

**THE BCS PROFESSIONAL EXAMINATION  
Certificate**

**April 2003**

**EXAMINERS' REPORT**

**Information Systems**

**Question 1**

1. Two large national Video/DVD rental companies have merged. You have been assigned as a member of the team which has been employed to investigate the current business activities and information systems that support them.
- a) Briefly outline an approach to managing this project and controlling the investigation and subsequent development of a common integrated system. **(15 marks)**
  - b) Give an example of TWO control techniques often used in project management. **(6 marks)**
  - c) You have been assigned to obtain facts from members of staff at all levels. You have been warned that although the management fully supports your investigation, you must plan with care. Prepare a plan describing a fact-finding strategy containing at least THREE different techniques. **(9 marks)**

**Answer Pointers**

- a) A bookwork question involving project management and control. Items to be mentioned include –
  - Investigation, analysing alternatives, choosing and selecting course of action, evaluating and reviewing choices and actions.
  - Set objectives, plan strategies, make decisions, allocate and execute tasks, obtain feedback, monitoring and control.
- b) PERT/Gantt charts – a short example and explanation of each was looked for.
- c) Interviews, questionnaires, sampling, observation – each of these has a place in an investigation.  
Strategic selection of members of staff and combination of the above is expected.

**Question 2**

2. a) Compare and contrast the following, giving appropriate examples:
- i) Relational Table – Indexed Sequential File **(5 marks)**
  - ii) Hypertext Mark-Up Language (HTML) – 3<sup>rd</sup> Generation Language **(5 marks)**
  - iii) Narrative Specification Techniques – Graphical Specification Techniques **(5 marks)**
- b) Write brief notes on the following:
- i) CASE and its role in prototyping **(5 marks)**
  - ii) An Expert System **(5 marks)**
  - iii) Object-Oriented Concepts **(5 marks)**

## Answer Pointers

- a) i) A relational table is considered a flat file and is based on Codd's rules and data modelling techniques. Accessed only using SQL (structured query language). An IS file is organised and accessed using hashed indexes.
- ii) HTML is the language used to design web pages and other documents, with all the necessary hypertext links to other pages and documents. 3GLs are programming languages such as ADA, COBOL, C, PASCAL are used in traditional systems development. They are imperative, structured and more suited to sequential systems development methods within the SDLC.
- iii) Narrative specification techniques range from natural language through pseudocode or Structured English to formal methods and are used to specify processing functions of a program, routine or module. Graphical techniques, such as flowcharts, decision tables, decision trees, dfds, etc are used to pictorially specify processing functions.
- b) i) CASE – Computer Aided Software Engineering tool reduces development time and assists in the production of a prototype using an Information Engineering or Structured System approach. Tools support a particular methodology such as SSADM. Prototypes may be of varying degrees of sophistication ranging from dummy to pilot. A prototype is defined as a representative and working model of an information system designed to be evaluated by the ultimate end-users. By using CASE tools with built in methods, the production of a prototype is quicker and more stable, although disadvantages can occur such as the user may not see the need for further development on what they see as a user tool rather than a prototype.
- ii) An Expert system is one that acts or behaves like a human expert in a particular field, with the facility to replicate the expert's knowledge. It consists of a knowledge base, using deterministic rules and semantic networks, an inference engine which seeks information relationships from the knowledge base, and a user interface which interrogates and displays the knowledge. Examples are: MYCIN (medical diagnostic), ACE (Management of telephone networks), Programming software – Crystal
- iii) This is an approach to a familiar problem of how to store and process information, in its various modern guises. Definitions of objects, classes, messages, methods, instance, class hierarchy and the concepts of encapsulation and inheritance etc are expected.

## Question 3

3. a) Information is said to be the most important resource within a business organisation. Briefly discuss how the information flows in a typical organisation hierarchy giving examples of the type of information at each level. **(6 marks)**
- b) Define what is meant by each of the following:  
i) Executive Information System  
ii) Management Information System  
iii) Transaction Processing System **(9 marks)**
- c) Draft a report explaining how multimedia applications could be used on the internet to increase a business's market and to give it a competitive advantage. **(10 marks)**

- d) As a member of the British Computer Society, you must be aware of the legal and ethical issues when developing on-line applications. Outline what precautions you must take during such a development to ensure that the application conforms to these legal and ethical issues. **(5 marks)**

### Answer Pointers

The first part of the question was looking for a standard bookwork explanation of information flows; that is, the lower in the organisation the more detail the information is and the higher up the organisation the more consolidated/abstract.

The second part of the question related to the type of information system that is necessary to support the information needs of the organisation hierarchy and as such required standard definitions of the terms.

Whereas the first two parts of the question were primarily book work, this part was looking for the candidate to show evidence of understanding and appreciation of how more modern developments could be utilised within an organisation.

In the final part, the examiners were looking for evidence that the candidate knew and appreciated some of the legal/ethical issues that need to be considered when developing information systems. Candidates were not expected to be able to know all the legislation with dates, but more the broad areas covered by the legislation.

### Question 4

4. a) A Systems Analyst is traditionally responsible for investigation of a project from initiation to implementation. Throughout each phase of a structured methodology, various techniques are used. You are required to describe, giving examples using a named methodology with which you are familiar, the following techniques:
- i) Dataflow Diagrams **(5 marks)**
  - ii) Entity/Relationship Modelling (Logical Data Modelling) **(5 marks)**
  - iii) Normalisation **(5 marks)**
- b) Implementation and transfer of data from an existing system to a new system is an extremely important function. There are several approaches that can be used. Outline at least THREE different methods and indicate what actions need to be taken to ensure a good professional and trouble free changeover from the current system to the newly developed one. **(15 marks)**

### Answer Pointers

- a) Good examples of each technique should show how, for example, dataflow diagrams decompose via a top-down approach from Context to High Level and Lower level diagrams. The conventions of external entities, data stores, data flow and process according to the method chosen should be drawn. A data model with entities, relationships, attributes, primary and foreign keys indicating the type of relationship (one to many, one to one and many to many) is required. Normalisation showing the rules from 1<sup>st</sup> to 3<sup>rd</sup> normal form, maybe with some indication of further refinement to produce stable relations.
- b) Typical methods are direct, pilot, phased approach to implementation - each should be described. There are other factors which need to be included such as completion of system testing, training, site preparation and installation, setting up of networks, take-on of data, evaluation of systems, review and maintenance etc

### Question 5

5. Certain data-centred analysis techniques (see below) are often confused and used inter-changeably. Briefly describe EACH of the following techniques.
- a) Data Warehousing
  - b) Data Mining
  - c) OLAP (On-line analytical processing) and
  - d) OLTP (On-line transaction processing)

(4 x 3 marks)

### Answer Pointers

A data warehouse is a database containing data that usually represents the business history of an organisation. This historical data is used for analysis that supports business decisions at many levels, from strategic planning to performance evaluation of a discrete organisational unit. Data in a data warehouse is organised to support analysis rather than to process real-time transactions as in online transaction processing systems (OLTP). OLAP technology enables data warehouses to be used effectively for online analysis, providing rapid responses to iterative complex analytical queries. OLAP's multidimensional data model and data aggregation techniques organize and summarize large amounts of data so it can be evaluated quickly using online analysis and graphical tools. The answer to a query into historical data often leads to subsequent queries as the analyst searches for answers or explores possibilities. OLAP systems provide the speed and flexibility to support the analyst in real time.

### Question 6

6. Some organisations store their operational and strategic data on a central database, alternatively some organisations have a de-centralized approach by which they allow individual departments to store their operational data on local databases held within the department.
- a) What are the benefits of the centralized approach? (6 marks)
  - b) What are the benefits of the de-centralised approach? (6 marks)

### Answer Pointers

Centralised – consistent, easy to gather stats data, data integrity, etc  
De-centralised – autonomous working, specific views, targeted reports, economic down-scaling

Hybrid approach suggests software managed replication of data at different levels but mainly by the DBMS server support (e.g. Oracle8i functionality). Some discussion on the differing needs of operational and strategic data; i.e. operational needs replication with transactional consistency (minimum latency etc)

### Question 7

7. A college library uses an information system to process transactions such as those listed in **Table 1** below. The transaction data is stored and processed by a spreadsheet package. Each column on the spreadsheet represents a field and each row represents an individual transaction record. Each transaction has a unique transaction number which reflects the row number of the spreadsheet. The spreadsheet package is programmed to allow users to 'look-up' related data (e.g. names of borrowers) which is held on other parts of the spreadsheet.

Transact Number	Transaction type	Trans-action date	Librarian	Borrower ID	Borrower Type	Book Number	Amount
10234	Book Loan	1/03/02	McKee	23	Student	1242	
10235	New Member	1/03/02	McKee	77	Staff		7.50
10236	Book Loan	1/03/02	Mistry	2	Student	1240	
10237	Book Purchase	1/03/02	McKee	1		3009	9.99
10238	Book Return	2/03/02	T.Young	21	Retired	1238	
10239	Fine Paid	2/03/02	T.Young	21	Retired	1238	0.50
10240	Book Purchase	2/03/02	T.Young	2	Student	3010	12.95
10241	Book Return	2/03/02	T.Young	2	Student	1240	
10242	Book Loan	2/03/02	McKee	77	Staff	3010	

**Table1**

Describe the problems that could occur by using a spreadsheet rather than a database to store and process the above transactions.

**(12 marks)**

### Answer Pointers

Lack of data independence

Difficult to check the integrity of the transactions.

There is redundantly duplicated data causing inconsistency and loss of data integrity

Difficult to reference related but constantly changing data (e.g. the status of a loan)

### Question 8

8. Describe the function of the following web-based user interface facilities:

- Style Sheets
- Image Maps
- Java Applets
- Frames

**(4 x 3 marks)**

### Answer Pointers

Style sheets – linked Text/CSS supports universality of fonts /colours and applies inherited features from other URLs.

Image Maps – rollover image linked to URL or text

Java applets provide 'gauche' to a web site. Simply put the Java VM runs a java program downloaded from a server on the client in the clients own address space. Thus no downloads/addins

Frames allow a browser window to be divided into multiple (rectangular) regions.

Different documents can be displayed in a single window, each within its own frame, and browsers allow these frames to be examined independently of each other.

### Question 9

9. Describe the characteristics of the software development tools that could be used to help build an information system containing significant static and animated image content.

(12 marks)

### Answer Pointers

The question emphasised "static and animated image content" so it was important that candidates demonstrated in their answer knowledge of image/graphic formats such as JPEG, GIF, raster, vector, etc and how these are handled in software development tools.

### Question 10

10. What security issues need to be considered when developing an e-commerce application for the internet?

(12 marks)

### Answer Pointers

Areas such as encryption, firewalls, virus checkers, physical security, user identification, etc as well as user education were looked for in the candidate's answer.

### Question 11

11. Describe THREE methods that could be used to test the processing logic of the user interface of a highly interactive information system.

(12 marks)

### Answer Pointers

The important point to this question was the "highly interactive information system". Candidates should therefore have described approaches that were suitable for this type of environment as opposed to a traditional batch processing environment, for example.

### Question 12

12. Part of an order processing system is dedicated to handling customer telephone enquiries about the supply of products. In particular, a user often enquires about invoices - on many occasions products have not been received despite appearing on a customer invoice. To counter complaints made by customers, a web-based enquiry system is to be developed allowing customers to query their own orders on-line and view the data returned from enquiries via a web browser. A prototype is to be developed and evaluated.

a) Draw the enquiry screen and the resulting display screen for the prototype.

(4 marks)

b) Comment on the features of your design that demonstrate it is suitable for users with a range of computer experience.

(8 marks)

### Answer Pointers

The screens need to show the functionality of GUI controls and interaction modes appropriate for an enquiry/result screen. Examples of what would be appropriate for a novice user and an experienced user should also be included.