

**14.4.1 and 14.5 - NETWORKS - An international company wants to set up a new computer network and as an IT consultant you have been asked to prepare a report for the company directors, outlining the issues, and the potential benefits, to communications and productivity that such a network could bring. Your report should include: 1) a description of the various network components which would be involved; 2) a description of the relative merits of different types of network which could be considered; 3) a description of the security and accounting issues involved; 4) an explanation of networked applications which could improve communications and productivity within the company.**

- Max. 6: (Description of network components involved) (H)
  - 1 mark for the name of the component,
  - 1 mark for a brief description of its functionality.
  - Network cards in work stations to allow connection to cables (1),
  - routers to link network segments together (1),
  - switches (1),
  - bridges (1),
  - repeaters (1),
  - types of network cable (thin Ethernet, cat5, atm, fibre optic, ISDN, etc) (1),
  - servers (1),
  - gateway (1),
  - hub (1)
- Max. 6: the relative merits of different types of networks which could be considered; (M)
  - Contrasting of LAN and WAN (2,1,0) – 1name = 1 mark
  - Different topologies exist examples of topologies e.g. ring, bus, star, peer-to-peer (2,1,0)
  - Relative merits of different topologies (2,1,0)
  - Need for routers, repeaters, bridges etc. (2,1,0)
- Max. 6: the security and accounting issues involved; (S)
  - Need for hierarchical password system (2,1,0)
  - Different types of access can be allocated (2,1,0)
  - Accounting: recording/tracking which of users are logged-on (2,1,0)
  - Accounting: recording/tracking use of systems resources (2,1,0)
  - Need for organisational code of conduct (2,1,0)
- Max. 6: Networked- applications which could improve communications and productivity (A)
  - Explanation of e-mail (2,1,0)
  - Explanation of work-groups (2,1,0)
  - Explanation of Intranet (2,1,0)
  - Explanation of Internet (2,1,0)
  - Distributed databases (2,1,0)
  - Exposure to hacking/sparring (?) - firewall (2,1,0)
  - Spread of virus, increased risk of exposure (2,1,0)
  - Client server (2,1,0)

- EDI (2,1,0)
- Video conferencing explained (2,1.0)
- Real time stock control (2,1,0)
- EFTPOS (2,1,0)
- Real Time Stock Control (2,1,0)

**14.10 - PROTOCOLS AND STANDARDS - An IT consultant wrote in a trade journal: “The growth in technologies such as personal computers, the ‘world wide web’ and ‘wide-area networks’ has only come about because manufacturers and suppliers of network hardware and software have adopted standard communications protocols. The OSI seven-layer model has been a key factor in this development...” Discuss this statement. Particular attention should be given to: 1) the meaning of “communications protocols” and why they are required; 2) the OSI model and a description of the role of three of its layers; 3) the benefits and limitations of standards. Illustrate your answer with specific examples.**

- Max 6 marks for each section
- **(P) Explanation of protocols and why they are required. maximum 6**
  - Protocols are sets of rules/conventions defining how systems communicate with each other **(1)**
    - Covering:-
    - cabling **(1)**,
    - transmission mode **(1)**,
    - speed of transmission **(1)**,
    - data format **(1)**,
    - Error detection **(1)**,
    - error correction **(1)**,
    - web addresses **(1)**
  - Allowing any equipment or systems using same protocol to be connected **(1)**
- **(S) Explanation of the OSI seven-layer model: maximum 6**
  - Abbreviation for ‘Open systems interconnection’ **(1)**
  - **Description of what OSI means:** Hierarchy of conventions/layers dealing with different aspects of how systems interconnect **(2,1,0)**
  - For up to a max of three layers- 1 for naming and 1 for describing its role in the model
  - **Application layer (1)** -closest to user/highest level **(1)**, deals with interface between end users, applications programs and devices **(1)**, deals with accounting **(1)**, entry control **(1)**, user ID’s **(1)** FTP,HTTP
  - **Presentation Layer (1)**- ensures data in different formats can be exchanged **(1)**- e.g. ASCII and EBCDIC **(1)**, deals with encryption **(1)**
  - **Session Layer (1)** - users interface to network **(1)**, deals with users requests for network services **(1)**
  - **Transport Layer(1)**- deals with data transmission between host computers **(1)**, addressing **(1)**, error controls **(1)**
  - **Network layer (1)**- routing of information around network **(1)**, network accounting **(1)**
  - **data link layer (1)** - physical transmission media: cables, etc are subject to interference **(1)** this layer handles data transmission errors **(1)**, deals with techniques for acknowledgement and receipt of data **(1)**
  - **physical layer (1)** ,lowest level **(1)** deals with mechanical & electrical connections of devices- pin connections on plugs and sockets **(1)** , signal voltage levels **(1)** timings, etc. **(1)**
- **(B) Benefits and limitations of standard: maximum 6**

- Need for international forum to agree standards (2,1,0)
- Wider marketplace for products complying with standards (2,1,0)
- Potential of standards to slow developments - waiting for standards to change to accommodate new developments (2,1,0)
- Ability of major manufacturers to dictate global standards i.e. de-facto standards (2,1,0)
- Easier exchange of files between different platforms (2,1,0)

**14.4.1 and 14.5 - NETWORKS - A car-hire company has different offices across Europe. Customers can hire a vehicle from one office and return it to any other office. All the offices have network access to the company's internal distributed information system. The network also gives staff access to public local and wide-area information systems. Discuss this system. Particular attention should be given to: 1) the nature and significance of a distributed information system, 2) the types of information systems that you would expect to be available on such a network, 3) the data that should be distributed on this system, 4) the advantages and disadvantages of distributing the data across the network**

3. The solution for this question is intended to provide a framework of key concepts rather than a definitive solution. The aim is to establish an agreed standard that can be applied consistently, by all examiners, taking account of the many alternative answers to this type of question.

Mark allocations

- Max 6 for describing the nature and significance of a distributed information system.
- Max 6 marks for types of information systems that you would expect to be available on such a network.
- Max 6 for advantages/disadvantages
- Max 3 marks for explanation of what data you would expect to be distributed in this type of system

Maximum mark for content is 16/20. Up to 4 marks are available for the quality and coherence of the candidate's argument. TOTAL 20.

**Describe the nature and significance of a distributed information system**

Wide-area/long haul network rather than LAN [2,1,0]

Likely to include special microwave links, satellite, land-based links [2,1,0]

Communications protocols exist to determine how information is transferred [2,1,0]

Distributed control as well as distributed data [2,1,0]

I.e. control lies with computers at each node or location [2,1,0]

Need For High Bandwidth Or High Volume Of Data Transfer [2,1,0]

The fact that distribution of control and data is transparent to the user; [2,1,0] Max 6

**Describe, with examples, the types of information systems that you would expect to be available on such a network.**

Company Internet e.g. access to company wide code of conduct or work procedures; [2,1,0]

Internet access e.g. Company profile, details of key contacts, hire-charges, etc. [2,1,0]

Public networks E.g. 'Electronic Yellow Pages' for supplier contacts. [2,1,0]

Closed user groups by subscription only: E.g. Motor insurance or accident repair rates available to company employees only; [2,1,0]

Company wide applications such as invoicing, purchasing, payroll, personnel, etc. [2,1,0]

Company wide e-mail to improve communications. [2,1,0] Max 6

**Explain what data you would expect to be distributed in this type of system**

Customer records, vehicle records, loan records. [3,2,1,0]

**Advantages/disadvantages:** Faster data processing data is stored on the node where it is needed less delays communicating with a central server. [2,1,0]

More robust system; No reliance on a single server [2,1,0];

Disadvantages: More complex system - increased management overheads [2,1,0]

Difficult to back up entire system [2,1,0]

Increased security risks - more points of access [2,1,0]

Risk of viruses – all offices need up to date anti-virus software [3,1,0]

Max 6

**14.10 – PROTOCOLS AND STANDARDS - A local council has decided to standardise the ICT systems across all its departments. This is due to problems experienced in transferring data and staff between departments. Discuss the above statement. Include in your discussion. 1) the benefits that the staff may gain from this approach, 2) the benefits that the council may gain from this approach; 3) the reasons why staff may not wish to change.**

- **BENEFITS TO STAFF (S marks)**
  - ease of learning (1)
    - the council can produce standard training documentation that matches the workstation HCI (1)
  - easier transfer of skills (1)
    - due to consistency of interface (1)
  - user can make use of other workstations (1)
    - so user does not have to be fixed to one work area (1)
  - users are able to support each other (1)
    - meaning simple problems can usually be solved without recourse to user support (1)
  - standard setting of defaults (1)
    - e.g. word processing package can be set with standard margins to suit the standard printer (1)
  - easier distribution/use of standard items (1)
    - such as logos/templates/etc (1)
- **BENEFITS TO COUNCIL (C marks)**
  - less training overhead (1)
    - as everyone can attend the same training (1)
  - perceived image of council may improve (1)
    - as anything produced will now definitely be in the required style (1)
  - easier quality control (1)
    - as there are less things to go wrong if everything is done in a standard way (1)
  - easier to manage licensing (1)
    - as all workstations should have identical software content (1)
  - upgrades will be easier to administer (1) –
    - there is less management overhead (1)
  - security is easier to monitor (1)
    - it will be more obvious if a workstation has had its contents altered (1)
- **RESISTANCE TO CHANGE (R marks)**
  - consideration of skill level of user (1)
    - standard will only suit a certain cohort of users/it may be too low level for experts or too high level for novices (1)
  - less control over software (1)
    - user has to wait for software configuration to be changed for them rather than do it themselves (1)
  - availability of specific software (1)
    - unless software is standard, user may lose necessary functionality (1)

- 'special needs' consideration **(1)**
  - colour sets may not suit colour blind users/physical workstations may preclude use by those with other disabilities **(1)**
- original system served user perfectly well **(1)**
  - so user cannot see the point in changing/sees this as a waste of their time **(1)**

**14.2 and 14.8 – software evaluation and software development. Software solutions can be provided for specialist applications in a number of ways. Discuss the possible ways of providing such solutions. Your discussion should include: 1) how the solution can be provided; 2) advantages of providing the solution in this way; 3) disadvantages of providing the solution in this way; 4) criteria for deciding which approach is the most appropriate.**

- *Possible way of providing the solution (P marks)*
  - Use generic application package/ generator to develop a specific solution (1)
  - Purchase specialist software off the shelf appropriate to the specific task (1)
  - Employ an in-house team to develop a specific solution (1)
  - Employ external consultants to develop a solution that meets the user specification (1)
- *Advantages of each method (A marks)*
  - *Generic*
    - Easily available solution c/w the others (1)
    - Lots of support available in terms of documentation, courses etc. (1)
    - Can be adapted for solving other problems (1)
    - Large skill base available in the workforce (1)
    - Able to transport data to other applications easily (1).
  - *Off-the-shelf specific package - max 2 marks*
    - Designed with this type of problem in mind (1)
    - Relatively short lead-time to operation c/w others (1)
    - Well supported by developers and other users (1)
    - Availability of personnel with proven skills on this software (1)
  - *Bespoke software - max 2 marks*
    - Exact match to the problem at hand (1)
    - More control over final outcome c/w others (1)
    - Possibility of marketing solution if very successful (1)
    - There may not be a suitable software solution on the market for this problem, so there may be no other choice (1)
- *Disadvantages of each method - (D marks)*
  - *Generic*
    - Solution still has to be created (1)
    - May not produce the most efficient/ ideal solutions
    - Difficult/ ill advised to alter coding of the application/ alterations may invalidate available support (1)
  - *Off-the-shelf specific package - max 2 marks*
    - May not have all the required functionality/ may have too much functionality (1)
    - May use proprietary file formats that cannot be shared (1)
    - Upgrades may be hard to get hold of/ expensive (1)
    - Will the company still be around in the future to support/ develop the product? (1)
  - *Bespoke software - max 2 marks*
    - Very long lead-time to completion of project (1)
    - Most expensive option c/w the others (1)

- Problem needs defining unambiguously for the developers **(1)**
- Quality of documentation/ support may not be of the required standard **(1)**
- Credit any advantages that are specific to development either in-house or by external consultants.
- *Criteria for selecting appropriate method (C marks)*
  - Company policy - does the company insist we use a certain method? **(1)**
  - Time constraints - how long do we have until we have to make use of the new software? **(1)**
  - Cost constraints - how much can we afford to spend on this solution? **(1)**
  - Personnel - do we have people with the skills available to purchase/ create/ use the new software?
  - Support issues - what support is available for this software/ how long will it be available for? **(1)**
  - Affect on the company - how will this solution impact on the rest of our business? **(1)**

**14.2 and 14.8 – software evaluation and software development. An employment agency currently holds information about job seekers and job vacancies on an information system that is several years old. As a consultant, you have been asked to help this company look at alternative software solutions. Discuss what you would do in order to produce a report for this company. Your discussion should include: 1) how you will establish your client’s needs; 2) the criteria you will use to evaluate possible solutions; 3) how you will match software capabilities to your client’s needs; 4) the content of the evaluation report you will write for your client.**

- *How client need is established (H marks)*
  - Initial meeting with end-user (1)
    - so that requirements are clear and understood by both parties (1)
  - Observation of the current system (1)
    - so that tasks that are carried out can be evaluated/ it can be seen where the current system works/ doesn’t work (1)
  - Look at documentation currently in use (1)
    - to see exactly the type of data that is currently used (1)
  - Interviews with users at different points in the system (1)
    - to get their perspective on the current system (1)
- *Criteria used to evaluate (C marks)*
  - **Functionality:** what does the system do/ does the system meet the end-user requirements (1)
    - for example if a list of ‘chef’ vacancies cannot be created, the software doesn’t do everything the company may need (1)
  - **Robustness:** how reliable is the system/ will the system cope with the demands placed upon it (1);
    - the company will deal with thousands of clients and thousands of vacancies – can the system deal with this volume of data without crashing? (1)
  - **Performance:** how well does the system carry out tasks required of it (1);
    - clients will want to know about vacancies quickly – if the system takes a long time to produce a list meeting client needs, the vacancies may already be filled (1)
  - **Resource requirements/ Compatibility:** what hardware/ software/ personnel does the system require (1);
    - can this system run on the hardware/ operating system currently in use by the company/ does the company have the personnel required to use/ manage the system (1)
  - **Transferability:** can legacy data be incorporated into the new system (1);
    - current data must be accessible, as well as data captured after the new system is in place (1)
  - **Portability:** can data be shared with other applications (1);
    - the company may want to produce statistics using another application about how many people were placed in certain job types every month (1)
  - **User support:** how is the system supported/ training provided/ help available (1);
    - the company will want to know that if things go wrong they can get advice in good time (1)
  - **Usability/ human-machine interface:** is method of accessing the system suitable for the end-user (1);

- if the system is not easy to use, the users are not likely to continue using it/ the company is likely to be less productive **(1)**
- **Cost benefit:** how soon can the company recoup costs **(1)**
  - if the system costs too much the company would suffer **(1)**      max 6 marks
- Match software capabilities to client need **(M marks)**
  - Establish which software is available to complete the task(s) **(1)**
  - Apply the criteria decided upon to these software choices **(1)**
  - Apply weighting to the criteria in order to compare different solutions **(1)**      max 3 marks
- *Content of the report (R marks)*
- **Description of the methodology:** the approach(es) used in the creation of the report **(1)**;
  - so that the client understands what has been done**(1)**
- **Evaluation:** the actual findings/ applying the criteria decided upon to the solutions under consideration/ discussion of advantages and disadvantages of different possible solutions **(1)**
- **Recommendation:** the solution that best fits the clients needs**(1)**
- **Justification:** how this decision was reached/ how the evaluation was interpreted to inform this decision **(1)**

**14.10 – PROTOCOLS AND STANDARDS and MANAGING CHANGE - 7. A local health authority has decided to standardise the ICT systems across all departments. Discuss the above decision. Include in your answer: 1) the benefits that the staff may gain from the standardisation; 2) the benefits that the health authority may gain from the standardisation; 3) the reasons why staff may not wish to change to a new system.**

- **BENEFITS TO STAFF (S marks)**
  - ease of learning (1)
  - easier transfer of skills (1)
  - flexibility of work location (1)
  - users are able to support each other (1)
  - use of templates (1)
  - easier communication (1)
- **BENEFITS TO HEALTH AUTHORITY (H marks)**
  - less training overhead (1)
  - perceived image of health authority may improve (1)
  - easier quality control (1)
  - easier to manage licensing (1)
  - upgrades will be easier to administer (1)
  - security is easier to monitor (1)
- **RESISTANCE TO CHANGE (R marks)**
  - effect on staff morale (1)
  - lack of consultation/discussion with staff (1)
  - staff may perceive constant change has occurred (1)
  - staff feel current skills are undervalued/ no longer of use (1)
  - staff perceive training as a waste of time (1)
  - consideration of skill level of user (1)
  - less control over software (1)
  - availability of specific software (1)
  - original system served user perfectly well (1)

**14.3 and 14.4.4 – DATABASE MANGEMENT CONCEPTS AND CLIENT/SERVERS - 8.** A charitable organisation needs to coordinate all the data that it holds at several locations across the world. They have discovered that there is often conflicting data held in different sites, and time is wasted in reconciling them. A consultant has recommended that they use a relational database management system. The organisation has accepted this advice and is now advertising for the post of database administrator. In the advertisement it states that each applicant should write a supporting letter. You have decided to apply for this post. Write a letter in support of your application, paying particular attention to: 1) the role of a database administrator; 2) how a relational database management system can help with this problem; 3) the advantages of a client/server solution to this problem.

- The role of database administrator (**R marks**)
  - Design of the database (**1**)
    - setting up appropriate tables, relationships, fields, naming conventions etc. (**1**)
  - Maintain the data dictionary (**1**)
    - i.e. the data structure, aliases etc. (**1**)
  - Monitoring performance of RDBMS (**1**)
    - and making appropriate adjustments to deal with problems as they arise e.g. system taking too long to produce a report (**1**)
  - Notifying user of changes made (**1**)
    - so that they can make changes to the way they use the database appropriately e.g. availability of new reports/ queries (**1**)
  - Allocation of access to users (**1**)
    - including access rights, providing user names etc. (**1**)
  - Provide training to the users as appropriate (**1**)
    - so new users learn how to use the system, and existing users get updates as necessary/ DBA will have to create remote learning materials in this context and be available to help with any queries that arise (**1**)
  - In charge of the backup procedure (**1**)
    - ensuring that the database is available to users at the times that they need it (**1**)
  - **Max 3 × (2,1,0) marks**
- *Application of a relational database management system (A marks)*
  - Provides a buffer between the user and the underlying structure of the database (**1**)
    - so the user is not concerned with the structure of the database, just with making relevant use of the data (**1**)
  - Can be used to create a consistent database with a consistent interface (**1**)
    - so if users move from one location to another they already know how to use the system (**1**)
  - RDBMS will control access to data (**1**)
    - so all places will see the most up to date data (**1**)
  - In event of disaster, RDBMS should help with disaster recovery (**1**)

- e.g. provide ability to consolidate data and roll back to a known correct state **(1)**
- RDBMS may provide improved security to the system **(1)**
  - so that there is less chance of inexperienced users inadvertently changing data/ malicious attempts to corrupt data succeeding **(1)**
- **Max 3 × (2,1,0) marks**
- *The advantages of a client/ server solution to the problem (C marks)*
  - Centralised store of data **(1)**
    - so there is control over the data itself; must be consistent across all users **(1)**
  - Control over access **(1)**
    - this can be monitored and restrictions set up as necessary **(1)**
  - Lower level of equipment needed as clients **(1)**
    - as processing and storage is dealt with centrally **(1)**
  - Network traffic issues **(1)**
    - only requests and results are sent over the network, not entire tables of data **(1)**
  - Clients do not need all the software to run the database **(1)**
    - they only need software to access the database, not the rest of the RDMBS **(1)**
  - **Max 3 × (2,1,0) marks**



**14.5 – NETWORKS - You are in charge of ICT in a large secondary school that has to be rebuilt. The head teacher wants all the computers in the new buildings to be networked. Write a report for the head teacher on the issues involved. Pay particular attention to: 1) security measures for the network; 2) network auditing; 3) network accounting.**

- **Security measures for the network (S marks)**
  - Use firewall (1)
    - protect system from attack/hackers (1)
  - Set access rights/levels (1)

- so only authorised users have access to sensitive data/need login and password (1)
- Install anti-virus software (1)
  - protect from viruses (1)
- Use audit trails (1)
  - detect misuse (1)
- Use physical measures/locks/security officers (1)
  - prevent physical access/theft (1)
- Backup server / fit UPS(1)
  - protect from natural disaster/power failure (1)
- Code of conduct / company rules (1)
  - example of security procedure (1)
- Credit any sensible **network** answer (1)
- **Network auditing (U marks)**
  - Use of operating system/other software (1)
    - To make a log/record/trail (1)
    - To detect/deter misuse (1)
  - **To track:**
    - Identity of user/who logged on (1)
    - how long logged on for / what time logged on and logged off (1)
    - At what workstation/network address (1) where (0)
    - Number of logon attempts/attempts at unauthorized accesses (1)
    - What applications run (1)
    - What files opened/ web pages/ what reads/writes/activities (1)
    - What systems failures/ crashes / error messages (1)
- **Network accounting (C marks)**
  - Use of operating system/other software (1) (**not here and in U**)
  - To make a log/record/trail (1) (**not here and in U**)
  - Of network traffic / throughput (1)
  - Of network resource use (1)
  - To plan for network flow peaks (1)
  - To enable upgrade strategies (1)
  - To charge e.g. departments appropriately (1)
- **to track:**
  - Use of processor time (1)
  - Use of memory / disk space (1)
  - Use of printer consumables / ink/ toner/ paper (1)
  - Use of applications (1) (**not here and in U**)
  - Use of application licenses (1)
  - What files opened/ web pages/ what reads/writes/activities (1)

**14.4.4, 14.6, 14.7 AND 14.9 – CLIENT SERVER SYSTEMS, HCI AND SOFTWARE RELIABILITY - The owner of a large private hotel has been advised to purchase a new ICT system. He is concerned that he could be taken advantage of by ICT suppliers, as he has little knowledge of ICT. He asks you, as an independent consultant, to prepare some guidelines for him so that he can understand the issues involved. Write a report for the owner, paying particular attention to: 1) system requirements; 2) user interface requirements; 3) reliability of the system.**

**System requirements (S marks)**

- required functions (1)
- assessment of current system (1)
- available alternatives (1)
- budget restraints (1)
- transferability of data (1)
- any 'compatibility' issue (1)
- hardware requirements (1)
- security (1)
- [max 6 marks]

**User Interface requirements (1 marks)**

- appropriateness of management interface (1)
- appropriateness of customer interface (1)
- appropriateness of operator interface (1)
- use of sound/images/colour/clear fonts (1)
- clear language (1)
- help/error messages for beginners(1)
- consistent with legacy software (1)
- [max 6 marks]

**Reliability (R marks)**

- ensure tested with existing hotel hardware (1)
- ensure tested with existing hotel software (1)
- ensure tested with hotel data (1)
- reputation of supplier / producer (1)
- guidelines about availability of maintenance (1)
- Can also be given if not awarded as 'S' marks:
- can handle current and projected volumes of data
- system uptime (1)
- error recovery (1)
- guidelines about availability of support / training (1)
- [max 6 marks]

### **14.3, 14.4 AND 14.5 – DATABASE MANAGEMENT CONCEPTS, COMMUNICATION AND INFORMATION SYSTEMS, NETWORKS**

**- A large company has many retail outlets around the United Kingdom selling consumer electronic devices such as televisions, audio equipment and personal digital assistants. The current stock control system is now inadequate for the company's business needs. An important decision for the company to make is how to implement its new stock control system. It is essential that each outlet will have access to the stock control data of all the other outlets. Each outlet must also have control over its own stock. Discuss how this company might implement a stock control database system with the above features. Include in your discussion consideration of the following issues: 1) resource requirements; 2) management of the data; 3) management of the system.**

*Resource requirements (R marks)*

- Human Resources
- Hardware Resources
- Software Resources
- Network Resources                      max 6 marks

*Management of data (D marks)*

- Distributed database
- Client/server database
- Data consistency
- Data integrity
- Data transfer
- *Management of the system (S marks)*
  - Access Rights
  - Technical Support
  - Security
  - Backup
  - Audit
  - Changeover method

**14.1 – POLICY AND STRATEGY ISSUES, AND BACKING UP - A partnership of architects is experiencing problems with its computer systems, which are several years old. These systems run both generic and specialist software, and make use of a range of hardware, including specialist devices. You have been asked to write a report that includes: 1) the reasons why this organisation may wish to upgrade its hardware, and how it could be done; 2) the reasons why this organisation may wish to upgrade its software, and how it could be done; 3) an outline of a backup strategy for this partnership.**

Hardware upgrade issues (**H** marks)

- to keep up with industrial trends (1)
- economic issues (1)
- improved technology (1)
- reduce maintenance costs/time (1)
- lack of support for equipment (1)
- instigate a rolling programme (1)
- have different approaches for specialist and general hardware (1)
- one mark per expansion of any relevant point (1) max 6 marks

Software upgrade issues (**S** marks)

- Improve functionality (1)
- Legal changes/ standards changes (1)
- Cost benefit (1)
- Compatibility with hardware (1)
- Changeover method (1)
- Method of obtaining the software (1)

Backup strategy (**B** marks)

- **Media** (1) plus why important/ appropriate media choice (1)
- **Frequency** (1) plus reason for appropriate frequency (1)
- **Storage** (1) plus description of appropriate storage choice (1)
- **Content** (1) plus description of what constitutes appropriate content (1)
- **Responsibility** (1) plus description of who would be appropriate (1)
- **Logging** (1) plus description of why logging is required (1)
- **Recovery testing** (1) plus description of why this is necessary (1)

## Quality of Written Communication Marks (Q marks)

- 4 marks** The candidate has expressed complex ideas clearly and fluently. Sentences and paragraphs follow on from one another smoothly and logically. Arguments will be consistently relevant and well structured. There will be few, if any, errors of grammar, punctuation and spelling.
- 3 marks** The candidate has expressed moderately complex ideas clearly and reasonably fluently through well-linked sentences and paragraphs. Arguments will be generally relevant and well structured. There may be occasional errors of grammar, punctuation and spelling.
- 2 marks** The candidate has expressed straightforward ideas clearly, if not always fluently. Sentences and paragraphs may not always be well connected. Arguments may sometimes stray from the point or be weakly presented. There may be some errors of grammar, punctuation and spelling, but not such as to suggest a weakness in these areas.
- 1 mark** The candidate has expressed simple ideas clearly, but may be imprecise and awkward in dealing with complex or subtle concepts. Arguments may be of doubtful relevance or obscurely presented. Errors in grammar, punctuation and spelling may be noticeable and intrusive, suggesting weaknesses in these areas.

**With this type of criteria candidates are given a mark on the basis of a “best-fit” approach.**

**[20]**