BCS THE CHARTERED INSTITUTE FOR IT

BCS HIGHER EDUCATION QUALIFICATIONS
BCS Level 6 Professional Graduate Diploma in IT

COMPUTER SERVICES MANAGEMENT

Monday 26th September 2016 First Sitting /
10th October 2016 Second sitting
Morning

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

Answer any Section A questions you attempt in Answer Book A
Answer any Section B questions you attempt in Answer Book B

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

Calculators are **NOT** allowed in this examination.

EXAMINERS' REPORT - September 2016

General comments on candidates' performance

The standard of answers was generally high for this examination, however, for some candidates there remained areas where significant improvements could be made. There is evidence that the candidates who performed best had thought carefully about the information presented and what was required for each question. They gave carefully argued answers that addressed all the core parts of the question and demonstrated an appropriate professional approach to their responses. The best candidates demonstrated an understanding beyond the confines of the syllabus.

The following comments should be noted for future candidates' preparation:

- ***Answer all parts of the questions.*** *Some candidates omit parts of the question. Even if unable to provide a full answer, a partial answer might result in the extra marks that could make a difference between failure and pass.*

- ***Answer the questions set.*** *Some candidates attempt to gain marks by providing answers that were related only vaguely, if at all, to the questions set. Candidates are advised that no marks are given for such answers.*

- ***Avoid repetition.*** *Some candidates attempt to answer questions by repeating points previously made or by repeating points made in the question. Candidates are advised that no marks will be gained for such efforts.*

The answer pointers below are for guidance only. Valid alternative answers that were relevant to the question would also attract full marks.

SECTION A
(26th October 2016 - First sitting)

A1. As the recently promoted Computer Services Manager, you have been tasked with selecting an outsourcing company to be responsible for all computer operations, including routine maintenance and enhancement of the existing systems. Senior management has invited three outsourcing companies to tender for this business.

a) Explain how the outsourcing companies and their proposals could be evaluated and a selection made.

(8 marks)

b) Describe the contents of a Service Level Agreement (SLA) that could be used to monitor and evaluate the ongoing operational service provided by the selected outsourcing company.

(9 marks)

c) Describe the possible **disadvantages** of outsourcing a computer service.

(8 marks)

Answer pointers:

a) Outsourcing vendor analysis

The command word for this part of the question was "Explain"; therefore an explanation was required of how the proposals could be evaluated. Some candidates lost marks through not providing any explanation; instead they relied on a list of possible questions. Whilst a list attracted some marks, an explanation as to purpose of each question would have increased the number of marks given.

Possible questions for the outsourcing companies:

- How long has the vendor been in business?
- What is the shortest contract I can have?
- How much will my service cost?
- How large is the vendor?
- Is the vendor financially stable and secure?
- How much experience does the vendor have?
- How good is the vendor's guarantee?
- Does the vendor regularly update its products?
- Does the vendor provide finance?
- Will the vendor put promises in the contract?
- Will the vendor provide customer references?
- Does the vendor have a good reputation?
- Does the vendor provide support?
- Does the vendor install the product?
- Does the vendor have competent staff?
- Does the vendor provide training?
- How responsive and timely is the vendor's support?

(One/two marks per point or question - maximum 8 marks)

b) Contents of an SLA

The command word for this part of the question was “Describe”; therefore a description of the SLA contents was required, not a simple list, although some marks were given for a list.

SLA items that could have been described include:

- Scope of agreement/Terms of Reference
- Signatories to the agreement
- Date of next review/renewal date/notice period
- Dates of previous amendments
- Brief description of service
- Charges/payments/penalties
- Service hours
- Service availability
- User support levels
- Performance
- Details of agreed minimum functionality
- Details of any service charges involved
- Change control procedures
- Details of any planned changes
- Contingency
- Anticipated growth
- Restrictions
- Central print facilities
- Central print distribution
- User training
- Changes to SLA
- Description of change control procedures for requesting SLA amendments
- Fault reporting
- Escalation procedures
- Any other valid item

(One mark per described content item - maximum 9 marks)

c) Disadvantages of outsourcing

The command word for this part of the question was “Describe”; therefore a description of the disadvantages of outsourcing was required, not a simple list, although some marks were given for a list. No marks awarded for describing the advantages of outsourcing.

Disadvantages that could be described included:

- Loss of control
- Escalating costs
- Limited/poor service
- Loss of priority
- Vulnerability to outsourcer going out of business
- Lack of staff loyalty
- Possibly locked into aged/unchanging technology
- Distance/language problems

(One mark per described disadvantage - maximum 8 marks) **TOTAL: 8+9+8=25**

Examiners' comments:

This was a popular question that most candidates were able to answer well. However, the evidence shows that some candidates ignored the requirement in Part a) for an explanation, confining their answer to a list of items to consider. Part b) was better answered, with candidates clearly drawing on their personal experiences of outsourcing. However, for Part c) candidates had difficulty identifying and describing the disadvantages of outsourcing, losing marks as a result.

A2. In the context of computer services management, explain EACH of the following:

a) Capability Maturity Model for Software

(9 marks)

b) Disaster Recovery Planning

(8 marks)

c) Computer Misuse Act 1990

(8 marks)

Answer pointers:

a) Capability Maturity Model for Software

The Capability Maturity Model (CMM) for Software describes the principles and practices underlying software process maturity and is intended to help software organisations improve the maturity of their software processes in terms of an evolutionary path from ad hoc, chaotic processed to mature, disciplined software processes. The 5 levels of process maturity are listed below:

1. **Initial - t**he software process is characterized as ad hoc, inconsistent, and occasionally even chaotic. Defined processes and standard practices to the extent that they exist at all are summarily abandoned during a crisis. Success depends on individual effort and talent.
2. **Repeatable - b**asic and consistent project management processes are established to track cost, schedule, and functionality. The process discipline is in place to repeat earlier successes on projects with similar applications.
3. **Defined - t**he software process for both management and engineering activities is documented, standardised, and integrated into a standard software process for the entire organisation. All projects use an approved, tailored version of the organisation's standard software process for developing and maintaining software.
4. **Managed** - detailed measurements of software process and product quality collected. Both the software process and products are quantitatively understood and controlled.
5. **Optimising** – continuous process improvement is enabled by quantitative feedback of the process and by piloting innovative ideas and technologies.

(Award marks for general description of CMM and further marks for process maturity levels described, maximum 9 marks)

b) Disaster Recovery Planning

Every business should ensure that it has effective contingency planning for disaster recovery. This is not just a technical issue but must form part of an overall business plan and needs senior management commitment. Vital records should be identified and protected. A disaster recovery plan may include some of the following:

- Systems critical to the organisation
- The recovery time frame for each system
- Easy to use reference manuals containing all the action that needs to be taken
- List of responsibilities
- Contact details for key staff
- Location of backup media
- Documentation to explain how the systems will be restored
- Details of alternative processing facilities available
- Pre-prepared press releases/letters to major customers
-

(Award marks for general description of disaster recovery planning and further marks for each point described, maximum 8 marks)

c) Computer Misuse Act 1990 – Notes

The Act makes provision for securing computer material against unauthorised access or modification and creates criminal offences for anyone doing so or attempting to do so. A person is guilty of an offence if:

- they cause a computer to perform any function with intent to secure access to any program or data held in any computer
- the access they intend to secure is unauthorised
- they know at the time they cause the computer to perform the function that that is the case
- they gain or attempt to gain unauthorised access to computer material with intent to commit further offences
- they make any unauthorised modification of computer material

(Award marks for general description of the Act and further marks for any offences described, maximum 8 marks)

Examiners' comments:

The evidence shows that many candidates demonstrated only a partial understanding of the Capability Maturity Model and did not specify the processes which an organisation needs to implement in order to move from one stage to another. Greater knowledge was shown for Disaster Recovery Planning, where candidates were able to draw on their own experiences. The Computer Misuse Act was generally well understood.

A3. *"The computer services knowledge and skills required to administer a small network of PCs are the same as those required to administer a large computer operation spread across several countries."*

Discuss, and justify, the extent to which you agree or disagree with the above statement.

(25 marks)

Answer pointers:

This question gave the candidate a good opportunity to demonstrate an in-depth knowledge of computer services in different scales of operation..

An answer could be in many forms but the better candidates were able to:

a) Discuss those areas which are **similar**, irrespective of size of organisation (concept of service, information security, compliance with legislation, management of software releases, provision of communications etc.)

b) Discuss **those areas of difference** (need to manage staff, suppliers, large numbers of users, help desks, DR plans, different groups of users)

c) Arrive at a "disagree" conclusion, **justifying reasons why**.

Marks

Fail mark range (0-9)

Candidate either **identifies** just one or two discussion points, or uses weak or incomplete arguments and possibly agreeing with the statement without justification. Typically the answer will have limited content.

Pass mark range (10-15)

Candidate **describes** two or three possible discussion points and the answer does have some content and the candidate's agreement/disagreement has some justification. There may be some gaps in understanding.

Medium mark range (16-20)

Candidate **considers** three or four discussion points and provides detailed explanations for each. A "disagree" conclusion is reached and justified.

High mark range (21-25)

Candidate **discusses and analyses** a wide range of different discussion points that are justified by rational explanation and relevant examples. A fully justified "disagree" conclusion is reached.

Examiners' comments:

This question was generally answered well, with many candidates achieving marks in the "medium" and "high" mark range. The evidence shows that those in the "fail" or "pass" mark ranges lost marks by either not justifying the conclusions reached or by failing to provide sufficient material upon which to base any conclusion.

SECTION A
(10th October 2016 - Second sitting)

A1. The Board members of an insurance company are considering using cloud computing to replace their in-house IT department and have asked you, a computer consultant, to advise them.

Some of the Board members have past experience of cloud computing and are concerned that service levels will decline. They are also concerned that the cloud computing company will perform unnecessary chargeable work and that the Board members will become involved in disputes. The other Board members disagree.

Prepare a report to include the following:

a) An explanation of how the required service levels could be achieved.
(7 marks)

b) A description of an escalation procedure that will prevent the Board becoming involved in minor disputes.
(6 marks)

c) An explanation of how Change Management could prevent unnecessary work being performed.
(6 marks)

d) A recommendation of appropriate governance procedures.
(6 marks)

Answer pointers:

a) Required service levels

The required service levels could be documented in a SLA. The Board, or its managers, will need to agree the service required and the cloud computing company will need to cost this. This process should be repeated until the organisation has agreed the service required at an affordable cost. This should remove all future arguments.

Typically, a SLA would contain some or all of the following:

- Scope of agreement/Terms of Reference
- Signatories to the agreement
- Date of next review/renewal date/notice period
- Dates of previous amendments
- Brief description of service
- Charges/payments/penalties
- Service hours
- Service availability
- User support levels
- Performance
- Details of agreed minimum functionality
- Details of any service charges involved
- Change control procedures
- Details of any planned changes
- Contingency
- Anticipated growth
- Restrictions

- Central print facilities
- Central print distribution
- User training
- Changes to SLA
- Description of change control procedures for requesting SLA amendments
- Fault reporting
- Escalation procedures
- Any other valid item

(Three marks for a description of an SLA, plus four marks for including some contents plus explanation. Maximum seven marks)

b) Escalation procedure

The purpose of an escalation procedure is to have formal levels of matching staff from each organisation. If the staff from the lowest level are unable to agree resolution of an issue, it is escalated to the next level, and so on. The highest level would be the CEOs of each organisation. For example:

Level	Cloud computing company	Insurance company
1	Help desk operator	Operational user
2	Help desk supervisor	User supervisor
3	Support manager	Departmental manager
4	Divisional Director	IT Director
5	CEO	CEO

The purpose of the escalation procedure is to prevent staff at all levels becoming involved in issues that should be resolved by others.

(Three marks for a description and three marks for examples, some examiner discretion. Maximum six marks)

c) Change Management

A Change Management Committee should be established. Typically, this will consist of representatives from the business users and the cloud computing company.

All changes should be given a priority category, typically 1-5, and estimates for the work involved should be available. Categories 1 and 2 may be defined as breakdown (Category 1) and business critical (Category 2).

The purpose of the Change Management Committee should be to:

- Jointly consider the respective priority of all issues
- Review and consider progress on Category 3, 4 & 5 issues
- Agree proposed service levels for resolution of Category 3, 4 & 5 issues

The Change Management Committee should ideally be chaired by a business user and should meet monthly and have the following benefits:

- Issues should be resolved according to the joint agreement of the interested parties, thereby concentrating effort on the most urgent items of work.
- There should be complete visibility of the work performed and all areas affected should have an opportunity to express their views as to the relative priorities.
- Management should be able to determine resources according to the required service levels

(Maximum six marks for a full explanation, some examiner discretion.)

d) Governance procedures

- All service levels must be within preset or benchmarked levels
- There must be agreed escalation and dispute resolution procedures
- The degree of "open-book" accounting must be determined
- There should be no exclusive agreements (new services can be put out to tender)
- There must be unambiguous charging, linked to realistic indices
- There must be agreed exit procedures
- Limits of liability must be preset
- Other at examiner's discretion

(One mark for each / maximum six marks)

(Total marks 7+6+6+6=25)

Examiners' comments:

This was a popular question and the majority of candidates who attempted this question achieved a pass. The highest marks were given to candidates who demonstrated a good working knowledge and understanding of service levels and the monitoring of the cloud computing company service provider. However, there is evidence that a few candidates demonstrated an understanding of governance procedures.

A2. In the context of computer services, identify the main points of the following:

a) ITIL
b) Depreciation of assets
c) Configuration management
d) PRINCE 2
e) Health and Safety (Display Screen Equipment) Regulations 1992

(5x5 marks)

Answer pointers:

Note: These are only a small sample of the possible acceptable answers. The scope of responses will to some extent be influenced by the experience and circumstances of the candidate.

ITIL:

IT Infrastructure Library – originally a core product of the UK CCTA, it has evolved into a services specification, delivery and monitoring standard covering a broad range of information technology and systems environments. Some candidates may only be familiar with the traditional "physical" series of books from the 1980s and 1990s, other will be aware of the current ITIL v3 / ITIL 2011 environment.

ITIL components:

a) ITIL Service Strategy: understands organizational objectives and customer needs.
b) ITIL Service Design: turns the service strategy into a plan for delivering the business objectives.
c) ITIL Service Transition: develops and improves capabilities for introducing new services into supported environments.
d) ITIL Service Operation: manages services in supported environments.
e) ITIL Continual Service Improvement: achieves services incremental and large-scale improvements.

Depreciation of assets:

Depreciation is an accounting concept which seeks to apply a systematic reduction in the recorded cost of a fixed asset – such as a personal computer, server or printer - over the useful life of the product.

Three important factors in establishing the rate of depreciation in each case are the useful life of the item, the residual (or salvage) value of the item at the end of its useful life and the method chosen to apply depreciation – which can be a straight line reduction, or one accelerated to depreciate much of the value early in the life of the item. Many IT hardware items are traditionally depreciated over a three year period – although this is not a standard.

Configuration management:

A concept which ensures that changes to an IT or IS infrastructure – including both hardware and software - are the result of positive management and operational choice, are carried out in a controlled manner, are fully documented and can be easily and effectively reversed if they are found to have an adverse impact on the overall system.

Good configuration management reduces the risk to IS/IT services and can ensure that investment if both appropriate and effective.

PRINCE 2:

PRINCE2 (an acronym for Projects IN Controlled Environments) is a de facto process-based method for effective project management. Used extensively by the UK Government, PRINCE2 is also widely recognised and used in the private sector, both in the UK and internationally. The PRINCE2 method is in the public domain, and offers non-proprietorial best practice guidance on project management.

Key features of PRINCE2:

- Focus on business justification
- Defined organisation structure for the project management team
- Product-based planning approach
- Emphasis on dividing the project into manageable and controllable stages
- Flexibility that can be applied at a level appropriate to the project.

Health and Safety (Display Screen Equipment) Regulations 1992:

This UK legislation seeks to protect the health of workers who regularly use display screen equipment – personal computers and similar devices.

Under the regulations, employers who have users of display screen equipment (DSE) – often still referred to as VDUs - are required to:

- analyse workstations to assess and reduce risks;
- make sure controls are in place;
- provide information and training;
- provide eye and eyesight tests on request, and special spectacles if needed;
- review the assessment when the user or DSE changes.

The regulations only apply to employers whose workers regularly use DSE as a significant part of their normal work (daily, for continuous periods of an hour or more). These workers are known as “DSE users”.

Examiners’ comments:

A popular question where the majority gained a satisfactory pass mark. There is evidence that a small number of candidates had full knowledge of all five topics but most generally had good knowledge of two, perhaps three of the topics. ITIL concepts, depreciation of assets and configuration management were generally understood but very few candidates had a detailed knowledge of PRINCE 2 apart from the fact that it is used in project management.

In the case of the final part few candidates discussed the Display Screen Equipment from a Health and Safety legislation perspective; mostly they referred to general health and safety issues.

A3. Compare and contrast the following pairs:

a) Computer Misuse Act 1990 **and** Copyright, Designs and Patents Act 1988.

(9 marks)

b) Operating system software **and** applications software.

(8 marks)

c) System development life cycle **and** the technology life cycle.

(8 marks)

Answer pointers:

a) Computer Misuse Act 1990 and Copyright, Designs and Patents Act 1988.

Both Acts are legal requirements which must be understood and followed by staff working in computer services.

The Computer Misuse Act makes provision for securing computer material against unauthorised access or modification and creates criminal offences for anyone doing so or attempting to do so, hacking being an example. A person is guilty of an offence if:

- they cause a computer to perform any function with intent to secure access to any program or data held in any computer
- the access they intend to secure is unauthorised
- they know at the time they cause the computer to perform the function that that is the case
- they gain or attempt to gain unauthorised access to computer material with intent to commit further offences
- they make any unauthorised modification of computer material

However, the Copyright, Designs and Patents Act specifically includes a computer program within the meaning of a 'literary work' and is concerned with copying, rather than hacking. When a software product is purchased, the purchaser merely buys the right to use the software in strict accordance with the terms and conditions within the licence agreement. Section 16(1)(a) of the 1988 Act states that any person who does a restricted act or authorises others to do such an act without the consent of the owner of the copyright will infringe the copyright. Examples include:

- Copying or reproducing software or hardware in any material form
- Issuing copies of software or hardware to the public when copies have not previously been in circulation
- Performing, showing or demonstrating the software or hardware in public
- Broadcasting it
- Making an adaptation or translation of it
- Reproducing the software or hardware

It is important that computer services staff understand these two Acts to ensure that the organisation they work for are not in breach.

(9 marks)

b) Operating system software and Applications software.

Both operating system software and applications software are collections of computer programs designed for a specific purpose.

However, operating system software manages hardware devices and related software and provides common services for computer programs. All computer programs, excluding firmware, require an operating system to function. Operating system programs are independent of any application.

An application program is a computer program designed to perform a group of coordinated functions, tasks, or activities for the benefit of the user. Examples of an application include a word processor, a spreadsheet, an accounting application or a stock control system.

In a computer services context, operating system software is used to enable all other programs to run.

(8 marks)

c). System development life cycle and the Technology life cycle.

Both follow a life cycle, with clearly defined stages. However, SDLC is for software development whilst TLC is for stages in a particular technology.

The systems development life cycle is a term used in systems engineering, information systems and software engineering to describe a process for planning, creating, testing, and deploying an information system. It consists of stages of development from initial feasibility through to implementation and maintenance.

The technology life cycle consists of stages that any technology goes through as it reaches maturity, closely followed by obsolescence. The stages consist of development, growth, maturity and decline.

In the context of computer services, it is important to understand at what stage any technology might be at when purchased. For example, computer services managers may not want to buy equipment or software at the development stage as it may not work properly and be beset with errors. Similarly, purchasing equipment or software at the maturity stage could mean that it may soon be unsupported.

(8 marks)

Examiners' comments:

The majority of candidates who attempted this question achieved a satisfactory pass. Although the question specifically asked the candidates to "compare and contrast" the topics, the evidence shows that many simply wrote a list of statements on individual topics.

Candidates demonstrated a vague knowledge of the technology life cycle and little understanding of the major differences between operating systems and application software.

SECTION B

B4. You work for the IT group of a local council. You have been told by your management that the IT support services of four councils in the same region of the country are to be merged and run as a single operation.

a) Write a report to the Head of Support Services of your council, who is a non-technical manager, describing THREE areas of IT service provision which would need to be considered in this merger.

(12 marks)

b) For ONE of these areas of IT service provision, draft a document which covers all the stages of negotiation and implementation which would be needed to safely transfer the service to the new service model.

(13 marks)

Answer pointers:

a)

- You are a technical person - you must demonstrate that you can communicate effectively with a non-technical manager.
- Use a report format which has all the standard attributes.
- Areas for discussion could typically include - network connectivity, domain structures, directory infrastructures, mail systems, security models.

Up to 3 marks for format and style
Up to 3 marks for each of THREE areas of provision

b)

1. Key point here is “safely transfer”. A council manages critical infrastructure which cannot afford downtime, loss of service elements or unreliability.
2. Note that the candidate is asked for the “stages of negotiation and implementation”. This lead should be followed!

Up to 3 marks for format
Up to 10 marks for material in support of discussion and decision

Examiners’ comments:

An unpopular question attempted by only 28% of candidates. The evidence shows that the main issue was that some candidates failed to identify the areas of IT service provision which needed to be considered in this merger in part (a); consequently it limited their ability to discuss the stages of negotiation and implementation which would be needed to safely transfer the service to the new service model for a particular an area of IT service provision. However, most candidates were able to answer the question in a satisfactory report format and style.

B5. The cost of a university’s computing facilities is apportioned between the various departments according to the number of students in each department. This method has worked satisfactorily in the past but has the drawback of benefiting high users of computing resources at the expense of low users. The issue has been put in sharp focus by a proposal to close the Music Department to all new students, as it is perceived to be too costly. The head of the Music Department argues that the current system of computer charging is grossly unfair, as the Music Department uses few computing resources compared to the Engineering Department, even though the number of students is similar.

The Vice-Chancellor has asked you, the Computer Services Manager, to propose a charging method that fairly reflects the resources used by each department. Write a report to the Vice-Chancellor to:

a) List all the elements of a computing service.

(7 marks)

b) Describe and justify ONE approach by which the elements could be charged fairly to each department according to their usage.

(10 marks)

c) Discuss how the implementation of revised charges could impact on the demand for computer services, both in the short term and the long term.

(8 marks)

Answer pointers:

This question tests the candidate's understanding of computer charges in a typical business situation where cost centres argue over the apportionment of costs.

a) Charging components:

Central computers:

- CPU usage
- Disk accesses
- Disk storage
- Printing/paper
- Security requirements
- Operating system software licence charges
- Application software licence charges
- Hardware maintenance
- Software maintenance
- Staff costs
- Cost of capital/replacement costs
- Etc.

Network Computers:

- PC/workstation hardware costs
- PC/workstation software costs
- Printers
- Toner
- Paper
- Cost of network
- Switches/routers etc
- Servers
- Security requirements
- Staff costs
- Hardware maintenance
- Software maintenance
- Cost of capital/replacement costs
- Etc.

(The question asks for a list of all computing elements. Half a mark for each element provided. Maximum seven marks.)

b) Charging method

No set answer, but the candidate should demonstrate understanding by suggesting a method to charge out all of the elements. One possible approach could be to differentiate between fixed costs and usage costs. Fixed costs could be charged directly to departments and usage costs according to actual usage.

Fixed Costs:

The desktop costs could be charged according to how many PC/workstations are in each department and the costs of each PC. The server costs could be apportioned according to the numbers of PC/workstations. This is fair, as the cost of a high usage PC is similar to that of a low-usage PC. Any powerful PCs/workstations would be charged a higher amount to reflect the initial higher purchase cost. Apportioning the server costs according to the number of PCs/workstations is also fair, as usage has minimal effect on the costs.

Variable costs:

One possibility: For central computing, the whole of the costs could be totalled and split between users according to their actual usage, rather than simply dividing the total cost by the number of users. One way of doing this is total the costs of each element and charge these as "computer units". So a certain amount of CPU usage might constitute a computer unit, as would a given number of disk accesses, a certain number of lines of print, etc. The charge for each unit would be varied as technology changes/develops or usage changes.

(Five marks each for identifying and describing fixed costs and variable costs, including a method of apportioning the costs. Maximum ten marks.)

c) Impact

Again, no set answer, but the examiners were seeking the candidate's degree of reasoning and understanding.

As the purpose of the charging method is for users to pay the fair costs of their usage, it is likely that usage may change. The past high usage departments may try to restrain their usage, as their costs are likely to rise. The low usage departments may not change their use at all. In the short term, it is possible that demand for computer resources will fall, rather than rise. However, in the longer term, department budgets and funding may change so the previous pattern of usage may return.

The computer services department will have to develop/purchase a system to charge the resources and may have to train/present the new charging methods to groups of users.

(Eight marks, depending upon the candidate's quality of argument / some examiner discretion)

Total marks for Question 5 are 7 + 10 + 8 = 25

Examiners' comments:

Not many candidates attempted this question and those who did generally gained marks for listing the applicable charging elements required in part (a). There is evidence to suggest that few understood the difference between fixed and variable costs and the implementation of charging for computer services. Only candidates that produced a reasonable attempt to answer part (b) were able to discuss a range of short-term and long-term impacts of introducing a charging method for computer services.