BCS THE CHARTERED INSTITUTE FOR IT
BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 4 Certificate in IT

Information Systems

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EXAMINER'S REPORT

General Comment

The overall pass rate has improved despite the large number of students from poorly performing centres. Several candidates from these centres did not attempt a single question. Many answers do not attempt all sections of the questions.

There was evidence that some students did not read the questions and assumed the requirements. Once again, it should be emphasised that the rubric should be explained to the candidates before the exam. Exam technique should also be introduced into courses.
Too often candidates spent too long answering one question in section A and did not give themselves time for a second. Candidates need to be very careful about the type of question they choose to answer. If they have not had much practice with some techniques, then it would be advisable to avoid such questions.

Candidates are still giving "note dumps" which are not really relevant to the questions. This style of answer limits the marks awarded.

Section A

A1. You have been appointed to investigate and to design an on-line system for a large garage dealing with vehicle repairs and annual maintenance.

A customer will contact the garage to book in a vehicle for repairs or annual maintenance. The system will check whether the customer is an existing customer or a new one. If he/she is an existing customer then the details will be displayed and confirmed. If he/she is a new customer then details will be required such as name, address, vehicle type, make, and car registration number. The system will then be used to find an appropriate time slot for the repair or maintenance. Once confirmed by the customer, the system will need to allocate a suitably qualified engineer to carry out the job. A time slot will be allocated to the engineer's records.

At the appropriate time, the customer will bring the car in for the work to be done. The engineer will inspect the car and carry out the repair/maintenance. Sometimes a spare part may be required which is not in stock. The engineer will raise a purchase order with the car parts supplier, inform the customer of the delay and will stop the job until the spare part arrives. Once the job has completed the customer will be informed and the job will be paid for and the car collected

a) Draw a Context Diagram and a set of Data Flow Diagrams to depict the above system.

(15 marks)

b) Draw a Data Model identifying the main Entities and Relationships indicating the degree of relationship and optionality.

(10 marks)

c) Draw an entity life history of the entity job.

(5 marks)

Answer Pointers

a) The context and data flow diagrams should identify the external entities, data flows, processes and data stores. They should be understandable – named lists were accepted

External entity – Customer, spare parts supplier, engineer.
Processes – request booking, allocating engineer, booking in, ordering of spare parts, payments.
Data stores – customer, car, engineer, job (repair), payment, spare part order

b) The entities will be customer, car, engineer, job, spare part order, and payment. Over a period of time the customer will have more than one job carried out on the car, this needs to be identified – effectively the job resolves the many to many between customer and car, similarly an engineer will have many jobs.

c) The job will go through the stage of allocation, inspection, repair/maintenance (selection and iteration), booking out, completion, and payment.

Examiner's Guidance Notes

More practice is required with these techniques. However, as the case study was quite detailed, marks were given for the identification of the main elements, even if the diagrams were poor. Several students designed screens, which indicate that they did not understand the question.

A2. a) You are the head of a systems development team who has a number of impatient users. Draft a report explaining the advantages and disadvantages of a structured approach to system development compared with a prototyping approach suitable for these users. Identify the stages within each approach.

(20 marks)

b) Briefly describe the purpose and typical contents of a Feasibility Report

(10 marks)

Answer Pointers

a) A methodology is a comprehensive and detailed version of an entire system development life cycle e.g. SSADM. It incorporates step-by-step tasks within phases. Each step and phase is carried out methodically and includes built in checks. Techniques such as data flow diagrams, logical data modelling, entity life histories, normalisation, structured walkthroughs etc are incorporated. Stages go from requirements analysis, through design, development, testing, and implementation. Prototyping on the other hand is an iterative process with no structure; however, it is quicker but can ignore many important processes such as security, recovery, documentation etc. It relies on user interaction and a build up of the prototype through iteration. Techniques used are JAD/JRP sessions etc. The advantage of the structured approach is that it is methodical, thorough and well documented, but it is best suited to large projects when the problem is well defined and is lengthy and may not involve the user quite as often as prototyping.

b) One major purpose of the feasibility study is to ensure that the proposed system is viable in terms of economic and technical aspects. The report will expand on the preliminary survey report. It defines the objectives, requirements and scope of the project, together with any constraints. Existing problems are discussed, responsibilities defined, resources and technology identified, alternate solutions provided, time scales and budgets proposed etc. The effect of the system on the company staff and any legal issues are also raised.

Examiner's Guidance Notes

A popular well answered question with a pass mark of 56%. Marks were lost as some candidates only described one method or did not provide advantages and disadvantages of each.

A3. a) Discuss how information flows in a typical organisation hierarchy giving examples of the type of information at each level.

(9 marks)

b) Briefly describe the use of the following types of commercial software systems:

(i) Executive Information Systems
(ii) Management Information Systems
(iii) Transaction Processing Systems

(9 marks)

c) Describe the main theories of a relational database approach to storing and accessing data.

(12 marks)

Answer Pointers

a) Operational, tactical, strategic levels are the three levels of decision making and communication within an organisation. Information flows both ways between each level from top management (strategic) to the operational level and within each level. Executive decisions would be made on aggregated information; these would be random and unstructured and deal with long range planning. Typical sources would be government policies, the market, competitors etc. Tactical decisions are more structured and timely; i.e. periodic or monthly and tend to include administration at management level, forecasting, budgeting etc. Operational information is the day to day processing and relates to the processes within the organisation

b) EIS - integrates data both external and internal, are interactive, may also be classed as artificial intelligent systems, are simple using graphics and simulation techniques and used by senior management.

MIS - summarises transaction data, high volume, simple models, routine reports, low level analysis producing summary and exception reports and used by middle managers.

TPS - transactions, events, deals with sorting, listing, merging, updating, provides detail reports and lists and used by operational personnel and supervisors.

c) Data is stored in atomic values as rows or tuples of columns within tables. Each row is accessed via a primary key and can be related to another table using a foreign key. Duplication of data is reduced using normalisation techniques. Integrity constraints are supported. It is process independent; changes can be made to the table without affecting the process. The theory is based on relational calculus, based on Codd's rules, providing projection, select, joins etc. Typical databases provide data descriptions, data manipulation, security and recovery mechanisms e.g. Oracle.

Examiner's Guidance Notes

Over half of the candidates attempted this question and answered parts a) and b) well. However very few candidates seemed to be able to define the main theories and describe a relational database.

A4. a) As manager of a large systems development project, describe the steps you would take to ensure that a project is produced on time. (NOTE – the system development life cycle is not expected).

(12 marks)

b) After development and testing, a system can be installed in several different ways according to the type of system. Describe THREE possible ways this can be done, identifying advantages and disadvantages of each.

(12 marks)

c) *"There are several threats to an on-line system".* Discuss this statement and identify ways of preventing unauthorised access to the system's data.

(6 marks)

Answer Pointers

a) Allocation of tasks, resources, implementation of a good project management system/software, use of structured methods, techniques such as PERT/Gantt charts, regular progress meetings, risk assessment, control, monitoring, motivation, structured walkthroughs etc.

b) Parallel method is the safest method of running the two systems side by side for a period of time and comparing the results. It is a costly method, but is of less risk. It is the most common method and would be used in updating outdated business applications. Direct changeovers are dangerous as there are no backup procedures, but are less costly and risky. It depends on thorough testing. The old system is abandoned and the new system used immediately. It may be the only method available, as the existing system is no longer relevant; e.g. web based systems. Pilot systems are used by large companies particularly when the system is being used in many places e.g. branches. It can also be a part of the system that is implemented first; e.g. a small section of the stock within a stock control system. Basically a small part of the system is implemented and tested before the whole system goes live.

c) Threats – unauthorised access, viruses, phishing, cookies etc.
Solutions - passwords, usernames, firewalls, virus scanners, screen savers, encryption, SSL, cloud computing etc

Examiner's Guidance Notes

This was the most popular question with a high pass rate of 62%. Those that did not obtain good marks were mainly those who failed the entire paper. Even though the question implied the SDLC descriptions were not expected, some candidates wasted time describing these in detail. Most could describe the three installation techniques, although a few described testing techniques and had not read the question correctly. The security part was answered well.

SECTION B

B5. You have been asked to produce a job description for a Business Analyst. What characteristics should they have and why?

(12 marks)

Answer Pointers

Craig Rollason (© 2006 The British Computer Society - Business Analysis, p14, ISBN: 978-1-902505-70-1) provides a very detailed overview of a Business Analyst.

Marks for each trait, such as

Communicator / people skills

Leader
Skilled in systems analysis techniques
Knowledge of project management techniques (if you assume that a Business Analyst would be SSADM trained or equivalent that you would assume PM knowledge)
Problem solver.

Examiner's Guidance Notes

A reasonably well answered question, where the candidate understood what a business analyst was. Some answers mixed this role and that of the project manager. Some credit was given to those answers where the traits overlapped.

This question was answered poorly which is surprising as one would expect an information systems student to understand varies job roles, such as systems or business analyst, DBA, project managers etc.

There were some very good answers, but there were a number of answers that provided a framework for a generic job advert. This scored very low marks as they did not address the advert from the viewpoint of recruiting a new business analyst.

B6. What do you consider to be the most important aspects of Human Computer Interaction (HCI) and why?

(12 marks)

Answer Pointers

An open ended question,

Three or four marks for each relevant area which had some reasoning or argument.

Areas could be

Screen layout and design
Interaction design
Use of animation / sound etc
etc.

Answers should show that good screen design leads to user acceptance while poor screen design leads to users not using the system.

For screen layout and design, comments might be on

Conformance to existing standards or other applications
Alternative ways of accessing functions (alt keys, icons etc,)
Support for disabled users
Adaption to local cultural issues (choice of colours)
Performance, some web sites work fine on a 100M link, but might have issues on ADSL or dial up links.
etc.

For use of animation / sound.

Consideration of technology and available software.
Cultural issues – for example the video is broadcast in English which might not be the first language of the viewer
Alternative methods of presenting the information – text commentary.
Performance issues, time lag, level of technology etc.

Examiner's Guidance Notes

Some good answers but some not really addressing the issues.

A number had been coached into defining HCI, and then doing a compare and contrast between GUI and command line interfaces. Some marks were awarded for this style of answer but on the whole these were off topic.

B7. What should be a computing code of conduct for an employee?

(12 marks)

Answer Pointers

Another open ended question with two or three marks awarded for each area discussed.

Areas could include

Professionalism
Equal opportunity
Adherence to the legislation and law
Honest
Compliance to computing practices (HCI, disabled users etc)
etc.

A straightforward question on how honest an employee should be, and how they should / could behave within the IT discipline.

A number of answers just discussed employees not stealing data, equipment, etc. and these attract a few marks.

Other answers discussed the running of illegal software and the downloading of illegal images and films. Again this is a narrow topic and resulted in the awarding of few marks.

Some answers discussed the employee keeping abreast of latest ideas in the workplace and also up skilling when required. This was considered as part of being a professional and so fell into this question.

A number of the areas overlap; for example, the trait "honest" is included in more of the subjects about.

The best link / way to gain an understanding in this area is to read the BCS code of conduct.

BCS Code of Conduct (within membership and networking)

http://www.bcs.org/category/6030

Examiner's Guidance Notes

This was a very poorly answered question. Ethics and codes of conduct are key to any successful company and so an understanding of this area is key to any IS professional.

B8. "*Video wastes bandwidth, text can represent information more clearly and uses less resources*."

Discuss this statement, stating whether you agree or disagree with this statement and why.

(12 marks)

Answer Pointers

One mark for stating whether they agree or not (as long as this is backed up with a statement, simply putting down a one word answer with Agree or Disagree will result in no marks being awarded).

Both sides of the argument can be valid as long as relevant points are made.

A number of countries do not have the basic bandwidth that one would expect in the US or UK. An over reliance on imagery and video can result in the web site being too slow and therefore not getting the message across.

If the site is multi-national and the level of English (or whatever language) cannot be guaranteed it might be advisable to use a combination of video and text to portray whatever the message is.

Up to three or four for each area / argument discussed.

Reasonably well answered with candidates arguing both for and against the statement.

The argument for usually stated that video does use bandwidth and processing time but as technology and internet connection speeds are increasing this is becoming less of an issue.

The argument against stated that internet connection speeds was an issue and that using text was a quicker and easier way to get the message across.

I was happy with either answer as long discussed issues from both sides of the argument. Where an answer only really addressed one viewpoint the mark was limited.

The phrase "a picture paints a 1000 words" was used often, and was the basis of a number of arguments.

Examiner's Guidance Notes

Reasonably well answered with candidates arguing both for and against the statement.

The best answers, and the ones that gained the highest marks, discussed using both video and text to get the message across.

A number of candidates discussed local issues verses global ones, which also was a valid argument.

B9. What screen design elements could be used for developing an on-line questionnaire to determine the functions a person uses on their mobile phone?

(12 marks)

Answer Pointers

Marks were awarded that showed an understanding of the domain and also an understanding of questionnaire design.

A mixture of

Text box answers (open ended questions)
Radio groups (yes / no style)
Drop down list (one option from)
Push button (a number of options from style)
etc

was expected.

The candidate was expected to decide type of questions, but high to full marks were only awarded for a variety of different styles of questions.

The use of one or two different approaches limited the marks awarded.

Examiner's Guidance Notes

Some answers confused this with developing a questionnaire on a mobile phone, rather than for a mobile phone. Where there was overlap, marks were given but on the whole those answers that misunderstood the question were poor.

B10. A small company has asked that you suggest a backup plan for their database. The database only operates for 12 hours a day and you have been asked to provide a solution that does NOT use tapes or CDs/DVDs.

Discuss how and when the database can be backed up and comment on any dangers to your approach.

(12 marks)

Answer Pointers

An open ended question but as the database is only used 12 hours a day, it leaves ample time to perform normal off peak backups.

Higher marks included a list of dangers (for example a once a day backup could result in up to 12 hours of data being lost).

Some very good answers, including references to cloud computing databases and the advantages and disadvantages of using them.

The majority of answers discussed having a second server for backup and this style of answer were given reasonable marks.

The highest marks were given to answers which included transaction logging or some means of backing up during the day. Just to back up during open peaks means the potential to loss 8 hours of work, which can always be replicated.

A basic pass or near pass answer was that the database was backed up once the main days processing had occurred, and that this backup was then stored on a secondary storage device.

B11. What is meant strategic by, tactical and operational information? Give two examples of each.

(12 marks)

Answer Pointers

Operational

Often referred to as short term data.

This is data that is needed for the day to day running of the organisation; it needs to be precise and accurate. It is usually gathered from internal only sources.

Any two reports that deal with the day to day management of the business; stock levels, staff rotas, today's offers, etc.

Tactical

Often referred to as medium term data.

This is the data that is needed for the monthly or quarterly running of the business. It could be considered to be at manager level and is used to support how the business will operate over the next financial period or so. The information is usually summarised internal data but could have some element of external influence.

Any report that has recent, short term summarised data; e.g. staffing required for the next month, last month sales figures, re-ordered reports for the next month.

Strategic

Often referred to as long term data.

Data needed to run the business over the next year or five. Could be considered at director level and could include external reports, weather forecasts, demographic forecasts etc. Sometimes these requirements are predictions and are not based on accurate data but are estimates for sales based on external data.

Any two reports that dealt with the long term view of the business; for example, the amount of summer product required for next summer, staffing levels for the next 5 years, the demographics of potential customers for the next 3 years.

Examiner's Guidance Notes

This was the best answered question within section B. Lots of answers showed a clear understanding of the differences between operational, tactical and strategic.

B12. a) What is meant by the following statistical terms?

i) Mean **(2 marks)**

ii) Mode **(2 marks)**

iii) Lower quartile **(2 marks)**

iv) Standard Deviation **(2 marks)**

b) What is a histogram and what is its primary function? **(4 marks)**

Answer Pointers

a) One mark for a good definition and one mark for an example

i) The mean is the sum of the values divided by the number of values

ii) The mode is the value that occurs most frequently in a set of values

iii) **first quartile** = **lower quartile** = cuts off lowest 25% of data = *25th percentile*

iii) It shows how much variation there is from the average
68.2 % of the data should be within 1 standard deviation of the average, for normal distribution of data

Mean and mode, were reasonably well answered. Standard deviation was poorly attempted.

b) Up to four marks for a description.

A histogram is a graphical representation showing a visual impression of the distribution of data.

Any answer that showed an X and Y axis, and showed distribution of data were awarded some marks. More marks were awarded for showing frequency over time.

The key idea was that this chart shows tabular data.

Examiner's Guidance Notes

A number of answers stated that a Gantt chart was a histogram, which gained few marks.

The answers were patchy with the lowest number of candidates attempting this question.