

BCS THE CHARTERED INSTITUTE FOR IT
BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 6 Professional Graduate Diploma in IT

IT AND THE ENVIRONMENT

EXAMINERS' REPORT

Friday 2nd October 2015

Answer **any** THREE questions out of FIVE. All questions carry equal marks.

The marks given in brackets are **indicative** of the weight given to each part of the question.

Calculators are NOT allowed in this examination
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General comments on candidates' performance

Now in its fourth year, this module saw a similar number of candidates sitting the paper. The overall pass rate continues to be satisfactory.

The candidates showed a reasonable knowledge of the syllabus topics, demonstrated by answers focused more on the facts around which the questions were based. Better answers were able to discuss the implications of those facts to the issues raised, showing a deeper understanding. Candidates should look for the pointers in the questions so that they can relate their answer to the questions asked.

There were a small number of very good answers where the deeper understanding expected at this level was shown. As with the previous year, there were also a large number of "threshold" marks where candidates had repeated the facts for a question, which may or may not have been a "pass mark" depending on how well articulated and complete they were. At Graduate Diploma level, candidates are expected to provide evidence of knowledge but also to show the application of that knowledge in a particular scenario.

Instructors teaching candidates for this module are again recommended to help the candidates prepare to discuss the issues. The candidates would benefit from classroom discussions of scenarios, followed up by candidates preparing written reports about the issues.

Section A

Question A1

A1. The manufacturing division of the UK company you work for routinely outsources some elements of its hardware production to an organisation in another country. As part of an audit of production methods, you discover that the outsourcing company is using a solvent in production which, although legal in its country, is banned in the UK.

A substitute solvent is available which is both more effective and has a much lower environmental impact – but costs substantially more than the one currently in use.

- a) Write a report to the Board of your company discussing THREE reasons why the outsourcing company should be required to stop using the solvent they currently use. **(12 marks)**
- b) In light of your report, the Board wants to review the quality processes of the company's suppliers. Discuss THREE areas that the company should focus on as part of a process improvement policy which aims to reduce environmental impact. **(13 marks)**

Answer pointers

Part (a)

The report could include discussion on the following issues:

- The moral obligation of the UK company to support best practice.
- Given that a more effective solvent is available, the existing processes may be simplified or streamlined, quality and yield may improve, etc. This could give positive commercial and environmental reasons to adopt the change.
- The nature of the ban may reflect on worker health issues as well as environment concerns.
- The company should be seeking to use the best available technology in its business.
- The organisation could benefit from good publicity associated with the reduction of its environmental impact.

Other relevant discussions points were given appropriate credit.

Part (b)

The discussion should have focused on three areas there were sufficiently different to justify three sets of marks. Areas could include the following, although other discussion points were given appropriate credit.

- The Environmental/Quality audit could form the basic toolkit for looking at environmental impact management by the outsourced company.
- The pursuit of the environmental goals may have additional benefits as it reinforces the “Plan, Do, Check, Act” cycle of quality management; this may have wider implications for both organisations.
- It is likely that that the ban will extend to other countries. Therefore, the outsourcing company is likely to gain from an “early start” at replacement of the solvent.

Examiners' Comments

The question was attempted by 19% of the candidates, 76% of whom achieved a pass mark.

There were a number of very good answers, which showed an appreciation of the issues and the ability to discuss them in the context of the question. However, there was a tendency amongst other answers to report the facts about the broad subject matter of the question and did not provide sufficient consideration of the significance of those facts in relation to the question on the legal and procedural issues.

Question A2

A2. You are the IT manager for a company which employs fifty administrative staff in a single, modern office building.

Each member of staff has access to a desktop computer and laser printer. All the desktop computers are networked to a number of servers.

The company is concerned that energy consumption by the IT systems may be higher than it needs to be. You have been asked to determine whether energy consumption can be reduced.

- a) Describe THREE areas of energy consumption by the IT systems that you would investigate. State any assumptions that you make. **(12 marks)**
- b) For ONE of these areas of energy consumption, explain in detail what you could do to reduce consumption. Discuss any compromises which this might entail. State any assumptions that you make. **(13 marks)**

Answer pointers

Part (a)

Discussion topics could include, but were not limited to:

- Are the PCs are left on all day/all night?
- Are energy profiles used to determine when to shut down or hibernate devices, e.g. after X minutes of inactivity?
- How many printers are there and how many of these are actually needed?
- Are the systems intrinsically efficient? How long would it take to payback the replacement of the old system, taking productivity benefits into account? This may have prompted discussion about the benefit of replacing desktop machines with laptops. Related discussion could have considered whether the server systems were of appropriate scale and efficiency for the tasks required.
- Could the server systems be integrated through virtualisation to reduce the number of "boxes"?

Part (b)

The main issue here is the question of detail that is provided for one of the points raised in part (a).

The answer should state any assumptions that support the discussion. The compromises might include slightly lower PC/server performance, slightly longer “wake-up” times from hibernation, walking further to printers and having to share specialised resources instead of them automatically being available to each user.

The conclusions should have been consistent with the information discussed in the question and with the material in (a). It should have added further discussion beyond that in (a) rather than just refer to the same points.

Examiners' Comments

The question was attempted by 90% of candidates, 84% of whom achieved a pass mark.

There were a number of very good answers, which showed an appreciation of the issues and about the environmental management of equipment as well as the ability to discuss them in the context of the question. However, there was a tendency amongst other answers to report the facts about the broad subject matter of the question and did not provide sufficient consideration of the significance of those facts for the specific situation described.

Section B

Question B3

B3. Early in 2013, the head of Yahoo banned employees from working at home, requiring them to travel to work in the company's nearest office during working hours.

- a) Which factors should be considered in deciding whether such a change is beneficial? Your answer should include work, financial, environmental and personal considerations. **(15 Marks)**
- b) Discuss TWO technological developments in the last 10 years that have made working at home a possible option for many people. **(10 Marks)**

Answer pointers

Part (a)

Productivity and efficiency are the overall guiding factors here, for example:

- Does the work need close collaboration and interaction that can best be done face-to-face?
- Does the work require access to specific equipment?
- Is there a cost saving in not providing / servicing office space? Is that balanced by the cost of providing connectivity?
- Are the environmental benefits of reduced travel balanced by the added cost of each staff member having a “home office” to maintain?

The answer might include discussion of some of the personal aspects arising from the removal of “water cooler” interaction and the lack of management oversight. There is the opportunity for the company to offer more flexible working patterns.

A good answer might also reflect on the drawback of a greater reliance on connectivity / technology solutions and the effects of possible failure of these solutions.

Other discussion would be given appropriate credit.

Part (b)

The answer should identify two different developments, for example:

- Digital broadband makes home interconnection a viable proposition because the bandwidth and reliability allows connection to be maintained;
- Web / cloud services enable data sharing from anywhere with a suitable connection;
- Teleconference and document sharing enable collaboration.

The answer must identify relevant technologies and discuss how the technology has enabled homeworking. Other technologies would be given appropriate credit.

Examiners' Comments

The question was attempted by 90% of the candidates, 47% of whom achieved a pass mark.

Whilst a few very good answers were given, a large number of candidates answered the question in a generic and unspecific way. While this might be appropriate for a lower level paper, an examination at this level requires the specific application of knowledge in the context of the question.

Question B4

B4. Your company has been invited to bid for a very large contract to provide the IT support for a major international cultural event. The company does not have the IT resources available to provide this support. You have been asked to provide a report comparing the benefits and drawbacks of buying the required equipment with those of using a cloud provider.

- a) Discuss THREE advantages of the option to buy the equipment. **(9 Marks)**
- b) Discuss THREE advantages of the option to use a cloud provider. **(9 Marks)**
- c) Your company decides to select the cloud solution. What effect will this have on the environmental impact? **(7 Marks)**

Answer pointers

Part (a)

The discussion might cover topics such as: direct ownership / control of equipment means it is immediately manageable by the organisation; the equipment can be used for further projects; there is a resale value for the equipment, which means that the cost can be mitigated. Other discussion would be given appropriate credit.

Part (b)

The discussion might cover topics such as: the ability to grow / shrink the system according to demand; there isn't any need to invest in the physical equipment; the management and maintenance are taken care of by the cloud provider. Other discussion would be given appropriate credit.

Part (c)

Alternative answers are possible in light of the ongoing “is the cloud necessarily greener” debate. Points for the use the cloud include: economies of scale; optimally located data centres; use of “greener” energy supplies; saving of locally supplied energy; opportunities for virtualisation and other forms of resource sharing. Points against the use of the cloud include: the offshoring of carbon; added energy cost of the communications infrastructure and data transfer. A positive, negative or undecided answer is acceptable providing that it is consistently argued.

Examiners’ Comments

The question was attempted by 84% of the candidates, 48% of whom achieved a pass mark.

A number of good answers from candidates were seen, but a number of candidates gained only low marks for a number of reasons:

- When asked to discuss three advantages in parts a) and b), some candidates chose only to list advantages rather than discuss them in appropriate depth.
- Some candidates offered fewer than three advantages in these sections, so could not score a high mark. Marks were divided pro rata in the sections.
- In many cases, the answer to part c) lacked depth and clarity, so did not score highly.

Candidates should note the distribution of marks on the paper as an indication of the scale and type of answer which is expected by the examiner.

Question B5

- B5. (a) Your city plans to introduce a traffic management system to its road system. The major aim of this system is to control the levels of air pollution in different parts of the city by controlling the number of cars and buses using different routes. Therefore there is a requirement to monitor air quality and control traffic signals.
- (i) Explain the equipment required to support this activity. **(7 marks)**
 - (ii) Could this equipment be used to provide long-term monitoring of air pollution (e.g. over a 2 – 5 year period)? Discuss other monitoring data which would be needed to give a fuller picture of air quality within the city and its effect on citizens. **(7 marks)**
- (b) The city also proposes to add to its current coal and nuclear power supplies by developing tidal and wind electric energy generation systems.
- (i) Explain how smart grid technology can allow these new forms of generation to be integrated into the power **supply**. **(6 marks)**
 - (ii) Describe the use of smart grid technology in balancing **demand** for electricity. **(5 marks)**

Answer pointers

Part (a)(i)

Sensors would be needed to sample and monitor concentrations of gas (NO_x) and other airborne pollutants. Analysis of particulate matter content, e.g. how much of a given polluting substance is present in a known quantity of air, is usually done by weight but can also be done by physical or chemical analysis.

Information that is acquired from sensors would then be communicated via data links to the traffic control system. This would operate according to pre-determined plans according to the pollution levels. Traffic signal sequences are then invoked accordingly.

Part (a)(ii)

The data relating to air quality could be stored and tracked over a longer timescale. The sampling frequency needed for the long term tracking is clearly less than that required to control traffic lights in real time.

Other monitoring data should include those not directly related to traffic – e.g. Ozone, SO₂ and should incorporate weather trends and patterns (wind, temperature, rainfall)

Part (b)(i)

Energy that is generated by these supply methods is much more variable, being related to tide, wind and water availability. Therefore, they create variable loads which need to be carefully integrated into the grid. Load balancing is used so that energy generated by these methods is used when it is available, e.g. by devices which are configured to use “available power”. Alternatively, energy storage methods, e.g. pumped storage, batteries..., may be utilized.

Part (b)(ii)

Ideas could include (i) devices that make decisions when to operate and at what level and (ii) the ability of electricity companies to instruct devices to reduce usage during peak demand.

Differential charging could be introduced as an incentive, which is higher prices during periods of high demand. At one level, humans and businesses could make decisions to change usage based on price information.

Simpler behaviour already exists, for example, in a day rate and night rate in the UK. However, a smart grid would enable fine grained modifications to prices that reflects current and short-term predicted demand; smart devices can monitor such changes and adjust behaviour without direct human intervention.

Examiners' Comments

The question was attempted by fewer than 20% of the candidates, fewer than 20% of whom achieved a pass mark.

In general, the answers were disappointing. Few candidates gave examples of sensor technology in other than the simplest way, and gave little idea of how the flow of data and its processing could be realised. The arguments regarding long-term monitoring were poorly discussed, again with little information regarding the issues which would need to be addressed. The smart grid discussions appeared, in many cases, to be based on a very limited knowledge of how the technology is implemented in other than a very simplistic way. Whilst there were some stronger answers, this is part of the syllabus that would benefit from further work and consideration by candidates on how to relate their understanding to the given question.