THE BCS PROFESSIONAL EXAMINATION
Certificate

April 2000

EXAMINERS' REPORT

Information Systems

General Comment
Examination technique was lacking in a significant number of scripts. Candidates should remember that a fuller answer is required for a ten-mark answer than for a three-mark answer, for instance. Examiners have to be able to read the answers - writing an answer down so fast that it is not readable only harms the candidate. Candidates should read the questions carefully and answer what is being asked, not what the candidates would like it to ask.

The marks awarded to the questions in section A were very similar. While the overall average mark of section B was similar to section A, there was a greater variation between the questions with those questions addressing newer topics (e.g. question 8) or requiring to apply knowledge (e.g. question 9) being answered poorly.

Section A

Question 1

Marking Scheme

a) Feasibility involves economic, technical, operational/social issues, tangible and intangible benefits. Examples of techniques used should include some costing practices such as break even costing, discount cash flow etc. Other techniques inevitably mentioned will include fact-finding, project management and control, structured methodologies, etc.

b) Examples are required to show that candidates have an understanding of simple analytical skills. Candidates should be able to identify dataflow and the transactions/processes involved in a service station - similarly identification of typical entities and the use of normalisation to support the design stage. A discussion of each technique was also expected - e.g. DFDs consist of a hierarchical decomposition of external entities, dataflow, data stores, and processes; the highest level is a context diagram. Entity modelling involves the identification of entities, attributes and relationships, degree and contingency of relationship to build a logical data model. Normalisation produces stable relations, removing repetition, partial and transitive dependencies to build a relation data model.

Question 2

Marking Scheme

a) Answers should include a professional approach to defining staff responsibilities. Typically -chains of command, definition of the management structure, definition of jobs, an appraisal system, training, good project management/control system, review the networking infrastructure, consolidate the hardware and software etc.

b) A thorough investigation was required and a mixture of techniques could be employed; e.g. designing a questionnaire to obtain details of current systems used, interviewing staff in all departments at all levels to discuss their hardware/software requirements in detail, observing staff to see if training schedules need to be implemented and sampling input/output documents.

c) Security should cover both accidental and deliberate breaches within the network. The use of passwords, levels of users, roles, regular updating of requirements, introduction of rules and perhaps a form of intelligence within the system would all be advantageous. Physical systems such as secure rooms with physical access control, introduction of fireproof safes to store back-ups, power surge detectors, back-up generators etc. could all be mentioned.

Question 3

Marking Scheme

a) Issues being looked for included ease of use, clarity, simplicity, common look and feel, use of suitable icons, good help facilities, awareness of good and bad use of colour, positioning, quantity of detail per screen etc.

b) Candidates were expected to show how test plans could be used to organise the testing of logic and paths either with a top down or bottom up approach (white box) and focus on the task by treating the code as a black box and testing the input and output. Good validation techniques, modular design, performance testing etc. could also be addressed.

c) Either direct or possibly pilot methods would be the most appropriate method, though each have advantages and disadvantages. Direct - simple but could be very costly and a risk if the system has not been tested thoroughly. Pilot - installing the system for a selected number of users allowing feedback does have some risk but would probably be the most advisable allowing the functionality to be tested although as all users would not be introduced performance issues may not be known. A parallel system is the safest but would not be as expedient as it entails running both systems side by side in case of problems which is costly in terms of time. Evidence that the candidate understood the options and could argue a reasoned case was important.

Question 4

Marking Scheme

a) The three main levels are strategic, tactical, and operational which can be illustrated using the hierarchical triangle. Strategic information identifies such criteria as trends and patterns and assists with the decision making process (DSS systems, financial modelling) and is used for long term strategy. Tactical information tends to be summative and factual, allowing for some prediction of future trends and is used to control the organisation's functions and processes. It is timely, i.e. monthly, quarterly or annual and forms part of the management information systems (MIS). Operational information is the day to day detail required to control, monitor and carry out the business functions - typically dealt with as transaction processing systems (TPS).

A typical example would be a purchase order process being dealt with by a supplier clerk at the operational level, the accumulated purchases made each period being produced by the accounts management at the tactical level while top management make the strategic decision to change their buying/purchasing/stocking policy to 'just-in-time'.

b) There are several methods such as waterfall method, structured methods (e.g. SSADM, YOURDON), Soft systems (e.g. ETHICS, RAD). A description of two of the techniques was expected.

c) Again several tools exist e.g. CASE tools, project management tools, 4GLs, data dictionaries/repositories, drawing and documentation tools, Database Management Systems, OO tools.

All are expected to increase productivity, provide documentation, support the development life cycle, allow easier maintenance, support standards, provide quality solutions, improve the opportunity for control and consistency.

Section B

Question 5

Marking Scheme

a/b) Suitable definitions are as follows with the file equivalents in brackets:

Identifier - a field or attribute used to uniquely identify a row (equivalent to Unique Index/Key)
Domain - a column of values with same data type (equivalent to Field)
Tuple - a row in a table (equivalent to a record)
Logical = relations, Physical = files - could be same object referred to in different ways

c) Physical and Logical data - Logical data is the perceived view of the data (e.g. a relation/table) whereas Physical data is the storage level view seen by the DBMS (e.g. files, pages, index structures).

Generally gave poor definitions were given for parts *a)* and *b)* and really not specific to relational model. There were many definitions of the term Domain unrelated to information systems. It is important that candidates consider the context of the question when answering definitions.

Part *c)* in the main was poorly answered with a range of answers often dealing with bits/bytes and with no understanding of database schema architecture

Question 6

Marking Scheme
This question was asking about the functionality of distributed information system architectures rather than just simple definitions. Suitable descriptions were

File server - access to data and software via local area network with an independent domain. Download information through an application launcher. No inter-process communication.

Client server - process to process communication with a central database server making a file server obsolete. The user simply runs tasks as processes so there is no download of software.

Corporate Intranet - much like a client server apart from limited application serving.

Marks were awarded for understanding the differences architecturally as well as user views. Not many candidates grasped the central idea of access to distributed data as 'processing objects' rather than entire files distributed over a network. The corporate intranet was not clearly distinguished from the other architectures in terms of being a specialised (thin-client)

version of a client server. Information about access controls and security which are pertinent to users, was often missing.

Question 7

Marking Scheme
The PrimaryKey is a row identifier which could be a ForeignKey in another Table. The ForeignKey enforces entity constraints.

A Stored Procedure is a procedure stored in the database and activated on a server machine for efficiency.

An Event Procedure is a user interface procedure. It is none persistent and runs as a program on the client machine.

RAD and SSAD are two very distinct methods of system design. An indication of the different software design life cycles (i.e. incremental design and delivery versus structured) was looked for.

Candidates answered parts *a)* and *c)* well with good examples.

Part *b)* was poorly answered with many candidates unfamiliar with the terms which are specific database programming concepts common to client server database platforms. Some candidates recognised that the term 'Trigger' was an alternative term to Event Procedure. However, the fundamental difference was missed, being that a stored procedure is invoked by a database operation, whereas an event procedure is triggered by a user event (e.g. by clicking a button). Other points about where these procedures are invoked (i.e. from a server (SP) and/or client (EP)) was absent.

Question 8

Marking Scheme

a) Data Warehousing supports informational processing by providing a platform of integrated, historical data for analysis. It provides integration in a world of unintegrated application systems. Data warehousing can organise and store the data needed for informational and analytical processing over a long period of time.

b) Data Mining is the analysis of data for relationships that have not previously been discovered. For example, the sales records for a particular brand of tennis racket might reveal information relating to other market data such as historical or seasonal correlation.

c) E-commerce is basically the buying and selling of goods and services over the Internet.

d) Access and presentation of music and video over the WWW would include discussion of different file formats and the use made of such information downloaded from the WWW as well as capacity and copyright issues.

Despite being based on contemporary knowledge/experience most candidates performed relatively poorly on this question. In particular, answers to parts *a)* and *b)* showed very little knowledge of the topics other than the names.

Parts *c)* and *d)* revealed better knowledge but in the main the answers to these parts were superficial and not very informative.

Question 9

Marking Scheme
Any of the column headers would be an attribute type being an attribute of a table definition.

RESORT NAME is an attribute that determines a particular AREA. An extra mark was awarded for giving the reason why this was the case (i.e. given an AREA, a corresponding unique RESORT NAME can be determined) since there was more than one corresponding attribute.

Resort will always have the same Area so therefore redundant duplication of data values.

Price though can have the same value (719) but is a non-redundant duplication of data values.

In the main candidates were uncomfortable with this question even though only a basic understanding of the motivation behind normalisation was required.

For parts *c)* and *d)* many candidates simply listed the set of records without indicating the redundant or non-redundantly duplicated data values.

It is very important in this type of question that candidates give the answer and also a justification for the answer so that the examiner can distinguish between guesses and understanding.

Question 10

Marking Scheme
Acceptable explanations were along the following lines:

Index Sequential - locate via an index and add if index value is distinct
Inverted file - locate primary index and follow pointer chain for insertion point
Random or Hashed - apply hashing algorithm and randomly place in file

Mention of overflow and the concept of blocks and pages was expected.

Indexed sequential structures combine random and sequential access but this structure can become very inefficient if updating is constant and disk space is not freed as overflow methods are required.

Inverted files utilise secondary indexes to form an access through looking up corresponding indexes and associating the index with a value on the primary key. Mainly used in document retrieval especially useful for keyword searching.

Random or Hashed files do not support index access but rather access is direct to the required record for updating. This is achieved by the use of a hash key or hashing algorithm which is used to locate a record.

This question was answered reasonably well apart from part *b)* where very few candidates had any understanding of Inverted files. Most candidates acquired marks in parts *a)* and *c)* by drawing the structure of primary indexes and file blocks as a static diagram. Most candidates appreciated the issue of overflow etc. but very few candidates could go the one step further and show dynamically the steps involved in updating indexes/records following an append operation. Some candidates chose to use pseudo-code to show the updating algorithm; these answers often had little commentary and were often unintelligible.

Question 11

Marking Scheme

In general screen dialogues make use of menus, command line, command prompts, toolboxes, drop down menus, option buttons and check boxes. They provide varieties of screen dialogues for user interaction such as messages, selection of objects, pausing execution etc.

Explanations along the following lines were looked for:

a) Text Box - on tabbing out of this control some action is performed; usually input has been received and possibly validated.

b) Table field is a way of displaying data derived from a database or flat file with fields acting as column headers for the Table. Candidates must appreciate the link with the underlying data structure – Master-Detail (1:Many relationship)

c) Drop-down list – a selection from a list of options which is useful for validation and an alternative to using input fields.

d) Option/Radio Buttons - multiple choices with only one selection.

This type of question is popular and normally attracts high marks overall. Marks were usually lost where no appropriate application was given from which to draw examples. Many candidates mistakenly thought a check box was the same as an option button. It was pleasing to see candidates draw a full GUI utilising an appropriate example where all four controls were present. More detail was expected in certain areas; for example, why are drop downs lists appropriate rather than just a description of them?

Question 12

Marking Scheme
This question was mainly about the choice of package for particular tasks and the need to integrate these packages. Identification of tasks for which the call centre requires office automation and which of these packages are useful in delivering solutions to these tasks was appropriate. Candidates should appreciate that the packages might need significant customisation. Mention of script based programming and connectivity methods (e.g. macros/templates/OLE/Visual programming) gained additional marks.

Candidates adopted one of two basic approaches to this question; namely,

- Isolate each PC package and discuss the particular use of that package on its own, possibly mentioning its limitations.
- Look at the packages as an integrated solution to handling the different needs of the call centre by utilising the relevant features of each package.

Most candidates answered the question by treating the packages in isolation which severely limited the answer to this question. It was very surprising to find candidates with little practical knowledge of PC packages or the potential of customising them. There was no mention of OLE or other office automation integration methods and very little knowledge shown in building these types of information systems.