BCS HIGHER EDUCATION QUALIFICATIONS
Level 4 Certificate in IT

March 2012

EXAMINERS' REPORT

Information Systems

General comments on candidates' performance

The standard of attempts has improved. The pass rate for Section A has improved, although Question A1 was poorly answered (see comments below). There are not so many very poor attempts where the candidates had absolutely no idea how to answer the questions, and only a few blank scripts. The examiners re-iterate the point that providers should give more practical exercises and examples or we make the exam more theoretical.

Section A

A1. A town's local government wishes to encourage more investment in its town and wishes to offer more facilities. A new exhibition centre is going to be built as the current building is not large enough. More exhibition halls will be provided. Each hall will be capable of containing a specific number of stands. A specific number of tables and chairs are allocated to each stand depending on its size. Extra furniture and other requirements can be ordered.

A new computerised system is required to manage the centre, dealing with external caterers, specialist exhibition suppliers, event organisers and exhibitors.

A calendar of events has already been drawn up for the current building. An organiser (new or existing) wishing to run an event will contact the centre to check availability of date and number of halls required. On confirmation of availability from the centre, the organiser's details will be added to its database if they do not already exist. The number of halls and number of stands required and booking date will be entered on to the system. Prior to the date of the exhibition, the names and numbers of exhibitors need to be recorded, specialist furniture may need to be ordered and catering facilities need to be organised. If the exhibition is a success, the exhibitors will be asked to add or confirm the date for the calendar for future years.

a)

i) Draw a Context Diagram identifying the main entities.

(6 marks)

ii) Draw a Dataflow Diagram identifying the main processes.

(6 marks)

iii) Draft an Entity Relationship diagram for the above giving an example of optionality, which may occur and identify and resolve any many to many relationships.

(8 marks)

b) Briefly describe what is meant by the following:

i) Systems Analysis

(5 marks)

ii) Systems Design

(5 marks)

Indicative answer pointers

a)

(i) The external entities are: External caterers, specialist exhibition suppliers, exhibitors, event organisers.

ii) Processes: Checking availability, confirm booking, record event details, order appropriate furniture, arrange catering facilities, book future events.

iii) ER model: Organiser, event, event booking, hall, stand, furniture. There is a many to many between hall and event (event booking) and optionality between furniture and event booking.

Organiser (org no, name), Event (event no, name, org no, start date, end date), Hall (Hall no, name), Event Booking (Booking no, event no, hall no, stand no), Stand (stand no, size)

b) System analysis covers the investigation of the current system, identifies bottlenecks and problems and captures all the features required by the users, documents them using techniques such as data flow diagrams, logical data models, entity life histories. CASE tools are used. System design deals with the physical elements, such as process/module, database, screen/interface and report designs using database management systems.

Examiners' comments

About half of the candidates attempted this question with only about a third achieving an overall pass mark. As a third of this question was a simple description of systems analysis and design, this is rather low. Very few candidates were able to draft even a simple entity relationship model. As usual, processes were invented, in particular invoicing and payments. Several candidate confused analysis with analyst and described the job rather than the process, but this was taken into account.

A2. a) You have been asked to interview the current exhibition centre manager from question A1, one of her clerical administrators and the technical manager. Describe how you would prepare for a formal interview with each of these and give examples of the type of information you require from them.

(9 marks)

b) Give examples and briefly describe other fact finding techniques you could use in investigating the current system and say how would use them.

(8 marks)

c) Describe the differences between the ‘domain of change’ and ‘domain of computerisation’.

(4 marks)

d) Briefly describe the following prototyping techniques:

i) Evolutionary

(3 marks)

ii) Throwaway

(3 marks)

iii) Staged

(3 marks)

Indicative answer pointers

a) The three interviews will need the same structure, an introduction, the reason for the interview, the questions, an open ended discussion and conclusion. The information required however will be different. The centre manager would provide the strategic overview of the requirements including budgets/time allocations, the administrator the detail processes and problems (operational) and the technical manager more tactical information concerning the technical detail.

b) Observation – observing the various processes, record sampling – obtaining the detailed records that have been kept, questionnaires – obtaining facts and ideas from existing event organisers as well as the administrators, prototyping – in particular story boarding etc.

c) Domain of change – the areas under study that may change in light of the new requirements. It can be shown within a dataflow diagram by using a dotted line. The domain of computerisation refers to the areas within the domain of change that are actually going to be computerised. The main difference is that the domain of change includes manual processes that may not be part of the computerised system.

d) Evolutionary – this a progressive method whereby the requirements are identified, the prototype developed discussed with the user and change made in an evolutionary manner The system is then developed with enhancements such as security. A throwaway prototype is used to provide the user with an idea of what the system will look like and how it may behave. It is not developed but discarded; however users’ comments have been obtained and are useful feedback. Staged or phased prototypes are prototypes developed either for a small part of the organisation and used to test the system before it is released or for an element of the system building up to all the requirements.

Examiners’ comments

Half the candidates attempted this question, with an overall improved pass rate of approximately half. This would have risen if many candidates had not lost sight of the fact that it was information and the system processes that were required in part a), not the qualifications or the building details. Some answers made reference to the different levels of information - marks were awarded for this. Parts b) and d) were answered well, but very few candidates attempted part c).

A3. a) Write brief notes describing the stages and techniques in the following:

i) Object Oriented Methodology

(8 marks)

ii) Rapid Application Development

(8 marks)

iii) An entity life history contains three constructs. Identify these and explain their purpose.

(6 marks)

b) The following is a copy of the current booking form for an event. Normalise the form into third normal form (TNF), identifying the relations, primary and foreign keys. You do NOT have to show your workings.

(8 marks)

Event	Title	Start Date	End Date	Event Organiser	Organiser's Name	Hall	Hall Name	Stand	Size
1	Clothes Show	2/2/12	9/2/12	1	BBC	1	Main	1	20
1	Clothes Show	2/2/12	9/2/12	1	BBC	1	Main	2	30
1	Clothes Show	2/12/12	9/2/12	1	BBC	2	Minor	1	15
2	Good Food	10/2/12	15/2/12	2	Cookery School	1	Main	1	20
2	Good Food	10/2/12	15/2/12	2	Cookery School	2	Minor	1	15

Indicative answer pointers

a)

(i) OMT (Object Modelling Technique) is an example of the OO modelling technique. The method follows the modelling and development stages of a system. Object models describe the class and relationships within the system, dynamic model – what happens; functional model – the functions, UML – unified modelling language. Diagrams such as class, use case, sequence, and collaboration are used.

(ii) For example, DSDM. This is an iterative prototyping approach to development and has several stages. Initial proposal and feasibility, business processes and data, functional model iteration – understanding the functional model in an iterative approach in close liaison with the users, design and build, implementation. Techniques include workshops, JAD and JRP sessions, priority of requirements and time boxing

(ii) Sequence – all events happen in strict sequence, each event following the next.
Selection – a choice of events occur, all events occur but not together,
Iteration – an event is repeated until a certain state is reached.

b) Relations are: Event (PK event number, start date, finish date, FK event organiser, Event Organiser (PK Event organiser number, name), Hall (PK Hall

number, name), Stand (Stand number PK, size), Event Booking (Event booking number (PK), event number (FK), hall number (FK), stand no (FK). The assumption has been made that all stands are standard according to their number.

Examiners' comments

This was the least popular question, probably due to the inclusion of normalisation. Less than a third of the candidates attempted it, with a pass rate below half, which considering the poor answers for part b) is encouraging. A description of three stages of normalisation was accepted, but very few relations were identified correctly. More practice is required by the candidates.

A4. a) Highlight the main functions and differences of the following:

i) A database management system **(8 marks)**

ii) A data dictionary **(6 marks)**

b) Briefly describe what would typically be contained in the following documentation:

i) Feasibility Report **(4 marks)**

ii) System Specification **(4 marks)**

iii) Technical Specification **(4 marks)**

iv) Security and Recovery Report **(4 marks)**

Indicative answer pointers

a)

(i) A database management system is a piece of sophisticated software which contains an organisation's data and is used to manipulate, calculate, display and report on the data. It contains the data dictionary definitions. It ensures security, integrity, backup, consistency etc

Current DBMS are based on the relational model; previous versions were based on hierarchical and network models.

(ii) A data dictionary is used to store and manage the data definitions (metadata) of all elements resulting from the investigation. It is a shared repository. It supports standards. It separates the data definitions from the processes and acts as documentation.

b) A feasibility report will contain the overview of the project. Its function is to prove feasibility is terms of economic, social, legal, technical and operational aspects. It will be presented to management for approval before the full analysis, design and development can begin. The system specification will contain the result of the investigation using system analysis techniques. The results of the methodology used will be recorded e.g. dfds, erds, class

diagrams as appropriate. The physical system in terms of the database, e.g. table, screen/interface, program/module and report design will also be documented. The technical specification will contain details of the hardware, software and network configuration, installation guidelines, maintenance contract details, contact details etc. The Security report will contain all the procedures for security, access rules and roles, recovery processes for the data, the system definitions and the hardware (disaster recovery plans).

Examiners' comments

This was the most popular question and a good pass rate of over half. However, not many candidates knew the functional part of the database which is essentially a dictionary. There was also some confusion between the system specification and technical specification, but most identified the contents of the feasibility and security reports.

Section B

B5. a) Define what is meant by the term CASE.

(3 marks)

b) Discuss how a CASE tool can improve the process of developing an Entity Relationship Diagram.

(9 marks)

Indicative answer pointers

a) Three marks for explaining

CASE – Computer Aided / Assisted Software Engineering

Software that assists with life cycle of an application, could aid with design, development, testing etc.

b) The case tool should:

Aid with the drawing of the diagram
Understand the meaning of the symbols of the diagram
Syntax verify the diagram
Understand the syntax and process of creating the diagram
Prevent diagrams that do not conform to the diagram ruling
Generate the SQL to generate the tables
Generate the SQL to create the PK / FK etc.
Perhaps generate test data for the tables.
Fully document the diagram

Examiners' comments

The definition of CASE was reasonably well answered, and there seemed to be a lot of note dumping. This led to part b) being poorly answered as again there was a lot of note dumping of different types of CASE tool, rather than explaining how the quality an ERD can be improved by using a tool.

B6. What is meant by the following methodology related terms?

a) Hard Method

(4 marks)

b) Soft Method

(4 marks)

c) Hybrid Method

(4 marks)

Indicative answer pointers

a) For example, SSADM - Traditional method, data centred, consistent with automating a paper based system, they were seem to be an engineered solution, tried and test method

b) For example, Soft Systems Methods – More recent style. Method tries to solve a problem which people in mind, or where there is a less clear solution. The method looks more at the social and politics areas, than a straight engineered solution.

c) An approach where elements from a number of different methods are customised to meet the requirements of a particular project. Agile could be used as an example, but the basic idea is that there is no one idea method that can be used for all projects.

Examiners' comments

Parts a) and b) well answered.

Candidates understood what was meant by part c) but provided one sentence answers, and therefore did not gain full marks. Where the question stated four marks, candidates need to ensure that they provided more detail.

B7. Discuss two different styles of software testing.

(2 x 6 marks)

Indicative answer pointers

This was an open ended question. Black box and white box were acceptable testing methods.

White-box testing (also known as clear box testing, glass box testing, transparent box testing, and structural testing) is a method of testing software that tests internal structures or workings of an application, as opposed to its functionality (i.e. black-box testing). In white-box testing an internal perspective of the system, as well as programming skills, are required and used to design test cases. The tester chooses inputs to exercise paths through the code and determine the appropriate outputs. (taken from http://en.wikipedia.org/wiki/White-box_testing)

Black-box testing is a method of software testing that tests the functionality of an application as opposed to its internal structures or workings (see white-box testing). Specific knowledge of the application's code/internal structure and programming knowledge in general is not required. Test cases are built around specifications and requirements, i.e., what the application is supposed to do. It uses external

descriptions of the software, including specifications, requirements, and designs to derive test cases. These tests can be functional or non-functional, though usually functional. The test designer selects valid and invalid inputs and determines the correct output. There is no knowledge of the test object's internal structure. (taken from http://en.wikipedia.org/wiki/Black-box_testing)

Examiners' comments

Again, a reasonably well answered question but again the majority of answers were short only providing one or two points about the testing technique.

There also was a tendency to note dump a number of different testing style (sometime 10 or more) which meant that credit was given to the first two mentioned and the rest of the answer was ignored.

Note dumping will gain some marks, but to gain higher marks the question needs to be read and answered.

B8. a) Discuss what is meant by the following related terms, providing one advantage and one disadvantage of each:

i) WIMP **(3 marks)**

ii) GUI **(3 marks)**

iii) Command Line **(3 marks)**

b) Are all GUIs WIMP? Give reasons for your answer. **(3 marks)**

Indicative answer pointers

a)

i) WIMP is Windows, Icon, Mouse and Pointer
Advantage – use of graphical interface and mouse to assist the user
Disadvantage – may require training and additional computer resource

ii) GUI is Graphical User Interface
Advantage – Similar to WIMP, but does not always need extra hardware (i.e. mobile phone)
Disadvantage – could be touch interface, and the problems of small icons and large fingers

iii) Command Line
Advantages – Quick to use, no need for high res screens and software
Disadvantages – All commands need to be known by the user, no help from front end

b) A GUI is a subset of WIMP, and so the answer is yes, but without the mouse and the pointer.

Examiners' comments

Some well answered questions.

The examiner was not too strict on part c) as this was this first time this question was asked. Some marks were awarded where the candidate has put no, but had put some reasonable arguments why they thought it was no. A no answer could not gain the maximum mark but did show that the candidate was thinking about the subject, rather than simply note dumping (which was the point of the section).

B9. What would you consider to be the main duties of a software development project manager?

Indicative answer pointers

Not an exhaustive list, but one or two marks for each relevant point

Development of the project plan and associated risk logs
Development of the project schedule and tasks.
Allocation of resources to the tasks.
Management of the project budget.
Management of the user expectation, and be the initial interface between the project team and the users
Deal with any conflicts that arise.
Management of the project team
Manage the project deadlines.

Examiners' comments

A number of answers equated this with the software development lifecycle and stated that a project manager had to basically cover the steps of that life cycle rather than manage a project.

There were some questionable aspects of what a project manager did (line manger staff, conduct appraisals etc.). This might be for the organisation that the candidate works for, but cannot be applied to all project managers. I would also suggest that on larger scale projects, project managers would not be involved in every task of the software development lifer cycle, some answers suggested they coded, tested etc.

B10. What is meant by the following related terms?

a) Hypertext **(4 marks)**

b) Hypermedia **(4 marks)**

c) Multimedia **(4 marks)**

Indicative answer pointers

a) Hypertext uses hyperlinks to link to other text that the reader can access (by a mouse click / keys). Hypertext may contain tables, images and other

presentational devices. Hypertext is the underlying concept defining the structure of the World Wide Web

b) Hypermedia is an extension of hypertext allowing graphics, audio, video etc to be included. Its structure is none linear allowing the user to choose where they go / read next. Its structure is used by the WWW.

c) Multimedia is media and content that uses a combination of different content forms to educate or entertain. The content ranges from text, pictures to film and video. Multimedia is not as confined as hypermedia.

Examiners' comments

For parts a) and b) the examiner was fairly strict when an answer simply stated that these were part of the world wide web / Internet. The WWW does use both terms, but both terms were in use long before the Internet.

A large number of answers suggested that these were internet protocols, which is wrong and so scored poorly.

Part c) was well answered.

B11. a) Discuss the organisational structure of a typical company.

(8 marks)

b) What additional departments would you expect to find in a company that developed software?

(4 marks)

Indicative answer pointers

a) There are a number of right answers to this question including the following roles

Managing Director
Finance director
Sales director
Marketing Director
Personal director

b)

One mark for any reasonable department, NOT job descriptions

Programming
Hardware support
Data Processing
Database
Information Systems / Services

Examiners' comments

Part a) was reasonably answered. Marks were given for matrix style departments and management, and for regional structures.

Part b) tended to be a note dump on the different roles within a software company rather than the departments

B12. Describe was is represented in the following diagrams and draw an example of each

a) Scatter graph **(4 marks)**

b) Pie chart **(4 marks)**

c) Bar Chart **(4 marks)**

Indicative answer pointers

a) A series of points plotted via X and Y axis. The idea being to see if there is a correlation between the various points plotted. If there is, a line is drawn to indicate the correlation

b) A circle which is divided into slices to indicate how much of the whole is represented by the slice.

c) A series of bars are drawn to indicate the amount that each topic shows

Examiners' comments

A number of answers drew the charts but forgot to include a legend / key so that the various aspects of the charts could be understood.

Pie and bar charts were reasonably clearly understood. Scattergraph was the weakest.

A number of answers mapped this to techniques used by project managers to manage projects (gannt, pert etc), which was not asked for.