BCS PROFESSIONAL EXAMINATIONS
BCS Level 4 Certificate in IT

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EXAMINERS' REPORT

Information Systems

General Comments

It was pleasing to see that candidates seem to be more aware of the rubric. The paper followed previous papers in style and content. Questions 2 and 3 were the most popular questions and were answered well, with a 70% pass rate for question 2 and 67% for question 3. This indicates that candidates are doing more revision and also looking at past papers. Question 1 was very disappointing only 22% attempted it with a pass rate of 26%. Candidates must be reminded that the number of marks allocated to each part of a question is indicative of the amount of knowledge being requested; e.g., a 2-mark question expects short answers with two or so relevant points.

In Section B, answers were often simply a note dump whether relevant or not so marks gained were often limited.

Section A

Question 1

A holiday resort is being developed and the local airport needs to expand its business. One area required is an on-line car hire system, which will cover several processes.

Drivers can make enquiries, reserve cars and pay a deposit using a credit or debit card. On arrival they pay the outstanding amount, take out optional additional insurance, which is offered by a reputable insurance company and pick up the car. Alternatively, a car can be booked on arrival, subject to availability. If the passenger does not pick up the reserved car, they are invoiced for the outstanding amount.

When the car is returned, it is checked for damage. If the driver did not pay for extra insurance, a charge is made for any damage.

Cars are obtained from local suppliers. When a request is made, a delivery order is placed with a suitable supplier. The car is allocated to the appropriate driver's request and delivered to the airport car park on the date required. An invoice is raised by the supplier, which is paid by the airport car rental company. When the car is returned to the local supplier, it is cleaned and repaired if required to wait further hiring.

a) i) Draw a Context Diagram depicting the above system, explaining the main symbols used.

(5 marks)

ii) Identify the main processes and data stores required dealing with the driver reservation only, assuming a High Level Diagram is to be drawn.

(12 marks)

b) Draw a Low Level Diagram dealing with the ordering of cars from the local supplier only.

(8 marks)

c) Briefly describe the main advantages of using a structured systems analysis method.

(5 marks)

Answer Pointers

(i) External entities – Passenger, Insurance Company, Car Supplier. Symbols used – external entity and dataflow.
(ii) Main processes – dealing with passenger enquiries, booking cars, paying a deposit, paying the outstanding amount, taking out additional insurance, checking for damage, charging for damage on return. Data stores – passenger, car, hire, deposit, payment, insurance,

(a) Low-level diagram should contain external entities passenger, car supplier, data stores – delivery order, invoice, payment, car, hire, processes – raising delivery order, allocation to hire, invoicing, dealing with payments.
(b) It is a top down iterative approach allowing smooth progression to each lower level. It is diagrammatic and easily understood. It contains clearly identified tasks and techniques.

Examiners' Comments

Most attempts were very poor and very few candidates read the question. Part a(ii) asked for identification of the main processes and data stores assuming a high level diagram was to be drawn. Most candidates drew a diagram, however marks were given for the correct processes and data stores depicted. Part b was misinterpreted in many cases as candidates drew an entity relationship model. The advice is always to read the question carefully do not assume you know what is being asked. A low level diagram is merely the next level diagram from a high level diagram where the process 'ordering cars' should be decomposed into individual processes.

Question 2

a) Define the terms data and information, giving an example.

(2 marks)

b) Briefly describe the benefits of using a database within an organisation.

(4 marks)

c) Information flows through an organisation. Draw a diagram indicating how management information flows through an organisation, identifying the three main levels of management and name typical systems used at each level.

(6 marks)

d) With examples, explain the type of information that each level of management would typically require.

(6 marks)

e) Discuss the main features of each of the following:

i) Transaction Processing System (TPS)
ii) Data Warehouse System
iii) Knowledge Based System
iv) Decision Support System

(12 marks)

Answer Pointers

(a) Data is a set of characters/numbers without any coherence on their own. Information gives meaning and contest to the data.
(b) Data is kept in one place, it is stored only once, it is checked for integrity and completeness, it is manageable, it can be used by intended users only, it can be shared and controlled.
(c) Strategic – top level (KBS), (DSS), tactical – middle level (MIS), operational – low level (TPS).
(d) Strategic – long term unstructured, risk oriented, often externally influenced egg stock market. Tactical – shorter term, typically periodic, structured, aggregated egg monthly sales figures. Operational – day to day, repetitive, detailed, egg daily job schedule
(e) TPS – low level processing of the man data within an organisation, used to support the activities and managed at supervisory level. Data warehouse systems are consolidate organisational database systems, used for high level analysis, historical/retro detail, forecasting etc. KBS – are systems built on expert knowledge used for example in medical diagnosis, they are able to help predict trends, diagnostics etc. DSS – support the decision making process within an organisation, usually by providing aggregated/consolidated 'what-if' information.

Examiners' Comments

A well-answered popular question. Parts b and c asked for different aspects of information. Several candidates ended up repeating themselves perhaps wasting time. Part c asked for a diagram, the three main levels and the software typically used at each level. Part d asked for the type of information at each level together with examples. Part e expected some knowledge of more recent IT developments such as data warehouses; many students thought these were stock control systems. Candidates are advised to read IT journals and newspapers to keep up with current trends.

Question 3

a) Identify the main purpose of a feasibility study and describe where it fits within the system development life cycle.

(2 marks)

b) What are the main issues that should be considered when undertaking the feasibility of a project?

(10 marks)

c) Describe the advantages and disadvantages of at least **FIVE** fact-finding techniques.

(10 marks)

d) Briefly discuss the steps you would take to ensure a project of good quality was produced on time.

(8 marks)

Answer Pointers

(a) It is used to ascertain the viability of a project in terms of costs, resources, etc. Alternative solutions can be made. It is at the beginning of the cycle after the preliminary survey

(b) Economic – cost benefits, times, resources, plans. Technical issues – physical and technical resources required. Operational – the way the new systems will be implemented, managed and staffed. Social – how the system will fit in with the staff and working practices. Legal and ethical – the system must conform to current legislation and ethical issues. The production of a feasibility report is important.

(c) Questionnaire – can cover a large number of staff over a wide area, difficult to design and returns poor.
Interviews – provides first hand information and contact, time consuming.
Observation – useful for identifying problems and bottlenecks, can be intrusive.
Sampling – quick and obtains real data, sample may be biased.
Record searching – useful for seeing what occurs including anomalies and exceptions, may be out of date.
Prototyping – excellent for assessing user requirements and involvements, however too often the prototype may be used and not developed adequately.

(d) Allocation of tasks, resources, implementation of a good project management system, use of structured methods, techniques, regular progress meetings, structured walkthroughs etc

Examiners' Comments

Another popular and well-answered question. Parts a and b were answered well. Several candidates misinterpreted part c by giving advantages of fact-finding rather than the individual techniques. Fact-finding is essential in analysing current or investigating new systems, there cannot be advantages and disadvantages to the overall stage. Once again project management was confused with project development (part d). The use of structured methodologies is part of good project management and the production of quality projects, but management techniques need to be applied whilst using the methodologies.

Question 4

a) Write brief notes on the following:
   i) Data Dictionary
   ii) CASE Tool
   iii) An Object Model
   iv) A Normalised Relation

(12 marks)

b) Documentation is an essential part of system development. Discuss how you would ensure good system documentation.

(8 marks)

c) Human Computer Interaction (HCI) is an important element of good design. Discuss the techniques that should be used to provide an easy to use interface.

(10 marks)

Answer Pointers

(a) Data dictionary – this is a central repository for a computer system, holding the system's metadata. It will contain not only database/file definitions but can contain the results of the analysis. It acts as a reference document. CASE tools – these are software programs that support the analysis and design aspects of development. They provide control and support of the development and are useful in that they support different methodologies. An object model is based on object-oriented techniques, which describe an object using classes, attributes, methods, inheritance, polymorphism etc. A normalised relation uses normalisation and mathematical techniques to support relational database design. It provides stable relations removing repeating items and is based on key functionality.

(b) Documentation should be developed in a top down way, particularly if a structured method is used. It essential that version control and change control are supported. Standard forms and documents should be used. Documentation should be simple and clear. A good filing system is required for manual/physical documents and a good back-up system for automated documents. Feasibility report, requirements specification, user manuals, coding manuals, technical specifications are examples of some of the documentation required.

(c) Typical answers would include understanding the type of user, simplicity, clarity, ease of use, commonality, use of colour, font size, simple and clear commands, a good help system etc.

Examiners' Comments

This was not as popular as other questions, however the attainment was reasonable with a 43% pass rate. This question gives a range of topics so enabling weaker students to pick up some marks. Part a was answered reasonably well although some candidates did not know what a data dictionary was. Documentation is an important part of system development; candidates should be made more aware of the implications of poor documentation.

Section B

Question 5

Define the types of testing required to ensure the quality of a commercial web site (for example, a company selling books).

(12 marks)

Answer Pointers

Limited marks were awarded where the answer did not mention or map onto web site testing.

A large proportion of the answers were a straight note dump mainly focusing on black box and white box testing and not related to web site testing.

For full marks, evidence of user testing or interface testing along with security, performance or load testing needed to be included.

Basic or standard testing answers were awarded pass marks but they did not address the question fully.

Generally a well scoring questions but perhaps not addressing the issue of the question.

Question 6

a) Describe what is meant by evolutionary prototyping.

(4 marks)

b) State four advantages of this technique.

(4 marks)

c) State four disadvantages of this technique.

(4 marks)

Answer Pointers

Another question that suffered from note dump style answers and where the candidate did not read or understand the question.

Some answers reflected the nature of this style of building a prototype where it can become the final working system, others simply note dumped on prototyping.

Two reasonable (short) sources for information on this area are

http://www.python.org/workshops/1998-11/proceedings/papers/masse/masse.html

http://www.softdevteam.com/Evolutionary-lifecycle.asp

Part b and c were not always mapped to evolutionary prototyping and marks were limited to either 2 or 3 marks out of 4 if the answer was standard prototyping.

Where the answers to parts b and c were opposites with little discussion for example:

b) Less costs to produce

c) increased cost to produce

marks were also reduced as both cannot be correct (depending on the answer)

A number of candidates for part c) discussed as a negative that the users may become too attached to the prototype and wish to keep it as the finished system. This of course is the reason for using this type of prototype and therefore perhaps should have been rephrased as a positive.

Generally a well answered question which required slightly more focus on the question domain and not just a note dump on prototyping.

Question 7

a) What is required (e.g. types of documentation) to convert an Entity Relationship Diagram (ERD) into an Entity Relationship Model (ERM)?

(8 marks)

b) Explain why developers might want to de-normalise data once it is in third normal form.

(4 marks)

Answer Pointers

This had the weakest answers of all the questions on this exam paper.

Part a) was looking for any document or diagram that could be used to enhance or support an ERD, for example:

i) a list of domain constraints – the diagram shows the relationship between primary and foreign keys but may not show that a primary key is restrict to a certain set of values.

ii) a content and data flow diagram and supporting documentation will show the frequency and amount of data flows, and therefore given an idea of size of tables etc.

iii) any documentation that would normally comprise a classic data dictionary

see http://www.businessdictionary.com/definition/data-dictionary.html

There is not an exhaustive list, but this was a question to show how an ERD fits into the documentation and design phase.

Only a couple of answers got part b) right. Normalisation produces a model which is data efficient (no duplicates, no inserts problems etc.) and is optimised for data input.

However, if the system is query intensive the model may need to be revised to reduce the amount of table joining (pre-joins in the queries) and therefore the developer may wish to denormalise the structure to make queries more efficient. It should be done with data items that are not prone to frequent updates.

Question 8

a) State two methodologies where the user is an integral part of the development process.

(2 marks)

b) Outline one of the methodologies specified in part a).

(7 marks)

c) Briefly discuss the benefits of user involvement in the development process.

(3 marks)

Answer Pointers

The most common answer for a) was hard and soft methodologies, which got one mark for the soft system element. Then (typically) the candidate would go onto describe a hard methodology (SSADM for example) for b) and not use the word “user” once.

Any two methods that were user centred would have gained the marks; a number of agile methods or RAD etc would have obtained marks.

Any reasonable method with reference to how the user was used obtained good mark.

Any reasonable point on how the user helped would also have obtained marks.

Question 9

Security is an essential part of any information system. What advice would you give on the following areas?

a) A password policy.

(6 marks)

b) Level of user privileges in the context of database systems.

(6 marks)

Answer Pointers

Part a) produced some of the more amusing and alarming answers from this paper.

One candidate spoke of writing the password down and placing it under the keyboard for safe keeping, another suggested that having simple, easy to remember passwords was the best policy.

A good percentage of the answers had good, sound policies like:

i) a time limit on the use of a password
ii) using a mixture of upper and lower case, symbols etc
iii) having a password that was longer than 6 characters
iv) using a password “cracker” to check the security of the system
v) making sure user were educated against using personal information such as date of birth, a family members name, simple words
vi) removing access to employees who have left.
vii) Not allowing the re-use of previous passwords
viii) Etc.

Any valid point that made the system more secure was awarded one mark.

Part b) was looking for a policy that prevented user from having access to data that they were not allowed to view. Also the management of privileges, creating an audit trail to ensure that privileges are not misused.

Further reading for part b) is contained within the following document:

Top Ten Database Security Threats

http://www.oracle.com/technology/deploy/security/Oracle9i/pdf/9i_checklist.pdf

Question 10

Backup and recovery of a database is seen as routine procedure in most organisations.

a) Outline a policy that ensures that all data and transactions are backed up.

(8 marks)

b) Why should an organisation test its recovery procedures?

(4 marks)

Answer Pointers

One answer stated that you should buy a second hand disc drive to backup your data. Which does raise questions as to whether any policy is good (having a policy is better than no policy) or rather you should implement a policy that works.

A backup policy would include issues such as:

i) Backing up of material onto an other source (tape, disc, another machine)
ii) The timelessness of the backup (daily, weekly, hourly)
iii) Who transaction were backed up, logged onto another media etc
iv) Who did the backup's (user v technical)

Marks were awarded for any sensible backing up policy.

The policy needs to move away from the 3 tapes grandfather, father and son approach as this does not really meet modern business practices.

Part b) was generally well answered. The organisation should test to make sure that it is backing up the correct data, but also to find out how long it takes to restore.

For example, a web business may have a service level agreement which states that the site can be only down for a maximum of 30 minutes. Without testing the recovery procedures, how can you tell how long it takes to rebuild the database?

Question 11

What is meant by the following terms, with respect to the development of Internet applications?

a) Web services

(4 marks)

b) HTML

(4 marks)

c) XML

(4 marks)

Answer Pointers

Part a) was poorly answered.

Definition: A Web service is a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format (specifically WSDL). Other systems interact with the Web service in a manner prescribed by its description using SOAP messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards.
http://www.w3.org/TR/ws-arch/#id2260892

Many answers simply stated it was the internet and email etc.

Marks were awarded for a discussion that used references to SOAP and XML etc.

Part B was well answered.

XML is not a web form development language but a technique for defining data structures and meta data.

Question 12

In the context of mobile devices, outline what methods are available within a standard application development environment that you could use to minimise the error rate in data entry.

(12 marks)

Answer Pointers

This was a poorly answered question with the candidates confusing mobile with mobile phone.

A mobile device can be a mobile phone, but it also can be a PDA, laptop etc.

The question was asking for the use of drop downs, radio groups, restricted lists etc.

Elements of pre-processing on the mobile device, or use of embedded queries could have been mentioned.