THE BCS PROFESSIONAL EXAMINATIONS
Certificate

October 2005

EXAMINERS' REPORT

Information Systems

General Comments

The questions in Section A ranged in popularity. Question 2 being the most popular and gave the highest pass rate, question 3 the lowest number and lowest pass rate.

Despite the rubric being changed to include advisory timings, candidates still fail to read it. Too much time was spent on some questions and not enough on others. Many candidates did not attempt the required number of questions; although this is not mandatory, it appeared that it was often because they had not understood how many questions were to be attempted or more likely ran out of time. Candidates must look at the number of marks allocated to a question. Candidates are advised to spend a little time reading each question before selecting them and calculating how long to spend on each. They should concentrate on those they can do most easily. It does not matter that the questions are not answered in sequence. Space can be left and the question returned to later if time allows. Candidates should also look at the wording of a question. The word 'briefly' means just that. It is a question of examination technique. Course providers should also take note and give candidates advice.

Question 1

1. You have been appointed as a software development consultant for a hire car company, which has merged with several smaller companies with the prospect of enhancing their business into the overseas market. Consequently, the existing systems need to be investigated thoroughly. You have been advised to take both a hard and soft system approach to this investigation.

a) Describe the investigation process using a structured analysis approach with which you are familiar, detailing the tools and techniques you would envisage using. **(16 marks)**

b) Give examples of soft system techniques which would also be useful in the investigation. **(8 marks)**

c) Briefly describe THREE fact-finding techniques you could use in the investigation and state in which situation each could be used. **(6 marks)**

Answer Pointers

The typical SSADM type of approach is expected going through the phases from feasibility, requirements analysis, requirements specification, and logical and physical design. Techniques - dataflow diagrams, entity modelling, entity life histories, normalisation etc. Tools - CASE tools, DBMS etc

A soft system such as Ethics (Edith Mumford) or work by Checkland and Scholes looks at the human aspects of an organisation. Soft systems techniques include rich pictures which give a logical view showing relationships, ideas and conflicts between the actors, (CATWOE) C - customer/client, A – actors, T – transformation, W – World view, O – owner, E – Environment, root definitions etc.

Fact finding techniques - interviews useful for obtaining detail, questionnaires useful for obtaining facts from a wide variety of users, sampling useful for seeing the documentation used, observations useful for finding bottlenecks and problems. Prototyping can be used as a fact finding technique later in the development cycle, but is generally seen as a development method and not part of a structured method.

Examiner's Comments
This was the second most popular and successful question. Once again the software development life cycle waterfall method was described rather than a conventional methodology. Structured systems analysis and design method (SSADM) is defined a set of procedural, technical and documentation standards for systems development. It covers the stages from feasibility to physical design within the development life cycle. Construction, testing and production are outside the methodology.

Very few candidates understand the difference between 'hard' and 'soft' methods and few knew any soft system techniques.

Question 2

2. *a)* Describe how information flows within an organisation, using an example with which you are familiar. You should indicate the three levels of management information, providing examples of each. **(10 marks)**

b) Briefly describe the following types of system:
i) Transaction Processing Systems
ii) Intelligent Systems
iii) Management Information Systems **(10 marks)**

c) Compare and contrast the following software systems indicating how they may be used:
i) Spreadsheets
ii) Database Management Systems
iii) Project Management Systems **(10 marks)**

Examiner's Comments
This was the most successful question and most popular. The first two sections are related and most students were able to answer them well. It was surprising that students did not know what the main functions of a spreadsheet were, although they provided commercial examples. There was little comparison between each software system, though most candidates conceded that all the systems stored and manipulated data in differing ways.

Answer Pointers
The three levels are Operational, Tactical and Strategic, flowing vertically from the bottom of an organisation through to the top management. Information also flows in a horizontal direction. Examples are day to day processing of orders, periodic/monthly sales analysis reports, annual balance sheets etc. Each level has its own type of system. Operational systems are generally known as transaction processing systems. Tactical level systems include management information systems and strategic level systems include decision support systems and expert systems. Information at the lowest level is structured and timely, middle level information is often summarised. Information at the highest level is unstructured and includes both internal and external influences.

Transaction processing systems (TPS) deal with the low level detailed processing generally day to day business processes either on-line or in batch mode e.g. payroll, stock control

Intelligent Systems are often known as knowledge based systems or expert systems, containing expert information, governed by an inference engine and are used in such areas as medicine.

Management information systems (MIS) are at the middle level of management providing collated or aggregated information e.g. accounting systems, accounts payable or accounts receivable. Information can be provided as exceptional reporting e.g. identifying debts above a certain figure.

Spreadsheets are matrix or table driven especially useful for processing figures and calculations. They can be used to draw simple and sophisticated graphs.

Database management systems (DBMS) provide processing, enquiry, design and development of databases, containing the organisation's data and being able to analyse and present the information to the users in a wide variety of ways.

Project management systems (PMS) provide the facility to monitor and control a project through the various tasks and phases. They allow allocation of resources, budgeting, re-allocation of resources and tasks and can provide sophisticated network charts such as PERT or critical path analysis.

Question 3

3. A new Accommodation Block has been built on a university campus enabling any student who is attending the university for the first time, or any who requires special needs, to be close to the university facilities. Previously, the Accommodation Office only dealt with private landlords, now it requires a database to support the new processes as well as dealing with the existing private lets. When a student is offered a place at the university, an accommodation leaflet and application form is sent to them. The form contains all the students' personal details, the course they have applied for, the type of accommodation they prefer, plus any special needs they require. The type of accommodation can be; a single room with bathroom, a single room with shared bathroom, a double room with shared bathroom, or private. All university accommodation has shared kitchen and dining facilities. There is a limit on all types of university accommodation especially a double room, but there are plenty of private rooms/houses available. Students are requested to put their choice in order of preference. Rooms are allocated to students on a first-come, first-served basis. Once the offer has been made, the students must confirm their acceptance and send a deposit within one month of the offer being posted. However, there are several problems that can occur, students may not send a deposit or acceptance, they may reject the offer and ask for a different offer or they may never arrive at the university. Therefore there has to be a further allocation of offers and further negotiation. A waiting list is produced and rooms offered, as they become available.

a) Draw a set of dataflow diagrams depicting the main processes detailed above. You must include a context diagram. **(10 marks)**

b) Construct a simple entity relationship model. **(6 marks)**

c) Identify the main entities with primary and foreign keys and provide suggestions for attributes, which would need to be recorded. **(6 marks)**

d) Design a set of storyboards demonstrating the system to the Accommodation Office Manager to enable him/her to see what the screens would look like. **(8 marks)**

Answer Pointers

The external entities would be student, private landlord. Processes - apply for accommodation, offer accommodation, accept offer, process deposit, prepare waiting list, contact private landlord, reallocate accommodation etc. Data stores - student, allocated room, room type (accommodation), offer, acceptance (could be part of offer), allocation, deposit, private landlords etc

Entities would be similar to the data stores i.e. student, allocated room, room (accommodation) type. They are items about which information needs to be held. Sensible attributes are expected.

A primary key is the identifier of an entity, i.e. student number, room type number; a foreign key denotes the relationship i.e. student number and room type number are foreign keys in allocated room.

The storyboards are intended to show that the student understands good design principles, commonality, simplicity, ease of use etc

Examiner's Comments
This was the least popular question and was not answered well. If a candidate attempts to draw diagrams, models and screen designs, they must ensure good preparation. A good technique is to identify the external entities, processes, data flows and data stores by listing them before attempting to draw a diagram. Entities and data stores can de identified by underlining the nouns (real words) in the text. Processes and data flows can be identified by underlining the verbs (doing words) in the text.

Candidates should practice drawing context, data flow diagrams and entity relationship models.

Screen design does need some thought. One golden rule is to keep it simple. Make sure that commands are included so navigation to the next screen or return to the menu is indicated.

Question 4

4. The management of a large auction house is investigating the use of the internet to advertise their goods and process the bids.

a) Prepare a report, which explains the terms that the auction house management needs to understand with regard to the technological aspects of the internet. You must also discuss the issues and problems that may occur whilst trading over the internet. **(14 marks)**

b) The initial investigation will need to include a feasibility report. Outline the areas that would need to be considered to produce this report. **(8 marks)**

c) The company will need to employ a network specialist and a database administrator. Draft a memo to the managing director outlining possible qualifications and skills that are essential and desirable in order to appoint to each of these posts. **(8 marks)**

Answer Pointers
The first part of the question is open-ended allowing the candidate to think about the various terminology and technology that are associated with the internet. This would include definition of the internet (web), discussion about email, networks, topologies, LANs, WANs, security and integrity issues, viruses, hacking, encryption, passwords, usernames etc

The feasibility report would need to consider economics - financial aspects, costings and savings, social aspects, technology issues, legal and ethical issues etc. It would also look at resource requirements, budgets, project planning, timing etc

Network specialist need to have professional qualifications such as CISCO, MCSE or Red Hat, they would also need academic qualifications such as a Higher Diploma, Under/post graduate degree or membership of the BCS. Similarly with the Database administrator (DBA), professional qualifications such as those obtained from Oracle and similar providers, attendance of courses, plus academic qualifications. The skills would be technical in terms of implementation, security etc. However, mention of good communication skills, working in a team, professional development, professionalism, and ethics is required.

Examiner's Comments
This question was answered reasonably well, however several candidates did not read the question and failed to discuss the technology which supports the internet. Some candidates provided examples of what would be contained in a feasibility report using the auction house as an example. This was acceptable provided they identified similar criteria as seen in the model answer.

Question 5

5. During every phase of a project, metrics should be gathered to assist in the planning on new or the next project.

Comment on the type of metrics and statistics that could be gathered during the life of a project to help the management of future projects. **(12 marks)**

Examiner's Comments
This was the weakest answered question within section B. Some candidates assumed it as a project life cycle question whereas the question was looking for measurement style answers.

Answer Pointers
Any reasonable metrics, whether named correctly or not was accepted, with some marks for the reason why you would use that metric.

For example,

- Lines of code or function points per day per person. A productivity metric that could help to estimate how long an activity might take.
  - This might be linked to how complex the task.
- Duration of any task, and thereby obtaining average duration per task.
  - For example, it might take 1 week (on average) to storyboard the front end design

Metrics are used to underpin a number of quality calculations so any reasonable comments.

Error rate in coding,
Errors detect before and after implementation
Number of days / hours needed to complete certain tasks
Comparison of defects found in logic / design etc and at what stage.

Question 6

6. Human Computer Interaction (HCI) is often seen as the most important aspect of any new system design. One technique to evaluate the success of a system is to prototype the application and demonstrate it to potential end-users.

a) State TWO different prototyping techniques. **(2 marks)**

b) Discuss in-depth the advantages and disadvantages of ONE of the techniques you have answered in part *a)*. **(8 marks)**
(4 marks for advantages)
(4 marks for disadvantages)

c) Do you consider prototyping to be a good requirements capture technique? **(2 marks)**

Answer Pointers

a) Any reasonable attempt – throw away, evolutionary etc. 1 mark for each

b) Depends on the answer to a) but would expect the following to be discussed:

- Greater user involvement – both good and bad
- Function creep
- Skills of development team
- Scope of functionality, speed of development
- Etc.

c) depends on the student's view point, but the reasons for a particular view were expected.

Examiner's Comments
Reasonable well answered question, some students stated that RAD and JRP / JAD were prototyping techniques. They got no marks for the techniques but some for the description

Majority of answers stated that prototyping was good a technique, some answered that it was a bad technique and were awarded marks if the reason was acceptable

Question 7

7. Imagine that you are a database consultant for a new internet site. The owners of that site wish to have a 24 hour, 7 days a week web presence.

The site will be available 24 hours a day, and customers will be able to enter orders on-line.

Comment on your recommendations for a strategy to ensure that the data is backed-up and that the data in the database is secure from potential hacking. **(12 marks)**

(6 marks for discussion of backup strategies)
(6 marks for security discussion)

Answer Pointers
a) Backup strategies

The answer should contain comments about transaction logging, incremental backups and full backups. Perhaps comments on the ability to take table spaces offline, back them up and then put them back on line.

It is probable that a policy of having the web site down for a defined period each week will be need (for example ebay.com use to be unavailable for 2 hours every Friday morning for backups to occur).

Answers in the style of "grandfather, father and son" tape rotation will result in no more than a bare pass.

b) Security

Audit logs
Access rights
Removal of default accounts
A policy on the type and rotation of passwords
Etc,

Any reasonable points will be awarded one mark.

Examiner's Comments
Another reasonably well answered question, including a centre that must have taught about "white hat hackers". (Marks were awarded for discussing white and black hat hackers within the security section).

Question 8

8. Computer Aided Software Engineering (CASE) are suites of tools that could be used to develop a range of applications.

A Software Engineering definition of a CASE tool would be a development environment such as Visual Basic. An Information Systems definition would focus on the analysis and design aspects of a project.

Describe SIX features that you would expect to be included in an "information systems" CASE tool. **(12 marks)**

Answer Pointers
1 mark for the feature
1 mark for a reasonable discussion

Typical Features

Prototyping
Testing
Report generation
Code generation
Syntax verifier
Version control
Document management
Etc.

Examiner's Comments
Having forced VB and development environments out of the answer by stating that these tools could be considered part of an software engineering case tool rather than an IS one, there was a level and depth of the answers to this question.

Question 9

9. Company X is considering using text-only dumb terminals for all data entry and using high specification Windows PCs for all management functions (reports, queries, market trends etc.).

Define, and then discuss, the advantages and disadvantages of using these two types of interfaces. **(12 marks)**
(2 marks for definitions)
(10 marks for discussion)

Answer Pointers
Definition of WIMP (Windows, Icons, Mouse, Pointers) or similar for PCs 1 mark
Definition of Forms or similar for Dumb terminal 1 mark

Advantages

Form	Restricts faults, Fill-in blanks, lower learning curve etc.
Wimp	Improve performance, flexibility, graphs for report etc.

Disadvantages

Form	Flexibility, meets user levels,
Wimp	Flexibility, cost, training, learning curve

10 marks for discussion, would expect at least one advantage and disadvantage for both interfaces

Examiner's Comments
A reasonable attempt at this question by most candidates, sometimes the answers were slightly blurred.

Question 10

10. *a)* Describe TWO different methods that could be used to test an application. **(6 marks)**

b) Discuss why testing is an essential part of any project. **(3 marks)**

c) As an Information Systems developer, apart from testing, highlight how you might prove that quality has been built into an application or project. **(3 marks)**

Answer Pointers
a)
Three marks were awarded for each recognised testing method stated

For example black box, white box and usability are three recognised but others are equally valid (cleanroom, interface etc.)

1 mark for the name of the test, 2 marks for the description

b)
Any reasonable discussion, which might cover areas such as:

Quality
Customer acceptance of application
Comparison to statement of requirements or requirement catalogue

Not an exhaustive list, 1 mark for each justifiable area discussed.

c)
Use of structured method
Company has quality standards
Code walk thoughts
Etc.

3 examples of where quality can be showed to be added.

Examiner's Comments
Generally well answered question,

Question 11

11. *a)* Discuss what is meant by prototyping with respect to systems analysis. **(2 marks)**

b) Discuss the safeguards you would put in place to ensure that prototyping was a success. Your answer should include the disadvantages of prototyping and how you would ensure that these disadvantages were overcome. **(10 marks)**

(5 marks for disadvantages)
(5 marks for how to avoid the stated disadvantages)

Answer Pointers

a) any reasonable discussion on prototyping would be worth a max of 2 marks.

b) It would be expected that the student would cover a range of topics like

Function creep
Raised user expectations
Perceptions that development times are short
Miscommunication
Biased towards prototyping environment
Etc.

Any reasonable area 1 mark, and a comment on how to make sure that this does not influence the outcome 1 mark

Examiner's Comments
Poorly answered question, especially part B.

Question 12

12. *a)* Define what is meant by the following terms and provide examples of their use.
i) Client Server Database
ii) Three tier Database architecture **(6 marks)**
(Definition 2 x 2 marks)
(Example 2 x 1 mark)

b) A customer's name, date of birth and address are possibly the most difficult items to validate and verify during data entry. Comment on what you would recommend to reduce the errors entered during this process. **(6 marks)**

Answer Pointers

a)

i) Client server application, processing distributed
ii) The server side is split into an application and data server

Any reasonable examples which equates to the DB architecture becoming more complex as you move from Tier 1

b)

Open ended questions.

Areas like

Automated
Use of postcode / address databases.
Voters register

Data processed
Name >= 1; age within a given range; etc.

Open to the student to discuss.

Examiner's Comments
Reasonably answered question, but there was tendency to state that using a primary key within a table solved the problem.