GCE

Information & Communication Technology

Advanced GCE **A2 7838**

Advanced Subsidiary GCE **AS 3838**

Mark Schemes for the Units

January 2007

3838/7838/MS/R/07J

Oxford Cambridge and RSA Examinations

CONTENTS

Advanced GCE Information and Communication Technology (7838)

Advanced Subsidiary GCE Information and Communication Technology (3838)

MARK SCHEMES ON THE UNITS

Mark Scheme 2512
January 2007

The Awarding of Marks for Written Communication

Marks are awarded for the use of accurate spelling, punctuation and grammar according to the following criteria.

Marks

Below Threshold Performance		**0**
Threshold performance	Candidates spell, punctuate and use the rules of grammar with reasonable accuracy; they use a limited range of specialist terms appropriately.	**1**
Intermediate performance	Candidates spell, punctuate and use the rules of grammar with considerable accuracy; they use a good range of specialist terms with facility.	**2–3**
High performance	Candidates spell, punctuate and use the rules of grammar with almost faultless accuracy, deploying a range of grammatical constructions; they use a wide range of specialist terms adeptly and with precision.	**4**

The marks will be awarded on an impression basis and will reflect the candidate's performance in the paper as a whole.

Rule of thumb

0   **Award only in rare circumstances eg no written work or minimal, which is not in sentences and is spelt incorrectly, without use of appropriate technical terms.**

1   **Questions answered using statements or single words only.**

2   **Candidates use some sentences and some technical words. Some errors in grammar and spelling.**

3   **Candidates use sentences correctly, with few errors in grammar. Some technical words used appropriately and with limited spelling errors.**

4   **Almost perfect use of grammar, technical vocabulary and spelling.**

The 'norm' will probably be 3 marks. However, do not be afraid to award 4 marks if appropriate.

1   **(a)**   **Using an example, define the term data.**

1 for definition:
- No meaning (1)
- Raw facts (1)
- Unprocessed data (1)
- Letters/numbers/alphanumeric characters (1)

1 for example:
Must not have meaning or explanation eg 12345 (1)   **[2]**

   (b)   **Identify three factors that could affect the quality of the information.**

Any 3 from:
- Completeness (1)
- Presentation (1)
- Age (1)
- Volume/level of detail (1)
- Accuracy/correct (1)
- Relevance (1)   **[3]**

   (c)   (i)   **State what is meant by syntax.**

Any 1 from:
- Rules (1)
- Grammatical arrangement (1)   **[1]**

       (ii)   **Give an example of a syntactic aspect of information.**

       Any valid example, eg capital letter at beginning of sentence (1)   **[1]**

   (d)   **Give two organisations who would want to buy the information. For each organisation give an example of how they would use the information.**

Identification of organisation to max 2
How information used – 1 per organisation to a max 2

Examples:
- Advertising firms (1)
- Target specific people who buy their products (1)

- Manufacturers (1)
- Spending patterns (1)

- Credit card companies (1)
- Spending patterns (1)

- Other supermarkets (1)
- See how competition is doing (1)   **[4]**

2   (a)   Compare off-the-shelf and custom-written software for keeping members' records.

Feature	Off-The-Shelf	Custom-Written
Cost	Either a one-off cost or a yearly rental cost. May be talking thousands of pounds plus additional costs for each station it is used on.	Need to hire the company/person to write the software. Many thousands of pounds. You do own the software at the end and can sell it on to recoup some of the costs.
Support	Discussion groups, on-line help, books and training courses.	Only likely to get support from the people who write the software – problems if they choose not to support it or go bankrupt.
Purpose	May have to be altered and edited to fit the purpose. May never meet the purpose. Will have many additional features that may or may not be used. Better to have them there and never use them than to want them and not to have them?	Will fit the purpose precisely and do exactly what was asked. May be some problems if the analysis was wrong. If it is not specified it will not be there.
Testing	Will have been tested by many individuals. Bug fixes will be released regularly by the company.	Will only have been tested by a few people and there may be many bugs. Correcting them will take time.
Availability	Immediately available.	Will take time to complete the analysis, etc. May be a few months.
Choice	Can be lots of choice.	There is choice of who to get to write the software and as the design will be specified by the end-users they will have a lot of say.
Upgrade	Likely to use a standard file format and the company is likely to release upgraded products. Support for new peripherals and operating systems as standard.	New printers and drivers for peripherals may not be supported and major upgrades might not happen. If it does not use a recognised file format the software may not be able to be upgraded.
New Staff	May well be familiar with the new software.	Unlikely to be familiar with the new software.
Footprint	Large footprint.	Small footprint.

[6]

(b) **Describe the following terms associated with relational databases.**

(i) **Primary key**

Any 2 from:
- Unique (1)
- Required for 1NF (1)
- Identifies a record (1) **[2]**

(ii) **Attribute**

Any 2 from:
- Single data item (1)
- Field/column (1)
- Can have its own data type (1)
- Can be validated independently (1) **[2]**

(iii) **Referential Integrity**

Any 2 from:
- No orphan records (1)
- Value must exist in linked entity (1)
- Linked by foreign key (1)
- Allows cascade update/delete (1) **[2]**

(c) **(i)** **Describe the purpose of verification.**

2 from:
- To ensure that the data has been **entered** correctly (1)
- No mistakes when copying (1)
- To ensure the source and object are the same (1) **[2]**

(ii) **Describe how double entry works as a method of verification.**

2 from:
- Data entered twice (1)
- by different methods/people/times (1)
- compared (1) **[2]**

(iii) **Identify one other type of verification.**

1 from:
- Manual checking (1)
- Proof reading (1)
- Lookup (1) [1]

3   **Identify three input devices that could be used by a person who has no arms.**

      3 from:
- Head mouse/pointer (1)
- Foot mouse (1)
- Puff suck switch (1)
- Microphone (1)
- Eye typer (1)   **[3]**

4   **(a)**

            (i)   **Describe what is meant by utility software**

                   2 from:
- Provide general support/maintenance function (1)
- Small programs (1)
- Part of system software (1)
- Perform individual functions (1)   **[2]**

            (ii)   **Identify one type of utility software and state its purpose**.

                   One for identify, second for purpose.
                   No brand names, examples:
- Compression (1) shrink size of files (1)
- Disk copier (1) backup files (1)   **[2]**

        (b)   **Identify two features of self documenting software.**

             2 from:
- Tool tips (1)
- Internal help guides/no external manuals (1)
- Meaningful variable names (1)
- Commented code (1)
- On-line help (1)
- Indenting code (1)
- Informative error messages (1)   **[2]**

5   **(a)**   **Identify one characteristic of a single-user operating system.**

            Only one user **at a time** (1)   **[1]**

        (b)   **Identify three characteristics of a multi-tasking operating system.**

            3 from:
- Several tasks/applications at the same time (1)
- Only one CPU appearance of executing at the same time (1)
- Switches between tasks (1)
- Programs given time slice (1)
- More than one CPU required for multitasking (1)
- Program takes over CPU for as long as it needs (1)   **[3]**

6 **(a)** **Identify two features of a LAN.**

2 from:
- Close geographical proximity/shared hardware (1)
- Direct connection possible (1)
- Cables owned by company (1)
- Requires NOS (1) **[2]**

(b) **Describe three advantages to the employees of networking the computers.**

Two marks per advantage, one for identify, second for describe. Must be to the employees, examples:
.

Can use any machine (1) access all work (1)
Work backed up/anti virus centrally (1) less likely to get lost/no responsibility (1)
Email (1) can communicate (1)
Standardised settings (1) each machine the same (1)
Print from any machine (1) no need to move (1)
Share files (1) more than one person can use file at same time (1)

[6]

(c)

(i) **Describe the importance of having a high bandwidth when using the webcams.**

2 from:
- Sound and pictures synchronized (1)
- Time sensitivity (1)
- No distortion/blocking of image (1)
- No lagging (1) **[2]**

(ii) **Describe how the analogue signal is converted into a digital signal.**

2 from:
- The analogue signal is sampled(1)
- read as a voltage level (1)
- The voltage level is converted into a binary signal (1) **[2]**

(d)

    (i) **Identify two components of an expert system.**

        2 from:
- User interface (1)
- Knowledge base (1)
- Inference engine (1)
- Rule base (1) **[2]**

    (ii) **Describe what is meant by an expert system.**

        2 from:
- Gives answers to questions (1)
- Acts like a human expert (1)
- Narrow range of expertise (1)
- Can show workings (1)
- Can learn from experience/heuristic (1)
- Ask questions based on previous response (1)
- Based on probabilities, not certainties (1)
- Allow example (1) **[2]**

7   **(a)**   **(i)** **Describe a suitable hashing algorithm to allow access to the hash table.**

        2 from:
- Identification of algorithm (1)
- Explanation of algorithm (1)
- Creates >2000 results (1) **[2]**

    (ii) **State two identification numbers that will cause a collision using your hashing algorithm.**

        Any two 7 digit numbers that cause a clash (1) **[1]**

  (b) **Identify <u>one</u> method to overcome the problem of collisions.**

    1 from:
- Allow example of method (1)
- Looping integers (1)
- Overflow area (1)
- Next available space (1) **[1]**

8   **(a)** **Describe two differences between a hub and a switch.**

    Two marks per difference, max 2 for one side only:
- Switch supplies full backbone (1), hub only a part (1)
- Hub is a repeater (1), switch is a bridge (1)
- Hub broadcasts on all cables (1), switch on one with machine at end of it (1)
- Hub makes no decisions (1), switch makes decisions based on MAC address (1) **[4]**

(b) **Identify one other hardware device and one piece of software Mr Lead will require to create network.**

One from hardware and one from software (no brand names) eg
- Hardware: NIC/Router/WAP/cable (1)
- Software: Protocol/email/browser/NOS (1)   **[2]**

9   **(a)**   **Explain why a code of conduct is required.**

Any 4 from:
- So responsibilities are known (1) by staff and employees (1)
- So expectations are known (1)
- Lays down what can (1) and cannot be done (1)
- Used in legal action (1) so action can be taken (1)   [4]

   (b)   **Describe two procedures they could introduce to prevent theft of data from the computer systems.**

Two from examples, one for identify, second for description:
- Locks/cameras/guards (1) to prevent physical access (1)
- Passwords (1) verifies user names/to restrict access (1)
- Biometric security (1) unique features of the individual are used to gain access/eg retina scan (1)
- Stop them using portable media (1) eg USB disks (1)   [4]

   (c)   **Describe the purpose of the RIP Act.**

Any 4 from:
- Allow monitoring of people's Internet habits /files/emails (1)
- Makes intentional interception without lawful authority illegal (1)
- Allow the intercepting (1) and decoding of communications (1)
- Bring Internet monitoring (1) in line with telephone monitoring (1)
- Cannot record to anonymous telephone helplines (1)
- Force users to give up PIN/encryption codes (1)
- Cannot record calls to anonymous telephone helplines   [4]

10   **Discuss the impact on individuals of increasing their reliance on automated ICT systems.**

Seven marks for discussion, 1 mark for conclusion:

0 – 2	**Identification only**
	Identification of 1 point only (1)
	Identification of 2 points or more (2)
3 – 4	**Advantage only OR Disadvantage only**
	1 advantage (3)
	2 or more advantages (4)
	1 disadvantage (3)
	2 or more disadvantages (4)
5 – 7	**Advantages AND Disadvantages**
	Advantages of 1 and disadvantages of 1 (5)
	Advantages of 2 and disadvantages of 2 (6)
	Advantages of 3 and disadvantages of 2 (7)
	Advantages of 2 and disadvantages of 3 (7)

Identification:
A relevant point that relates to the question and involves ICT. It is not expanded upon or implications given.

Advantage/Disadvantage:
The point is applied to the situation and the advantages or disadvantages are expanded upon.

Codes to use are:
- I – Identification
- P – Advantage (positive)
- N – Disadvantage (negative)
- C – Conclusion (1)

Points to cover may include:
Lose skills, reliance on electricity, no physical understanding of how things work (1)

Advantages (expanded) to include:
Everyday tasks that individuals do not want to do are done by computers; computers hold information and it is easier to access it automatically increasing our knowledge and understanding; more time for leisure, creating employment in the leisure industry (P)

Disadvantages (expanded) to include:
People could lose their jobs as computers take over their work; skills will be lost so if there is a power cut we will not know how to survive (N)

Points to cover may include:
- Employment
- Skill loss
- New industries
- Lack of understanding

Code	Marks
I	1
II	2
P	3
N	3
PP	4
NN	4
PN	5
PPNN	6
PPPNN/PPNNN	7

**Mark Scheme 2514
January 2007**

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Question	Mark

1   (a)   Describe the following features of a word-processing package.

Up to 2 per point

(i)   Paragraph Style
- Used to define features of text (1)
- Can be predefined/housestyle (1)
- Features include alignment/line spacing/font size and style/number/bullets (1)

[2]

(ii)   Section
- Portion of a document (1) in which page formatting options are set (1)
- package treats document as single section (1) Until section breaks are inserted (1)
- Can be used to vary layout (1) within a page/pages (1)

[2]

(b)   Describe the following features of a desktop publishing package.

Up to 2 per point

(i)   Frames
- Area of a page/screen (1) that contains text/graphics (1)
- Frames can be resized/moved (1) independently (1)
- Changes to contents of a frame (1) will not affect the content of another (1)
- Frames can be linked together (1) contents can flow/autoflow (1)
- Frames act as different sections (1) that can be moved until the layout is acceptable to user (1)

[2]

(ii)   Grouping
- Several objects/frames (1) will behave as one (1)
- They can be moved/resized/rotated (1) as one (1)
- Preserves the arrangement of all objects (1)

[2]

Question			**Mark**

1   **(c)**   **Describe two advantages and one disadvantage of using Wizards.**

              Max 2 per point

              Any two from:
              Advantages:
- Speed with which an item is created (1)
- Standard formats (1) to choose from (1)
- User-friendly approach/novice users can develop documents (1) less training required (1)
- Corporate image can be applied (1) all new documents created will look the same (1)

              Any one from
              Disadvantages:
- Presentation may look similar to other companies (1) may not follow house style (1)
- Wizard may offer you options you do not want (1) final product may not meet end-user requirements (1)

                                                                 [6]

    (d)   **Describe how a style sheet could be used in the creation of the brochure.**

              Any four from:
- Used to set out the layout of brochure (1)
- Are predefined (1) follow company existing housestyle (1)
- Components defined (1) include font size/alignment/font style (1)
- Give flexibility for individuality of non predefined components (1)
- Using a style sheet a team of people (1) working remotely can produce parts of brochure (1)

                                                                   [4]

    (e)   **Explain one advantage and two disadvantages of using an image library as the source for these graphics.**

              Max two per point

              Advantages:
- Readily available (1) does not have to be designed (1)
- Saves time/cost (1) of employing specialist designers (1)
- Lots of images on page (1) can compare images (1)
- Categories of images (1) are predefined/grouped (1)

Question   **Mark**

1   **(e) cont.**   **Disadvantages:**
- May not be unique (1) other businesses may use the images (1)
- May not find anything appropriate/limited (1) may detract from information given in brochure (1)
- May be copyrighted from a variety of sources (1) may be difficult to obtain permission to use graphic selected (1)
- Image may be of poor quality (1) may take longer to enhance quality than designing from scratch (1)
- Thumbnail in image library (1) may not link to larger graphic (1)

                                                              [6]

    (f)   **Describe the following features that could be used.**

                 Max 2 per feature

        (i)   **Shade**
- Difference between light and dark (1) position of light source selected (1) based on this the shading is automatically calculated (1) based on intensity of the light (1) and the size of the object (1)

                                                              [2]

        (ii)   **Soften**
- Reduces the harshness of the images/smooths (1)
- Can blur the <u>edges</u> of the image (1) colours flow into each other (1)
- The contrast of adjacent pixels is decreased (1)

                                                              [2]

        (iii) **Sharpen**
- Used to define the <u>edges</u> in an image (1)
- Corrects blurring (1) if logo is scanned (1) or a photograph is used (1)
- The contrast of adjacent pixels is increased (1)

                                                              [2]

    (g)   **Describe how the logo can be transferred to the brochure without using cut/copy and paste.**

                 Any two from:
- File is exported (in common file format) (1)
- File then imported (into brochures) (1)
- Locate the file (1)
- OLE(1)

                                                              [2]

Question **Mark**

1 (h) **Explain why the company logo should be included on the brochure.**

Any two from:
- Recognition by clients (1)
- Use of corporate style (1)
- Has been designed/paid for (1) will be used (1)

NO marks for professional

[2]

2 (a) **Explain two advantages of using a spreadsheet for financial modelling.**

Max 2 per point, any two from:
- Can predict future expenditure (1) can use 'what if' questions (1)
- Use of graphs (1) graphs can change automatically as data is changed (1) can show trends (1)
- Automatic recalculation (1) as data input changes so does result (1)
- No special software needed (1) spreadsheets are standard business software (1)
- Calculations are easier to perform (1) than manually (1)
- Can compare cost (1) of small cars to 7 seat cars (1)

[4]

(b) **Describe the following features of a spreadsheet that make them suitable for financial modelling.**

Max 2 per feature, for example - MUST relate to Airport Cars

Rules
- A set of procedures that must be followed (1) sequence of events required for a calculation to work (1) example given (1)

[2]

Formulae
- To calculate the values/perform calculations (1) use of mathematical operators (1) example given (1)

[2]

Functions
- Standard routines (1) used to perform complex/common tasks (1) example given (1)

[2]

Question				Mark

2   (c)   **Explain, the purpose of ranges, workbooks and worksheets.**

Max 2 per feature, 1 for example (MUST relate to Airport Cars)

         (i)   **Range:**
- A group of (selected) cells (1) can be adjacent (1) or non-adjacent (1)
- Can be used as a validation check (1) eg to ensure within a min - max selection (1)
- The cells (1) can be named and saved(1)

            Example:
eg number of seats in a car

            [3]

         (ii)   **Workbook:**
- Keeps data in one file (1)
- Collection of worksheets (1)

            Example:
eg monthly records, year records

            [3]

         (iii)   **Worksheet:**
- Is part of a work book (1)
- Can be stored and accessed as a single unit (1)
- Data can be related (1) changes on one sheet can impact on others (1)
- Can perform calculations (1) based on data from multiple worksheets (1)
- Can enter and edit data (1) on several worksheets simultaneously (1)

            Example:
eg day of week, Airport, cars/drivers, Account customers

            [3]

     (d)   **(i)**   **The proportion of customers travelling to each airport.**

Pie Chart   **[1]**

         (ii)   **A comparison of the running costs of each car owned by Airport Cars.**

Bar Chart/Histogram/column

            [1]

Question   **Mark**

3   **(a)**   **Explain four design considerations for the data entry screen.**

Max 2 per feature, any four from:

- Screen design (1) must be clear and uncluttered (1)
- Font (1) must be easy to read (1)
- Logical order (1) aids user data entry (1)
- Colours (1) different colours to highlight information required (1)
- Using pull/drop down menus/menu options (1) to limit choice/show all the options (1)
- Validation checks (1) to only enter appropriate data (1)
- Help option (1) to assist in using the system (1)
- Volume of information on screen (1) screen should not be cluttered (1)
- Navigation (1) options to go back to previous pages (1)

[8]

      (b)   **Describe two advantages of storing the customer records in a database.**

Max 2 per description, any two from:

- Code optimisation (1) software is designed for searching and sorting (1)
- Referential integrity (1) to ensure related data is valid (1)
- Can link tables (1) using primary/foreign keys (1)
- Normalisation (1)
- No data duplication (1)
- Reports (1) to present data to users (1)
- Queries (1) to extract data from tables (1)
- Data is independent (1) of database structure (1)
- Data can be added (1) without the need to redesign the database/queries/reports (1)

[4]

4   **(a)**   **Describe one advantage and one disadvantage of using a template in the creation of this presentation.**

Max 2 per point

      (i)   **Advantages:**
- Corporate image (1)
- Consistency of layout (1)
- Templates can have standard text/graphics in position (1) only have to complete specific details (1)   **[2]**

4   **(a)**   **(ii)**   **Disadvantages:**
- Cannot alter information (1) different versions of presentation may need different information to be given (1)
- Template may not be appropriate (1) presentations may be different (1) eg target audiences/local details of airports (1)
- If a mistake is made on the template eg spelling (1) then will occur on all slides (1)

                                                                                                [2]

   (b)   **Describe three features of presentation software that could be used to create this presentation.**

   Max 2 per feature, any three from:

- **Hotspots/hyperlinks** (1) area on a screen that responds to a mouse click (1) may be a button/text/graphic (1) will take user to another page/screen (1)
- **Buttons** (1) used to move the presentation from one screen/slide to another (1) provides interactivity (1) user can jump to other parts of the presentation (1)
- **Sounds** (1) can be used to emphasise a point (1) add impact to a slide (1) can be used for speech/music (1) ie company jingles (1)
- **Animation** (1) sound/visual effects (1) added to text/objects (1)
- **Video** (1) can be used to show company advert (1) may begin automatically on a slide (1) or started by user intervention (1)

                                                                                                [6]

   (c)   **Identify and describe the most suitable transition method for this presentation.**

   1 for method, max 2 for description

   Method:
- Automatic

   Description:
- Can be left to show slides in a loop/continuously (1)
- Does not need anyone to advance presentation (1)
- Timings can be set and left (1)
- Timings/controls can be 'hidden' from clients (1)

                                                                                                [3]

Question   **Mark**

5   **(i)**   **Explain the difference between static and dynamic data.**

                        Max 2 for just static or dynamic description.

                        Dynamic:
                        •   Data is constantly updated (1) information always up-to-date
                               (1)
                        •   The user interacts (1) with the data (1)
                        •   Example (1)

                        Static:
                        •   Once created the data does not change (1) on the web site
                               the data is written into the code (1) the code must be re-
                               written if the data changes (1)
                        •   Example (1)
                                                                                                              [4]

            (ii)   **Evaluate the use of dynamic data in this situation.**

                        Any two from, examples MUST relate to Airport Cars:

                        •   Able to gain up-to-date information about landing times (1)
                               cars/driver not waiting for customers (1)
                        •   Can check on flight departures (1) informed of any delays (1)
                        •   Can use the same search (1) for different flight numbers (1)
                                                                                                              [2]

            TOTAL   **86**

            Quality of written communication   **4**

Mark Scheme 2515
January 2007

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1   **(a)**   **Bus**

Benefits

- No requirements for switches/hubs (1)
- Easy to add extra nodes/terminals/stations/devices (1) (as the main cable can be extended) (1)
- Easy to cable (1)
- Low cost network because of (simple) cabling (1)

Drawbacks

- If the main cable fails then the whole network/segment will fail (1)
- Likelihood of data collisions (as data travels in both directions)(1)
- Restriction on length of cabling between terminators (1) without the use of repeaters (1)
- Terminals are required at both ends of backbone cable (1)
- Difficult to identify the problem if the entire network shuts down (1)

Ring

Benefits

- Low cost network because of (simple) cabling (1)
- Less likelihood of collisions as data travels in one direction only (1)
- Faster data transfer because uni-directional (1)

Drawbacks

- A failure of one node/terminal/station could affect the rest of the network (1)
- More difficult to extend the network as the physical cabling needs to preserve the ring structure (1)
- More difficult to set up the initial cabling (1)

Star

Benefits

- If one node/terminal/station fails, the rest are unaffected (1)
- Centralised control of message switching allows higher security (1)
- Easy to identify cabling faults (1)
- Easy to add in extra devices (1)

Drawbacks

- If the hub fails, the whole network is affected (1)
- Complexity of installation (1)
- Cost of cabling and/or equipment (1)
- Need for specialised equipment (1)

One benefit, one drawback for each – max 6   **[6]**

(b)   Gateway:
- links two (dissimilar computer) networks (1)
- provides a single point of entry to a secure network (1)
- acts as a firewall (1)

NIC:
- Allows communication to network (1)
- Interprets protocols (1)

Repeater:
- used to link (two) cable segments (1)
- amplifies signals (1) before passing them on (1)
- to extend the overall length of cable (1)
- to extend the distance between nodes (1)

Max 6, but must have at least 1 mark in each section to score full marks   **[6]**

(c)
- prevents external users (1) from gaining unauthorised access to a computer system (1)
- limits/filters the data that can be received (1) or sent (1) (to external users)
- could block certain types of data (1)
- to protect data (1) from being viewed/altered/deleted (1)
- to comply with the data protection act (1)
- to stop hackers/viruses from entering the system (1)   **[4]**

(d)
- user names and passwords (1) which determine appropriate facilities for individual users (1)
- organising users into groups according to their needs (1)
- Firewall prevents unauthorised access (1)
- access levels – read only … etc (1)
- physical access to computer system (1)   **[4]**

(e)   **(i)**
- capacity of the (communication) channel (1)
- measured in bits per second (1)
- determines the volume of data which can be transmitted in a fixed time (1)
- the range of frequencies (1) a channel can handle (1)   **[2]**

      (ii)
- because of the time sensitivity of the data transmission (1)
- the high volume of data generated (1)
- a high bandwidth is necessary in order for response times to be acceptable (1)
  (accept a converse argument here)   **[3]**

      (iii)
- parity checking/parity bit/parity byte (1)
- echo back (1)
- use of a check sum (1)
- Hamming codes (1)
- Cyclic redundancy check (1)   **[3]**

2 **(a)** • when a user is in a phone prohibited area eg hospital/concert (1)
(accept other appropriate examples of 'no go' areas)
• when the phone is out of range/has no signal (1)
• when there is no battery power left (1)
• if the user has a pre-pay phone they may have run out of credit (1)
• whilst driving a vehicle (1)
• during a meeting (1) [3]

(b) **eg**
• signal goes by radio waves (1)
• from phone to the base station (1)…
• …for their current cell (1)
• it may be transferred through a series of base stations (1)
• before (the base station) sends the call to the service provider data centre (1)
• where credit is checked (1)
• and international call status checked (1)
• data then forwarded into the pstn (1)
• from here the signal travels through the pstn (1)
• may be by satellite or by undersea cables (1)
• then converted back into radio waves (1)
• and passed through base station(s) (1)
• signal is amplified (1) [6]

3   **(a)**   Graphics tablet
- will enable high quality/accurate designs to be drawn (1)
- which can be stored edited (electronically) (1)
- which can be transferred/shared electronically eg email (1)   **[2]**

           Plotter
- to produce accurate/precise hard copies/drawings (1)
- ability to produce large printouts (1) eg A1/A2/A3 (1)   **[2]**

   (b)   **(i)**   Packet Switching
- message is broken into small packets/segments/chunks (1)
- each packet carries the ID of the intended recipient (1)
- and sequencing information/ID (1)
- each packet treated individually (by the router) (1)
- and sent to its destination by an optimum route (1) (NOT FASTEST)
- the packets are re-sequenced at destination (1)
- checked for errors at destination (1)
- checked for missing packets (1)
- in which case request data to be resent (1)

           Circuit Switching
- path is set up before transmission begins (1)
- path is held for the duration of the connection (1)
- (even though) at some point in time no signals may be passing (1)
- message sent as a whole (1)
- user has full bandwidth for the duration of the connection (1)

           Max 4 for any one part   **[6]**

       (ii)
- more economical (1) there is no need to tie up a route for the duration of the transmission (1)
- more secure (than circuit switching) (1) because packets are separated (1)   **[2]**

4   **(a)**   **(i)**   •   several computers each hold part of the data relevant to them(1)
                           •   extra data can be requested from the other computers (1)
          (ii)   •   each site only keeps employee details relevant to that site (1)
                           •   (local) indexes held for main database (1)
                           •   which is then accessed via the index (1)   **[4]**

    (b)   Advantages
        •   less chance of a central failure putting the whole company out of action (1)
        •   increased response time to local queries (1)
        •   less network traffic (1)
        •   (so) less chance of excess data jamming the system (1)
        Disadvantages
        •   risk of loss of data integrity (1)
        •   because there are so many copies available (1)
        •   which will only be synchronised periodically (1)
        •   higher security risk (1)
        •   as there are many more access points (to the database) (1)
        Must be at least one advantage and one disadvantage for full marks   **[6]**

    (c)   Encryption
        •   to stop unauthorised access to their data (1)
        Authentication
        •   a process to ensure that the recipient is who they say they are (1)   **[2]**

5   **(a)**   **(i)**   •   Description of present system (1)
                              Production of a requirements spec. (1)
                              Collection of information using appropriate method (1)
                              Suggested alternative methods of solution (1)
                              Details of current problems (1)
                              Any 2 points   **[2]**

          (ii)   •   involve customers/users through prototyping (1)
                           •   make design changes as a result of feedback (1)
                           •   design familiar documents on the website (1)
                           •   design of queries/macros/entities/inputs/outputs etc. (1)
                           •   design of test plan (1)
                           Any 2 points   **[2]**

          (iii)   •   involve customers/users through prototyping/beta/black box testing (1)
                           (Can be credited in (ii) or (iii) but not both)
                           •   alpha testing/white box testing (1)
                           •   errors corrected (and system re-tested) (1)
                           •   normal, extreme and unusual test data used (1)
                           •   to make sure that the system works properly (1)
                         Any 2 points   **[2]**

    (b)   eg: •   sound (1) eg bleep to alert user to missing or wrong response (1)
                    •   dialogue box/error message (1) to give more specific information on what
                       is required (1)
                    •   animation (1) to catch the attention of the user (1)
                    •   colour/highlight (1) to draw attention to particular area of screen (1)
                Accept other valid answers (1 mark for sensible conclusion)   **[6]**

6   **(a)**   Advantages eg:

- less office space needed (1)…
- thus saving a need of further building (1)
- possibilities of 'hot desking' (1)…
- thus less equipment required (1)
- more choice of staff (1)…
- as people can be recruited from a wider geographical area (1)
- less heat/light/petrol allowances etc. needed (1) thus saving on costs (1)

Disadvantages eg:

- difficult to monitor the work force (1)…
- are they working the hours they should? (1)
- extra costs involved (1) for installing equipment in homes (1)
- no office and set of people to control (1)
- poses a security risk (1) as many users are accessing data from many access points (1)

Mark in pairs

1 mark is available for a conclusion, but full marks may be awarded without a conclusion.

(Must be at least one advantage and one disadvantage explained – a list can score max 3)   **[7]**

   (b)   **(i)**   eg:
- voice mail/video playback (1)
- can transmit/receive video and sound (1)
- portable (1)
- personal phone book (1)
- quick dial facilities (1)

Accept other valid answers   **[2]**

          (ii)

Advantage
- body language can be assessed (1)
- which gives participants extra information (1)
- can be used as a form of videoconferencing (1)
- which saves the company time/money in reduced need for travel (1)

Limitation
- noticeable audio delay/poor quality transmitted image (1)
- makes it difficult to manage responses/coordinate eye contact (1)   **[4]**

**Mark Scheme 2517
January 2007**

The Awarding of Marks for Written Communication

Marks are awarded for the use of accurate spelling, punctuation and grammar according to the following criteria.

Marks

Below Threshold Performance		**0**
Threshold performance	Candidates spell, punctuate and use the rules of grammar with reasonable accuracy; they use a limited range of specialist terms appropriately.	**1**
Intermediate performance	Candidates spell, punctuate and use the rules of grammar with considerable accuracy; they use a good range of specialist terms with facility.	**2–3**
High performance	Candidates spell, punctuate and use the rules of grammar with almost faultless accuracy, deploying a range of grammatical constructions; they use a wide range of specialist terms adeptly and with precision.	**4**

The marks will be awarded on an impression basis and will reflect the candidate's performance in the paper as a whole.

Rule of **thumb**

0   Award only in rare circumstances eg no written work or minimal, which is **not** in sentences and is spelt incorrectly, without use of appropriate technical terms.

1   **Questions answered using statements or single words only.**

2   **Candidates use some sentences and some technical words. Some errors in grammar and spelling.**

3   **Candidates use sentences correctly, with few errors in grammar. Some technical words used appropriately and with limited spelling errors.**

4   **Almost perfect use of grammar, technical vocabulary and spelling.**

The 'norm' will probably be 3 marks. However, do not be afraid to award 4 marks if appropriate.

1   **(a)**   **(i)**   **Identify three software packages used in an integrated office system.**

A word processor. **[1]**
A spreadsheet. **[1]**
A database. **[1]**
An email application. **[1]**
A publishing package.**[1]**
Calendar/diary. **[1]**
Presentation package. **[1]**
Graphics package. **[1]**

Max [3]

         (ii)   **Describe how the firm makes use of an integrated office system.**

eg:
The staff are familiar with the layout of one application **[1]** and so will need minimum of training to use the others. **[1]**
Data can be moved from the database to the spreadsheet **[1]** in order to create an invoice to send to a school. **[1]**
Data can be moved from the database to the word processor/email package **[1]** to create mail-merged letters to send to the schools. **[1]**
They could use a word processor to write letters to the customers. **[1]**
They could use a spreadsheet to create an invoice for a customer. **[1]**
They could use a database to store the customer's address. **[1]**

Max [4]

         (iii)   **Explain the need for the effective management of information.**

eg:
Information is a resource **[1]** that can be shared by all in the company**. [1]**
It should be managed 'effectively to maximise the benefits **[1]** gained against the costs of collecting it. **[1]**
The needs of the user will not be met **[1]** if the information is mismanaged. **[1]**
If the information is not up-to-date **[1]** it could lead to a delivery being delayed. **[1]**
If the data is not accurate **[1]** a delivery may go to the wrong address. **[1]**

Max [2]

     (b)   **(i)**   **The firm uses questionnaires to collect information about the hardware being used in schools.**
                 Describe two other ways that the firm could collect information from the schools.

They could interview the teachers. **[1]**
They could examine published data collected by the government. **[1]**
They could visit schools and look at the equipment they are using. **[1]**
They could use software to automatically interrogate the hardware at the school. **[1]**

Max [2]

(ii) **Explain how the information collected from the school is used by the firm in decision making and strategic planning.**

eg:
The types of computers used in schools **[1]** would lead to ordering more of that type to sell **[1]** and could be targeted as a promotion/sale of similar computers. **[1]**
Trends in sales of computer related equipment **[1]** such as electronic white boards **[1]** could lead to a change in buying strategies for the firm. **[1]**
The firm could determine the prices **[1]** that the schools are prepared to pay for the equipment. **[1]**
The number and age of the computers being used in schools **[1]** could help model future purchases. **[1]**

Max [4]

(iii) **It is important that information is exchanged accurately and in a timely manner between departments in the firm.**
Using examples, explain what is meant by the phrase 'accurately and in a timely manner'.

Accuracy:
Information must not lose its integrity as it moves around the firm. **[1]**

eg:
The schools might lose confidence with the firm. **[1]**
The firm loses money through orders being sent to the wrong schools. **[1]**

Timely manner:
Information must reach appropriate departments within the useful life-time of the information. **[1]**

eg:
Schools may not be billed in the correct financial year. **[1]**
The firm could lose money because the equipment they are ordering is out-of-date. **[1]**

Max [4]

2   **The firm is going to introduce on-line ordering of its products.**
       They will need to plan this project.

      (a)   **Describe three factors that will be discussed when planning this project.**

              eg:
              The budget will have to be discussed **[1]** to determine how much money they can afford to spend on the new system **[1],** or if they need to borrow any. **[1]**
              The deadlines will have to be discussed **[1]** to determine how long they have to introduce the new system. **[1]**
              The tools available for the planning **[1]** will be considered such as CPA/project managing software. **[1]**
              Minimising disruption to schools/employees **[1]** in order to keep the business going smoothly. **[1]**
              The skills required to implement the project **[1]** perhaps necessitating the hiring of new staff. **[1]**

                                                                       Max [6]

      (b)   **Describe the design, production (development) and implementation (changeover) stages undertaken for this project.**

              <u>Design</u> **[max 2]**:
              The new inputs/outputs **[1]** software specifications **[1]** hardware specifications **[1]** and data storage **[1]** are designed.
              The type of user interface involved is chosen **[1]**
              <u>Production</u> **[max 2]**:
              The programmers write the software for the interface **[1]** The database/webpages is constructed/altered/amended. **[1]** Backup procedures are defined. **[1]**
              What personnel will be required **[1]** and what operations they will carry out is decided **[1]**.
              What testing will be used **[1]**
              <u>Implementation</u> **[max 2]**:
              When the new system is to be put into practice. **[1]**
              What method will be used to implement the new system. **[1]** The time scale for implementing the new system. **[1]**
              The information and training that may be needed by schools/employees. **[1]**

                                                                       Max [6]

      (c)   **The user interface for the on-line ordering system will be developed using prototyping.**

          (i)   **Describe the process of prototyping.**

                  A model of the new interface is built. **[1]**
                  The model is tested by the schools/employees. **[1]**
                  The users can make suggestions **[1]** and the interface can be adjusted to their satisfaction. **[1]**

                                                                       Max [2]

(ii)   **Explain the process of iteration and why it is used.**

Process:
The process of iteration is one of repeated **[1]** design and refine. **[1]**
A model of the interface is reviewed repeatedly **[1]** by the users and their suggestions lead to changes in the design. **[1]**
Importance:
The users feel more confident about the outcome **[1]** and so are more likely to use it. **[1]**
The system correctly matches the needs/expectations of the users **[1]** because they have had an input in the design. **[1]**
The firm does not waste time/money **[1]** producing an interface that will not increase the efficiency of their business. **[1]**

Max [4]

(iii)   **Describe the user interface design tool known as the 'Model Human Processor', developed by Card, Moran and Newell.**

The "Model Human Processor" draws an analogy between the processing and storage of a computer **[1]** with the perceptual, cognitive, motor and memory activities of a human. **[1]**
It describes how a visual or audible stimulus is captured **[1]**
eg (attention drawn to box on screen). **[1]**
The physical attributes of the stimulus are decoded. **[1]**
eg (the human interprets the response needed)**[1]**
a motor response is initiated. **[1]**
eg (the human clicks a mouse) **[1]**

Max [4]

(d)   **Explain the importance of matching the on-line ordering interface to the user's mental model.**

eg:
Users bring their own preconceptions to the interface, **[1]** so it is important to have an understanding of the users mental model, so that the interface matches this model. **[1]**
Most users will learn to use the interface by trial and error. **[1]**
If the interface is inconsistent with the mental model the user will get lost using the interface. **[1]**

Max [2]

3   **The data entered into the on-line ordering system will have to be verified and validated.**

       (a)   **(i)**   **Describe the purpose of verification.**

                    To make sure that data has been entered correctly. **[1]**
                    To make sure that the entered data is the same as the source data. **[1]**
                                                          Max [1]

               (ii)   **Describe the purpose of validation.**
                    To make sure that data entered is sensible/reasonable. **[1]**

       (b)   **(i)**   **Describe one method that might be used to verify the data entered into the on-line ordering system.**

                    Proof reading **[1]** where the user checks the input by eye. **[1]**
                    Double entry/where the data is input twice **[1]**, the computer checks the second entry against the first. **[1]**
                                                        Max [2]

               (ii)   **Using an example, describe one method of validating the data entered into the on-line ordering system.**

                    Name of method **[1]**, example **[1]**, description **[1]**
                    Accept any sensible validation for the user interface. Not data transmission checks.

                    eg:
                    Range check **[1]**
                    Data is checked to see if it lies within a plausible range **[1]**
                    The number of computers ordered is greater than 0 and less than 200. **[1]**

                                                         Max [3]

4 **All the stock is held in a warehouse before it is sent out to the schools.**

(a) **The firm has decided to upgrade the software used in the warehouse. Explain three factors which must be taken into account when upgrading the software.**
(Allow method of changeover for up to **2** marks only).

The expertise of the employees **[1]** because they might need training to use the software. **[1]**
The costs of installing/producing the software **[1]** must be cost effective. **[1]**
The long term benefits **[1]** need to outweigh the inconvenience of installation. **[1]**
The current system needs to be considered. **[1]** Will it be compatible with the new software? **[1]** **Max [6]**

(b) **The new software can be custom-written or purchased off-the-shelf. Explain the differences between custom-written software and off-the-shelf software.**

Off-the-shelf is readily available **[1]** whereas custom written takes time to develop. **[1]**
Off-the-shelf is well tested **[1]** whereas custom written may still have bugs/problems. **[1]**
Employees/schools may already be familiar with the off-the-shelf software **[1]** but training may be needed for the custom written. **[1]**
It is generally more expensive to buy custom written software **[1]** because production costs of off-the-shelf have been shared. **[1]** There is a wide user base/support/help for off-the-shelf **[1]** but with custom written you are on your own. **[1]**
Custom written often has a smaller footprint than off-the-shelf **[1]** so is a more efficient use of memory. **[1]**
There may be unwanted features in off-the-shelf **[1]** but with custom written you get exactly what you want. **[1]** **Max [6]**

(c) **Describe two methods of changeover which could be used when implementing this software. For each method give one advantage.**
[One mark for the name of the method, 1 mark for each description, up to 2 mark for the advantage.]

<u>Direct changeover</u> **[1]**
The old system is stopped and the new system started immediately. **[1]**
This costs less than other methods because staff only have to run one system. **[1]**
<u>Parallel conversion</u> **[1]**
Allows the new system to operate alongside the old system for a short period of time after which the old system is removed and the new system remains. **[1]**
The old system can be compared to the new system to make sure the new system is running properly. **[1]**
Employees can learn the new system at their own pace. **[1]**
<u>Phased conversion</u> **[1]**
The system is split into a number of parts and each part is implemented separately at different times. **[1]**
Installation/training can be spread over a period of time. **[1]**
<u>Pilot conversion</u> **[1]**
The system could be trialled in one area of the warehouse before it is fully implemented. **[1]**
The results of running the new system can be compared with the old system. **[1]**
Bugs can be cleared from the system. **[1]**
Training can be modified in the light of experience. **[1]** **Max [6]**

5 **Changes to the software system in the warehouse must be carefully managed.**

(a) **Three factors which must be considered when managing this change are personnel, accommodation and equipment. Using examples, describe how each of these factors must be considered when managing this change.**

(i) Personnel
The staff must be involved/consulted at all times, **[1]** to alleviate the fear of change **[1]** and to avoid the possibility of resignations/industrial action. **[1]**
Training must be offered **[1]** to maximise the efficiency of the change **[1]** and to ensure that the staff are enthusiastic about the new system. **[1]**

(ii) Equipment
The installation of the equipment **[1]** must be done sympathetically with the minimum of disruption. **[1]**
The new system must be compatible with the system as a whole, **[1]** as data might be exchanged (eg) between suppliers and the firm. **[1]**

(iii) Accommodation
The buildings/rooms/space needed must be planned **[1]** as extra staff may need to be accommodated. **[1]**
The new interface system may generate new business **[1]** necessitating extra warehouse space. **[1]**

Max [6]

(b) **Discuss the ways that Computer Aided Learning (CAL) can be used to assist in this change.**

This answer will be marked using **P, E** and **C**.
P is a point made.
E is a worthwhile expansion of that point. More than 1 **E** can be awarded for each **P**.
All marks can be gained with **P** and **E** but there is a possible extra mark for a conclusion **C** (but maximum of 5 marks for this question)

P	1 mark
P, P or PE	2 marks
P, PE	3 marks
PE, PE	4 marks
P, PE, PE	5 marks

eg:
CAL can be carried out at home **P** enabling the employee to study the new system without disrupting their daily routine. **E**
The management can monitor the progress of an employee **P** without the employee being aware of the monitoring. **E**
The employees can work at their own pace **P** enabling each employee to work without pressure from peers. **E**
CAL is overall a good way for people to learn as they can be in control of their learning, where and when it is done, though some might be a bit suspicious of the management looking at their scores. **C**

Max [5]

6   **The firm are always looking for new products to sell to the schools.**
       Discuss hardware and software developments which might change the way in which students are taught in schools in the future.

       This answer will be marked using **P**, **E** and **C**.
       P is a point made.
       E is a worthwhile expansion of that point. More than 1 **E** can be awarded for each **P**.
       All marks can be gained with **P** and **E** but there is a possible extra mark for a conclusion **C**
       (but maximum of 7 marks for this question)

P	1 mark
P, P or PE	2 marks
P, PE	3 marks
PE, PE	4 marks
P, PE, PE	5 marks
PE, PE, PE	6 marks
P, PE, PE, PE	7 marks

       <u>Any sensible ideas</u>

       eg:
       Intelligent whiteboards
       Mobile phones
       Internet training
       Video conferencing
       Students working from home
       AI on computers/expert systems instead of teachers
       Virtual reality experiences in the classroom
       Automated registrations
       Electronic paper
       No hard drives but storage on the internet
       Examinations taken at will and marked on the spot by computer
       Experiments in the lab done as VR
       Language teaching by teachers in another country by video link Voice input/no keyboards
       Computers decide which subjects you should study to maximise your potential
                                                                     Max [7]

Advanced GCE (ICT) (3838/7838)
January 2007 Assessment Series

Unit Threshold Marks

Unit		Maximum Mark	a	b	c	d	e	u
2512	Raw	90	56	50	44	38	32	0
	UMS	90	72	63	54	45	36	0
2514	Raw	90	55	49	43	37	31	0
	UMS	90	72	63	54	45	36	0
2515	Raw	90	60	54	48	43	38	0
	UMS	90	72	63	54	45	36	0
2516	Raw	120	98	87	76	65	54	0
	UMS	120	96	84	72	60	48	0
2517	Raw	90	60	55	50	45	40	0
	UMS	90	72	63	54	45	36	0

Specification Aggregation Results

Overall threshold marks in UMS (i.e. after conversion of raw marks to uniform marks)

	Maximum Mark	A	B	C	D	E	U
3838	300	240	210	180	150	120	0
7838	600	480	420	360	300	240	0

The cumulative percentage of candidates awarded each grade was as follows:

	A	B	C	D	E	U	Total Number of Candidates
3838	11.9	27.0	55.6	78.6	93.7	100.0	130
7838	0.0	22.2	55.6	100.0	100.0	100.0	18

148 candidates aggregated this series

For a description of how UMS marks are calculated see;
http://www.ocr.org.uk/exam_system/understand_ums.html

Statistics are correct at the time of publication

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