

**THE BCS PROFESSIONAL EXAMINATION
Diploma**

April 2001

EXAMINERS' REPORT

Multimedia

This paper required the candidate to attempt four questions from a choice of six. Most candidates gave reasonable, if not full answers, but some clearly ran out of time or floundered when asked to consider issues wider than pure technical detail.

QUESTION ONE

- a) Outline the problem that the TWAIN working group was set up to address (7 marks)**
- b) Outline their solution (8 marks)**
- c) What are the benefits of their solutions? (10 marks)**

No candidate answered this rather straightforward question. Scanners and scanning software are mentioned explicitly in section three of the syllabus and two out of three module objectives relate to this topic.

Answer Pointers

- a)** Application designers used dedicated applications to drive input devices such as scanners. A particular application would need to know about a particular device. The proliferation of such custom interfaces was inefficient, frustrating, time consuming and expensive.
- b)** The TWAIN solution was an open industry standard interface for input devices. The creation of a generic TWAIN interface allows any input device such as scanners and digital still camera to work with any application which supports the TWAIN standard.
- c)** Benefits include:
 - 1. Application developers code to a single TWAIN specification
 - 2. Device manufacturers produce a single TWAIN compliant driver for their proprietary device
 - 3. TWAIN compliant applications have a standard Acquire and Select Source menu
 - 4. Efficient
 - 5. Cheap
 - 6. Easy

QUESTION TWO

- a) Distinguish between lossless and lossy compression and explain a suitable application for each (12 marks)
- b) What is meant by the term bandwidth? Why is it a serious issue in the context of multimedia? (13 marks)

Most candidates were able to distinguish between lossy and lossless compression. Not all were able to give suitable examples of each. The concept of bandwidth was generally well understood although a few candidates confused it with wavelength and used radio transmissions as an example.

Answer Pointers

- a) Lossless compression is a method where the data is identical to the original after it has been compressed and then decompressed. Lossy compression results in some loss of information from the original under compression and decompression. This loss of information may be unnoticeable and may allow a greater degree of compression. Suitable application for lossless is binary files where even the changing of a single bit might prevent the program from running e.g. zip. A suitable application for lossy compression is mpeg3 where the ear does not notice the missing information.
- b) Bandwidth is a measure of the size or capacity for a communication channel to convey data. It is a serious issue because multimedia artefacts are usually large. Channels such as the Internet, fibre optics or even a twisted pair of telephone cables represent a bottleneck in the transmission of multimedia. The solutions are to increase the bandwidth or use compression to reduce the size of the multimedia artefact.

QUESTION THREE

A new company is setting itself up in business as a producer of multimedia CDs and web-based services. You have been employed by this company to provide advice on their hardware, peripheral and networking requirements. Write a report for the managing director with clear advice on hardware and network specifications and the options available to the company. (25 marks)

Most candidates were able to produce a core technical specification, but few considered a range of options or provided a rationale for their choices. Some candidates provided no coverage of peripherals or the networking needs.

Answer Pointers

The question is fairly open-ended. Candidates would be expected to reflect on:

The business context and the likely technical knowledge of the MD who is liable to be fairly computer literate, will probably want a high-end specification for development and may want good support.

The workstation standard (e.g. in excess of MPC3)

1. Box (e.g. tower, desktop, laptop, palmtop)
2. Processor (e.g. P2, P3, 300-500MHz or dual processor)
3. Memory (e.g. 64M, 128M, 256M)
4. Hard-disks (e.g. EIDE and/or SCSI. 4G-20G)
5. Removable storage (e.g. FD, Zip-disk, CD-RW 4X4X20)
6. Monitor (size, resolution, and graphics card support)
7. Keyboard and Mouse (standard or specialised)
8. Printers (Matrix, Inkjet, Laser; Monochrome or colour; DPI)

Other peripherals for:

Sound input and playback (sound capture, MPEG cards, MIDI interfaces etc)

Graphics input (graphics tablets, scanners, accelerators etc.).

Video input and editing (capture cards, cameras etc.).

Networking including internal networking (Ethernet, ATM etc), external networking and service provider support (in-house or out-sourced).

General conclusions including suggested standards for the current purchase, emerging standards, new products and enterprise opportunities.

QUESTION FOUR

a) Briefly describe the principles and available supporting technologies for each of the following:

1. Digitised and synthesised sound

2. A/D and D/A conversions

3. The MIDI interface

(15 marks)

b) The audio used in a multimedia presentation can come from a number of sources. It may be background music, sound effects the original audio track, voice-overs etc.

What are these different sound elements?

Explain how they can be used to add to the overall quality of a multimedia presentation.

How are they integrated into a multimedia presentation?

(10 marks)

The technical descriptions were handled well by most candidates. The uses of sound to add richness, emotion and other effects were also mentioned by most but issues relating to their integration into the “whole” were not well developed.

Answer Pointers

a) The first section is fairly factual. The candidate was effectively asked to indicate how sound is encoded in different digital formats, the methods used to convert between digital and analogue formats and then talk specifically about the MIDI music interface. The examiners expected to see the following elements presented:

1. Sound defined in terms of waveform, frequency, amplitude etc
2. Digital Formats and quality
3. Bit sampled at a fixed frequency
4. Synthesised sound built out of encoded sound information e.g. phonemes/allophones for speech, music notation or envelope descriptions
5. A/D Analogue waveforms (sine waves) converted to Digital (square waves)
6. Fourier waves analysis and transformations
7. Sound cards, microphones, amplifiers, speakers, analogue recordings etc
8. Software tools and mixing software
9. MIDI – defined, mixing, production etc
10. Instrument: Defined Enveloped (e.g. piano, guitar etc)
11. Notation: Note pitch, duration, amplitude
12. Editing: stave notation, editing playing keyboard etc

b) Here the candidate is more open to explain the uses of sound from a variety of formats and which are appropriate to different contexts e.g.

1. Voice-over to narrate a story or add commentary
2. Music to add atmosphere, colour or emotion
3. Sound effects to indicate button presses, page turns etc
4. Original audio to provide feeling of presence etc

These are generally mixed together using sound studio software which can mix a number of sound tracks into one (mono) or two (stereo) tracks at different volumes. Use of fades etc. Keying of sound to visual frames etc.

QUESTION FIVE

Authoring a multimedia system involves both technical and artistic considerations.

a) What are these considerations and how are they liable to influence your choice of authoring language, development and delivery platforms and the overall design approach? (10 marks)

b) “The implementation of a multimedia system bares very little in common with traditional software engineering. In fact it has much more in common with film production”. Discuss (15 marks)

Candidates generally understood the implications of section a) although candidates tended to concentrate on the strengths and weaknesses of authoring tools. Section b) was generally answered in terms of the ways in which multimedia systems differ from traditional software engineering because of the need to ‘entertain’. Candidates tended to agree with the quote rather than challenge it in any real sense.

Answer Pointers

b) There are many ways of answering this. This could be represented on a grid showing the trade off and tensions between the various technical and artistic considerations and their influences on design, development and delivery.

Consideration	Authoring Language	Development Platform	Delivery Platform	Design Approach
Artistic				
Visual Appeal	Presentation	Professional		Screen-based
Quality of Media	Presentation	Professional	High End	<i>Assets-based</i>
Metaphor/Narrative	<i>Most appropriate language and platform</i>			<i>Novel design</i>
Design Coherence	<i>Consistent language and platform</i>			<i>Simple design</i>
TECHNICAL				
Consistency	<i>Consistent language and platforms</i>			<i>Simple Design</i>
Robustness	Known to developers			<i>Simple Design</i>
Performance	Specialist		High End	
Delivery	<i>Readily Available</i>		Standard	

c) There are very many ways a candidate might choose to tackle this question. One would be to compare and contrast the methods and roles appropriate to software engineering and film production. Define software engineering approach:

e.g. Analysis, Design, Implementation, Testing and Roles, (Software Manager, Systems Analyst, Programmer, Technician etc)

Concept or Story line, Script, Production Plan, Production, Post Production, and roles (Producer, Director, Script-Writer, Actor, Camera-man, sound-editor etc)

Draw parallels and suggest a method and roles drawn from the two.

QUESTION SIX

a) A company specialising in the development of multimedia training is considering producing materials to support students in their BCS Professional Examinations. You have been asked to develop some initial design ideas and a prototype to support the BCS Multimedia module. What are your initial design ideas?

Show clearly the following elements:

- 1. Visual design (story-boards, screen designs etc.)**
- 2. Content (content structure charts, media lists etc.)**
- 3. Navigation (links between sections, hyperlinks etc.)**
- 4. User Interface (interactions, menus etc.) (18 marks)**

b) Which elements would you choose to include in your prototype and why? (7 marks)

The first section was generally well tackled with most candidates giving a good indication of the required visual and navigational components. The second section was not so well answered. Many candidates appeared to interpret the question in the light of which prototyping tool to use or which elements might be usefully included; indicating a lack of general understanding of the difference between a prototype and finished product.

Answer Pointers

- a)** In principle the candidate was expected to provide a basic design idea comprising:
1. Visual elements – story boards and concept design elements, icons, buttons, navigation bars etc.
 2. Content design – content list, JSP and/or lists of media
 3. Navigational elements – flow charts or listed links references between screens
 4. User Interface – e.g. lists of menus, interactions, questions, SAQs, exercises etc
- b)** The prototype might be:
1. Illustrative of the interface
 2. Mock-up important features
 3. Show general interactions
 4. Ignore most of the exceptions or error situations
 5. Be a focus of discussion with the client

These factors should be explained in the choice of elements.