

**THE BCS PROFESSIONAL EXAMINATION
Certificate**

April 2000

EXAMINERS' REPORT

Technology

General Comment

The distribution of the marks for the two sections of the examination was distinctly bimodal; while the marks for section A were very low, marks for section B were above average. Many candidates did not seem to take into account the weights given to the questions in the two sections. Many, in fact, spent more effort on questions in section B (12 marks) than they did on questions in section A (30 marks). This would suggest that while the candidates were conversant with the basic principles of the subject area, they lacked deeper comprehension of the material. In addition, on many questions, the candidates either knew the subject matter very well or hardly at all. This would suggest that the syllabus in such cases was not covered comprehensively.

Section A

Question 1

Answer Pointers

Good answers needed to show the logical connections between the components of the CPU. While most candidates could identify the components, they often failed to show how they were linked. It was also necessary to specify the types of registers and buses.

- a) A bookwork section of the question with many candidates able to "state" the function and purpose of the components. For example, the ALU performs all arithmetic and logical operations. It adds/subtracts, shifts and performs Boolean operations on words.
- b) A good answers needed to explain the sequence of actions in the machine cycle, with reference to the key registers: PC, MAR, MBR, IR, CU, ALU.
- c) The major limitation of the von Neumann architecture is the single-instruction execution bottleneck. It was necessary to identify this, and the remedies using pipelining and parallel processors, for example. Some credit was given for sensible improvements on the von Neumann architecture, such as wider data buses, but not larger hard disks and RAM.

Question 2

Answer Pointers

The question was constructed to test the candidates' knowledge of modern high-performance peripherals and their appreciation of the difference between the workstation and laptop environment.

It was necessary to separate the discussion of the peripherals between portables and desktops. A good answer needed to identify and discuss the characteristics/ performance of around five peripherals, in each case. Where the same peripherals were discussed in both cases - very common - it was required to identify how their application differed in the two cases.

A good answer would describe, for example, a scanner and give its typical speed (time to scan a page), the number of dots per inch horizontally and vertically, and the number of bits chosen to represent a pixel. Candidates were not expected to go into detailed construction or operating principals of peripherals.

Question 3

Answer Pointers

- a) Many candidates who attempted this question were knowledgeable of the topic. Most were, however, unable to differentiate between standards and protocols.

Protocols are the mutually agreed rules or procedures enabling computers to exchange data in an orderly fashion.

Standards refer to a mutually agreed protocol. Standards also cover the hardware used in data communications.

- b) Most candidates were able to describe the ISO 7-layer model, but could not say why it had been devised; e.g. to modularise the various necessary actions, to isolate specific functions, to provide standards, to simplify implementation, etc.
- c) Many candidates were able to identify the major concerns of bandwidth, security & privacy, vandalism & crime, economic imbalances, cultural/social/political interests. Unfortunately, few attempted to suggest possible solutions. Many also spent excessive effort on just one or two issues. A good answer needed to address comprehensively most of the issues.

Question 4

Answer Pointers

Most candidates failed to recognise the crucial requirement in this question: "*.. the operating system as the point at which hardware and software meet*". It was necessary in both parts of the question to at least state the role of the operating system as an interface between some hardware and some software. Hence, for example, in the case of interrupts the hardware could be an I/O device and the software the interrupt service routine. In the case of memory management, the software is a piece of program to be executed and the hardware is the physical RAM.

If a question asks the candidate to '*Discuss the truth or otherwise*', then comment is expected on whether the candidate believes the statement to be true or false.

Section B

Question 5

Answer Pointers

With six small parts to the question, each carrying two marks, only a brief statement was required for each. A good answer briefly described the device and stated its application or gave an accurate description and an example.

Question 6

Answer Pointers

Simplification of the function was through either function reduction or a Karnaugh Map. Where a K-Map was used, it was necessary to indicate which group of inputs contributed to which part of the simplified function. Half the marks were awarded for the function simplification and the other half for drawing the simplified form.

Candidates were expected to implement the simplified function and not the original function, which required around 15 devices of one sort or the other. This question was answered better than any other section B question.

Question 7

Answer Pointers

With details of four memory devices being requested, only a short note was required for each device. A good answer described the device and stated its application. Credit was given for stating the typical capacities of these memory devices.

Question 8

Answer Pointers

- a) The main distinction is that long distance transmission requires the use of a carrier wave. Most candidates failed to recognise this.
- b) The issues looked for in this question were cost, data transfer rate, data security and communication software. Candidates who used one issue as an advantage in one system and then used the same issue as a disadvantage in the other system only gained one set of marks.
- c) Most candidates answered this part of the question rather well. Again, candidates who used one issue as an advantage in one topology and the same issue as a disadvantage in the other only gained one set of marks.

Question 9

Answer Pointers

- a) With the exception of memory management, the accepted functions of an operating system included user interface, process management, peripheral management and file management. Credit was given for any statement that related to these functions. Most candidates were able to name at least three functions.
- b) Most were able to describe virtual memory and its operation in satisfactory detail

Question 10

Answer Pointers

With this question consisting of six small parts (2 marks each) only brief answers were required. Writing an essay on the WWW, for example, only penalised the candidate as it meant less time for other questions.

Many candidates were unable to distinguish between the Internet and the World Wide Web, although they knew one or the other.

Many candidates only stated that "html" is a language used to create web pages but not how it was used to link different formats of data, for example.

Most candidates recognised that the "url" refers to the address of a web page. Not many candidates commented on how the "url" was used in document identification on the WWW.

Question 11

Answer Pointers

- a) Many candidates described what I/O interfaces are but not the reasons they are used. For example, different types of peripherals, different speeds of peripherals, different data formats and very low speeds compared to the CPU.
- b) Most candidates were able to describe DMA and its operation to varying, but satisfactory levels.

Question 12

Answer Pointers

- a) Most candidates were familiar with floating representations and answered this part of the question very well.
- b) For some reason many candidates gave the correct answer for this part of the question without showing the working, or gave the correct answer where the working was clearly wrong.
- c) Many candidates were familiar with two's complement arithmetic and answered this part of the question quite well.