be able to design a functional screen. Most candidates could identify a few design issues but only a few could relate to the differing roles within IT.

Question A2

a) There are several methods that can be used in business systems analysis. Briefly describe the basic stages, components and techniques of the following methodologies:

(i) SSADM (not the Systems Development Life Cycle)
(ii) OOAD
(iii) RAD

(24 marks)

b) Briefly describe the following specification techniques, giving an example of each:

(i) Flowchart
(ii) Decision Table
(iii) Pseudocode

(6 marks)

Answer Pointers

(a) SSADM – SDLC descriptions will not be accepted. SSADM is a structured method, providing developers with very detailed rules and guidelines. The SSADM modules are: Feasibility (stage 0), Requirements analysis (stage 1 and 2), requirements specification (stage 3), logical systems (stage 4 and 5), physical design (stage 6). The stages are numbered 0-6: - Feasibility, investigation of the current environment, business systems options, definition of requirements, technical systems options, logical design, and physical design. Techniques such as dataflow diagrams, entity relationship modelling, entity life histories, and normalisation are expected.
OOAD – object oriented analysis and design method is based on object, object classes and methods. It does not replace traditional approaches; it is more an additional method. There are various relationships between classes such as inheritance, aggregation, association, persistence etc. Methodologies such as Coad and Yourdon or Unified Method encompass the analysis and design stage of classes. UML (unified modelling language) is a graphical modelling (use case, collaboration diagrams, sequence and activity diagrams) and documentation notation language describing the structure and behaviour of OO applications.
RAD – rapid application development, which is a user centred prototyping method. Typical examples are DSDM or the Agile Method. It is a combination of structured techniques combined with prototyping and joint application development. The use of various session discussions such as JAD and JRP provide user feedback throughout the development in a cyclical manner.

(b) A flowchart is a procedural diagram using symbols for processes, files, and decisions in a manner of selection, sequence and iteration. A typical flowchart with symbols is expected. A decision table is a method of drawing a table identifying, actions and conditions and is useful for If/Then structures and is non-procedural. Pseudocode is similar to Structured English and is a narrative tool encompassing sequence, selection and iteration using common simple commands to describe a process. Table names (record) and attributes are used for clarification.

Examiner's Guidance Notes

This was the least popular question, but apart from the poor centres reasonably well answered. Despite the question stating not the SDLC, candidates still included stages not included in SSADM. Decision tables were confused with truth tables, but one mark was given. Too much time was spent describing flowcharts and pseudo code, only 2 marks are allocated to each part.

Question A3

a) You have received the terms of reference for a new large project and been assigned to manage it. It is expected to take six man months to develop. Prepare a plan showing how you would manage the project.

(15 marks)

b) Discuss the main features of each of the following

(i) Data Warehouse System
(ii) Expert System
(iii) CASE tool **(12 marks)**

c) Describe the rules for:

(i) First Normal Form
(ii) Second Normal Form
(iii) Third Normal Form **(3 marks)**

Answer Pointers

a) Project management tasks fall into the following areas: planning, organising, staffing, resourcing, costing, scheduling, monitoring, controlling and reviewing. The scope and the boundaries, stages and tasks of the project will need to be defined. Time scales for each stage/task will need to be prepared. The use of PERT/GANTT charts may assist in the process. Resources will need to be identified and possible costs calculated. Software tools such as Microsoft Project/PRINCE 2 are available to assist in the process. The identification of the various stages is acceptable, but managing and control issues must be discussed

b) Data Warehouse – a data warehouse comprises of a number of software components. It is used to store and analyse historical and operational data. It supports the management decision-making process by storing the raw data from all the systems both internally and externally. Data mining can be used to support strategic decisions using OLAP (on-line analytical processing tools) to search for patterns in the data. Old legacy system data (often unstructured or repetitive) can be stored together with more data from modern relational databases. An expert system supports users in their tasks by incorporating the knowledge of an expert. An inference engine is the component, which applies knowledge to a particular problem. These systems also support the decision making process within an organisation. They are commonly used in medical diagnosis, credit checking, chemical analysis etc. CASE (Computer Aided Software Engineering) tools support several methodologies and aspects of the system development life cycle. Their purpose is to automate, manage and simplify development. Mention of Upper and Lower CASE tools supporting differing aspects is acceptable.

c) 1NF – This stage is the first stage in normalisation and removes repeating groups. It ensures that all attributes are atomic (i.e. the smallest possible attribute). 2NF – (partial dependency) ensures that all non-key attributes are functionally dependent on the entire key. If not, they are split into separate relations. 3NF – (transitive dependency), often thought of as the final stage. Ensures that all non-key attributes are functionally independent of each other, if not a new relation is created.

Examiner's Guidance Notes

A number of students did not concentrate on system development projects, some even mentioned building projects. Not many discussed managing the project, most described the stages within the normal systems development life cycle, which was acceptable, but managing the project was also required. The term 'six man months' was not familiar to some candidates, so six months was accepted.

Only short/brief notes were expected for part b and c.

Question A4

a) Documentation is an essential part of system development. Discuss this statement giving reasons and examples of what should be contained in a typical systems specification manual.

(10 marks)

b) What security measures would you take in the following cases:

(i) To be able to recover from a fire in the Accounts Department, which has affected all computers and valuable data has been lost.
(ii) To prevent a disgruntled employee from deleting crucial data.

(10 marks)

c) Define the following terms and give two examples of each from the case study in question 1.

(i) An entity
(ii) A relationship
(iii) An attribute
(iv) A primary key
(v) A foreign key

(10 marks)

Answer Pointers

(a) Documentation should be developed in a top down way, particularly if a structured method is used. It is essential that version control and change control are supported. Standard forms and documents should be used. Documentation should be simple and clear. A good filing system is required for manual/physical documents and a good back-up system for automated documents. Feasibility report, requirements specification, user manuals, coding manuals, technical specifications are examples of some of the documentation required.

(b) (i) A disaster recovery plan would be required. The computers should be networked and data stored on a server in a fireproof room. Data should always be backed up and held both on and off site. A recovery procedure would need to be devised to reload transactions, which had been entered since the last save point. This can be provided by database software (e.g. roll back). A new approach to on-line storage is cloud computing. (ii) The use of roles, user names, passwords, virus checkers and audit trails, training staff to always log out etc. When staff leave their access authority and privileges should be revoked so they cannot re-access any information either internally or externally.

(c) (i) An entity is a person, place or thing about which information needs to be held e.g. enthusiast, lot. (ii) A relationship exists between an entity and another entity or itself. It can be optional or mandatory e.g. enthusiast place-a bid, enthusiast is-a-member-of motoring-club (iii) An attribute is an atomic element describing the entity e.g. enthusiast-name, car-make. (iv) A primary key is the unique identifier of an entity e.g. lot-no, car-registration-no. (v) A foreign key is the primary key of another entity and is stored within an entity to

identify the relationship between each entity e.g. Lot-no is in the enthusiast's bid, the motoring-club-ref-no is the foreign key in the enthusiast entity.

Examiner's Guidance Notes

This was the most popular question, attempted by 69% of all candidates, but the average pass was low once again due to poor candidates. As in a previous question, candidates did not relate to system development, although it was in the question. Too many candidates are confused with the logical and physical aspects of analysis and design in part c.

Section B

Question B5

What are the typical duties of a Database Base Administrator for a large scale company ?

(12 marks)

Answer Pointers

An opened ended question but expected references to

- Managed of backups, but not doing the backups
- Education of users in terms of strategic use of the database
- Management of a team who support the database
- Etc

The answer should indicate that the DBA is more a manager of a strategic resource rather than being a technician.

Examiner's Guidance Notes

A number of answers stated that the DBA was responsible for inputting the data, creating table and making sure integrity of data was maintained. This is not the role of the DBA, but of a data entry clerk and a systems / business analysis.

The average mark was on the low side which reflected that the students either knew the answer or got it totally wrong.

Question B6

Outline the typical organisational structure of an IT company.

(12 marks)

Answer Pointers

A typical company's departments could be

- HR
- Sales
- Manufacturing
- Pre Sales
- Head Office
- Etc

There to be a number of departments, depending on the example the student gives, and therefore there will be 2 or 3 marks awarded for each department discussed.

Where an answer talked about the 3 levels of data (strategic, tactic and operational) some credit has given.

Where the answer then mapped the levels to jobs and job roles further marks were given.

Examiner's Guidance Notes

Again, students either knew or did not know the answer.

Question B7

When designing and developing a web site, how would you ensure that the web site can be used by disabled users?

(12 marks)

Answer Pointers

An open ended discussion was required which should focus on having alternative ways of presenting information

For example

Any text or graphic may have a sound file which "reads" the content of the text or graphics.

Any sound related file may have a text file associated with it so that a deaf person can read what it in the sound file.

Discussion of disabled web standards (for example Bobbie) also gained marks

1 or 2 marks awarded for each relevant point.

Examiner's Guidance Notes

A percentage of answers discussed Braille keyboards, voice recognition systems and other hardware. This is outside the scope of the design of a web site and those answering with this type of answer did not score well.

Another section of answers discussed people with no arms and legs and how they could interact with a computer system. Again this is outside of the scope of the question and did not score many marks.

A number of answers did focus on deaf and blind users, and these answers were usually very good.

Question B8

Discuss what is meant by the following terms:

(i) Black box testing
(ii) White box testing
(iii) Regression testing.

(3 times 4 marks)

Answer Pointers

Up to 4 marks for each section, with a discussion that backups the terms

a) testing without regard to the internal working of the application
b) testing with regard to the internal working of the application
c) testing with regard to changes made to the application

Examiner's Guidance Notes

Another question where the student either knew or did not know the answer. Very polarised.

Parts a) and b) were answered well. Part c) needs more work as testing is not just about the code or the inputs and outputs from the application.

Question B9

Discuss what is meant by the following terms

a) XML
b) ASP (Active Server Pages)
c) Web 2.0

(3 times 4 marks)

Answer Pointers

Up to 4 marks for each section, with a discussion that backups the terms

a) a mark up language which can assist with electronic data interchange and presentation of data within web pages

b) A development language that can assist with database applications, the code generation is interpreted html

c) A terms that encompasses some of the more social aspects of web development.

Examiner's Guidance Notes

Very few answers understood the concept of Web 2.0 and its social aspects.

Many answers stated that XML is used to build web pages. This is not strictly true as XML is a mechanism for presenting data to a web page so it can present the data.

Question B10

Outline a Fact Finding Plan for ensuring that all of the potential customers requirements are captured.

(12 marks)

Answer Pointers

Open to the student to suggest, but it might entail

- Interviewers
- Observation
- Sampling
- Questionnaires
- Etc

Up to 4 marks for each reasonable area discussed, with relevant points made to how the customer's requirements are found.

Examiner's Guidance Notes

This was the best answered question on the paper.

The majority of answers reflected that the student knew about fact finding techniques.

Some answers only focused on 1 or 2 techniques and therefore were limited to a maximum of 4 or 8 marks.

Question B11

Outline the database rules and logic that ensures that the entry of a customers name and address is correctly achieved.

(12 marks)

Answer Pointers

Name - Should be split into 2 or 3 sections, first name, initials, last name perhaps. The first and last name should not be null

There is not really an upper limit on the length, so perhaps 100 characters max.

The address could be trapped via a postcode database (or similar)

There should be a zip code / postcode of a least 8 characters.

Country / state / county could be selection from a drop down list

The address maybe up to three lines long, each line is not null.

Any reasonable or valid point was awarded 1 or 2 marks

Examiner's Guidance Notes

When answered the focus was on the use of primary and foreign keys to restrict inputted values.

Question B12

There is an argument that the multimedia element of a web site consumes too much network bandwidth and that the web site should just be textual.

Argue against this statement, stating why multimedia should be used.

(12 marks)

Answer Pointers

An open ended but expect mention of

Using the correct media to get the message across
Using pictures can reduce the amount of words
Using media can be language neutral and therefore get to a wider audience.
It is what the user expects.
etc

1 or 2 marks for each valid point

Examiner's Guidance Notes

In this context media is not newspaper, radio and TV. This style of answer was awarded no marks.

Some very good points arguing for and against the statement, even though advantages were asked for.