BCS HIGHER EDUCATION QUALIFICIATIONS
BCS Level 4 Certificate in IT

April 2010

EXAMINERS' REPORT

INFORMATION SYSTEMS

General Comments

There were more blank papers or copying of questions than usual. It was also noted that a high proportion of attempted questions had a mark of zero or very low marks, lowering the pass rates for some of the popular questions. This was particularly noticeable in a couple of centres. Apart from these anomalies, the standard has improved over the years. Time management is still a problem. A candidate obtains good marks in one question then does not have time for another. Candidates should be reminded of exam techniques. Bullet point answers are quicker and easier to write rather than a long piece of prose.

Question 1

A1. Taxi Company

A taxi/minibus company realised they were losing lucrative airport booking business as they did not have an on-line booking system. You are a member of a small software development company and have been asked to analyse the proposed system.

Records will be kept detailing the vehicles (taxis, minibuses), maximum number of passengers and driver details. More than one driver may be allocated to a taxi but not all drivers are eligible to drive certain vehicles, so driver details and availability are required. One driver will be responsible for the allocation of the vehicle and is designated as head driver. It will also be necessary to store airport distances and time allowances. All these details will need to be created, amended and deleted. Potential customers will be asked to register on the system by providing a username and password and contact details. Single or return bookings can then be made. The customer will enter the required airport destination, dates, number of passengers, flight numbers and flight details. The system will need to calculate the time span, check whether there is a suitable sized taxi available, ask for payment details and confirm the booking. Payment will be made either by debit or credit card. Charges will be made for use of a credit card. The system will need to use appropriate credit company payment checking software to ensure that a genuine card is being used.

(a) Give examples of the following techniques using the above example:

(i) Data flow diagramming including a context diagram and a high level data flow diagram **(8 marks)**

(ii) Entity relationship modelling **(3 marks)**

(iii) Rich picture **(4 marks)**

(iv) Entity life history **(3 marks)**

b) Describe the functions of a feasibility study discussing its position in the Systems Development Life Cycle.

(12 marks)

Comment

This was poorly answered. This poor figure was inflated by a number of zero attempts. Many candidates concentrated on airports rather than the taxi company and so missed the actual booking of a taxi. Many included a member as an external, which is the developer. Customer and passenger were accepted. Descriptions of the techniques were accepted even if there was no attempt to depict the models.

Answer points

Part a:

Only examples are required proving the student can use the techniques. The functions are provided and should be repeated.

External entities would be customer, credit card checking software.

Data stores would be required for all the external entities separately and would include booking, customer, airport details, taxi/minibus, driver details, and driver availability.

Entities: customer, booking, credit company, airport, vehicle, driver, driver availability, driver allocation

The rich picture would depict the external elements as described above. Conflicts would arise between the various functions when booking for example.

An entity life history could be drawn using any of the main entities e.g. booking, vehicle.

Part b:

The function of a feasibility study is to determine the feasibility, objective and boundary of the system relating to the terms of reference. Feasibility is measured in terms of economic/financial, operational, technical, legal and ethical feasibility. Benefits of the system need to be provided together with resources, time scales and staffing.

Question 2

a) Object oriented techniques are used to combine data and function, when analysing a system. Describe the following techniques using examples from the case study in question A1.
   (i) Type
   (ii) Class
   (iii) Inheritance
   (iv) Method **(12 marks)**

b) Relational data analysis techniques are used to define the system data. Define the following relationships drawing an example from the case study in question A1 using conventional symbols.

(i) Mandatory relationship
(ii) Recursive relationship
(iii) Optional relationship **(9 marks)**

c) Describe the functions of a Database Management System.

(9 marks)

Comment

This question was the least popular with less than a third of the candidates attempting it, with a very low pass rate. Object oriented and relational techniques should be understood and easy marks could have been obtained with the descriptions. Candidates were not able to describe a database management system, again a crucial part of computer technology and software.

Answer points

Part a

Type – models the common features of a set of objects, having the same feature of abstract type; e.g. character
Class – a set of objects that have the same structure, attributes and methods; e.g. vehicle
Inheritance – classes can be subdivided into subclasses that inherit the main characteristics of the class; e.g. Minibus inherits the main characteristics of vehicle but has its own attributes and possible methods.
Method – process or manipulation of the object; e.g. allocation (as in allocating driver to vehicle)

Part b

Mandatory relationship – this describes a relationship, which must exist; e.g. a booking must be made by a customer.
Recursive relationship is one where an entity is related with itself; e.g. head driver manages other drivers
Optional relationship is one where the relationship may not always exist; e.g. a driver may not be able to be allocated to a particular vehicle.

Part c

– A database management system (DBMS) is a large piece of software that is used in defining, creating, amending and deleting a company's data. All interaction with the data is via the DBMS. Conceptual modelling techniques such as entity relationship modelling are used to design the database. 4GL languages such as SQL are used to manipulate, present and define the data in an integrated development environment. The DBMS also provides security in terms of protecting certain data between users by using views, prevents unauthorised access, provides back-up and recovery mechanisms.

Question 3

a) In a typical organisation, information provided to management falls within three main areas.
Identify the types of information and typical systems used in each area.

(12 marks)

b) During the system investigation there are many ways of extracting facts from users. Identify three traditional different methods discussing their advantages and disadvantages. In addition discuss other more informal ways of obtaining the facts.

(12 marks)

c) Within an organisation, there are a variety of identifiable functions carried out by departments. Write brief notes indicating the brief functions of the following departments:
(i) Sales
(ii) Finance
(iii) Production **(6 marks)**

Comment

The most popular question, attempted by almost 90% of candidates with a reasonable pass rate. Several candidates described departments rather than management areas. As this is a common question, if they had looked at previous papers they would have been guided to the correct answer. Most of those who described the levels of management and differing software support answered the question well. Similarly with the fact-finding techniques, this part was answered well. Some had problems with knowing anything about business functions, an important part of information systems.

Answer points

Part a

Operational information is the lowest level of data used within an organisation. It is of timely, often daily, importance and is produced as a result of transaction process systems or office automation systems and is used by the lowest managers such as supervisors to ensure smooth processing.

Tactical information is the middle level. It consists of accrued information such as that produced weekly or monthly by management information systems and is used for such functions as financial reports indication the progress of the organisation.

Strategic information is at the top level often unstructured and is used by the executives to control the organisation. Information can be internal such as annual profit and loss or external such as the market forces and stocks and shares. It is produced by executive information systems, decision support systems or knowledge-based systems.

Part b

Interviewing – personal one-to-one discussions, structured, good for obtaining ideas and problems but reactive, time consuming, off putting.

Questionnaires – useful for obtaining detail from a larger clientele and many sources, but difficult to design, often not returned.

Observation – useful for identifying anomalies, obtain actual detail but can be disruptive and time consuming with the facts not being revealed due to fear of redundancy.

Other aspects – workshops, group discussions (JAD sessions), historical records, prototyping, brainstorming sessions, etc.

Part c

Sales – the basic function is that of selling products or services. Staff deal with customers and their requirements often in the form of orders, bookings or enquires. Efficiency of supplying these requirements is of paramount importance to an organisation. It is often allied with marketing and advertising.

Finance – often known as the Accounts Department. A company is in business to make money. The Finance department keeps track of that money and controls it. It deals with budgets, all the income and expenditure and provides information to all levels enabling decisions to be made ensuring the continuance and development of the company. It produces profit and loss accounts and balance sheets.

Production – this is often the main reason for the establishment of the business and deals with providing a quality product or a service. Normally it associated with converting raw materials into a saleable product in the most efficient and cost effective way, satisfying orders and demand.

Question 4

a) There are several ways in which users can be provided with a new system, depending on the type of system. Describe the following implementation methods indicating advantages and disadvantages and examples of when each would be used.
   (i) Parallel Running
   (ii) Direct Changeover
   (iii) Pilot System **(9 marks)**

b) The advent of networking and the use of trading over the internet have exposed corporate information systems to security issues. Prepare a report to your manager advising what steps the company should take with both the hardware and software to prevent loss of data.

(12 marks)

c) As part of the implementation or installation of a system, there are other aspects you need to consider. Write brief notes on plans which need to take place for the following:
   (i) Testing
   (ii) Training
   (iii) Data conversion **(9 marks)**

Comment

A popular question, attempted by almost 90% of candidates with a reasonable pass rate. Only those candidates with low results could not describe implementation methods. Security issues were too often confined to email rather than the prospect of fraud whilst trading over the internet. Surprisingly some candidates had no idea what training, testing or data conversion was concerned with as if they were not aware of the system development life cycle.

Answer points

Part a

Parallel running a system entails the running of both old and new systems side by side until the user is satisfied with the new system. It is costly in terms of time and effort but safer. Direct changeover can be used when, for example, a computerised system has not existed previously. It is cheap in terms of staffing and time but costly if not fully tested and a higher potential for failure. However if staff are trained well, it can work. Pilot, as its name suggests, involves running the system as a pilot in one part of an organisation. This is also costly but not as much as parallel running and is often used when several locations or systems are being implemented.

Part b

Security issues: - all aspects need to be included for both hardware and software, the environment in terms of organisational, logical and physical security.

Typical areas - usernames, passwords, roles, use of views, database management system features such as referential integrity, constraints, triggers, encryption techniques, pin numbers, virus scanners, firewalls, locks, computer room systems, back-up, fireproof safes, contingency plans, disaster plans, insurance, use of intranets.

Part c

Testing – testing should take place throughout the system development cycle. There are several testing methods such as module testing, top down testing, system testing, acceptance testing, performance testing. Etc.

Training – this will need to cover all users from the operational staff to top management. It should be formal as well as on-the-job. Timing is essential. They will need to be trained to use the system, recover from their errors, know how to backup, trouble shoot etc. Often done in parallel with data capture and file take-on. The production of user manuals.

Data conversion – once the system is ready for implementation, the data needs to be converted from the old system to the new according to well specified rules. It maybe that this means manual entry, as in the case of the taxi company in the case study or the downloading and conversion of existing data from the old files or scanning. It will also depend on the implementation methods chosen. A schedule needs to be drawn up to ensure the data is converted/loaded in time for the start of implementation.

Question 5

Large scale projects will be managed by a Project Manager.

What other roles / positions would you expect to have within a large scale project and why?

(12 marks)

Comment

For this question, candidates either answered it well or did not understand the question. Lots of the answers concerned the quality of project managers but the question asked for “other” roles.

Answer points

An open ended question but the following were expected to be included

Scribe
Quality Manager
Senior Developer / Developer
Tester
DBA
Etc.

Question 6

a) Discuss what is meant by a hard methodology, and name one hard method.
(6 marks)

b) Discuss what is meant by soft methodology, and name one soft method.
(6 marks)

Comment

This was a straightforward question and ha a wide range of answers.

One group of candidates stated that hard methods are used where the users are IT literate and soft methods are used where the users are not IT literate. This is not a commonly held view.

Answer points

a) One mark for any reasonable hard method (SSADM,RAD etc)

   Up to 5 marks for discussing hard methods, the emphasis of the discussion should be a structured, engineered solution within a semi strict structure. The system is developed by focusing on the data and processes.

b) One mark for any reasons soft method (SSM, Wisdom etc.)

   Up to 5 marks for a discussion that focuses on people and the more political aspects of systems design. The structure of the method will be less rigid and more akin to a framework

Question 7

Human Computer Interaction (HCI) is often seen as the most important part of the systems design. Outline what guidance you would give to the BCS if they were to produce a new website targeted at the country in which you live.

(12 marks)

Comment

This was an open ended question.

Answer points

Candidates did discuss radio buttons, drop downs etc but not many discussed how the web site might be affected by local constraints; e.g. poor bandwidth. A number of candidates did consider this and discussed the need to reduce the use of large objects (avi, flash etc.).

A number of answers also discussed what the BCS should sell on its site, rather than discussing the design constraints or guidelines.

Any reasonable comment will be awarded one or two marks.

Question 8

Prototypes are often seen as a useful tool for fact finding.

What types of facts can be established by using prototyping and how?

(12 marks)

Comment

A simple note dump on prototyping did not attract many marks. Candidates were expected to address the reasons for prototyping and what information is sought from prototyping.

Answer points

Examples of facts:

Screen layout and navigation.
Functionality required.
Scope of application
Etc.

Question 9

Web sites use a variety of multimedia to present information.

Outline three different types of media that could be used to present information, commenting on their strengths and weaknesses.

(3 times 4 marks)

Comment

A well answered question although a number of answers concentrated on TV, Radio as an answer even though the question said to exclude broadcast media.

A number stated video, flash, moving pictures as their three options, which are very similar media type, achieved in slightly different ways.

Answer points

A range of media is available, text, pictures, motion, sound, movie etc.

Example answer for a type of media; Text – easy to present, low cost / quick development, can take up a lot of the screen space, assumes that the visitor to the web site can understand the text etc.

Question 10

a) Outline the structure and stages of Normalisation so that the data is left in third normal form.

(6 marks)

b) It is then permitted to De-Normalise the data, why?

(6 marks)

A straight forward textbook question. Part a) was answered well, part b) was not.

Answer points

Six marks were awarded for outlining the stages with comments.

Up to 3 marks for awarded for a discussion on denormalisation and why; performance issues, tuning etc. Up to 3 marks for examples.

A classic example of denormalisation is shown by a fact table in data warehousing. Denormalising is a tool to enhance performance within queries where excessive table joins is an issue.

Question 11

a) Outline what you consider to be the best backup strategy for a database (not using RAID technology)

(6 marks)

Comment

Part a) was reasonable well answered apart although there were a number of traditional grandfather, father, son style answers.

Part b) tended to focus on the DBA doing the backup, which again is dated. Most DBA manage the process and not actually do the process. Again candidates were marked down for simply discussing the backup process and not the rest of the duties of a DBA.

Answer points

a)

Regular
Backup stored on another machine.
Transaction logging
Different physical locations
Etc

b)

Planning
Strategy
Education
Testing
Etc.

Question 12

Companies are now using the web to trap more and more data from their customers.

How would you design a web form so that it aided the customer to enter their data correctly?

(12 marks)

Comment

A relatively open ended question allowing the candidate the opportunity to cover a range of topics.

Answer points

General web site design was not the key aspect of this question although a few marks were awarded for good comments. A discussion on how to improve data quality by use of radio groups, drop downs, list boxes etc. was looked for. Two marks were given for each reasonable discussion on how this is achieved.