THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION
Certificate

TECHNOLOGY

18th April 2002, 2.30 p.m.-4.30 p.m.
Time: 2 hours

SECTION A

Answer TWO questions out of FOUR. All question carry equal marks.

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

1. *a)* The specification of a microprocessor is given by the following: *200 MHz processor, 64-bit Bus, 256 KByte cache, floating-point accelerator, superscalar dual-pipeline.* Describe each of the specifications (shown in italics) and, in particular, state the significance of each in relation to the processing power of the microprocessor. **(20 marks)**

b) An Instruction Cycle comprises three stages: fetch, decode and execute. Explain what happens in each of the stages, with reference to the internal registers. State any assumptions made. **(10 marks)**

2. *a)* Explain the differences between a compiler and an interpreter. **(10 marks)**

b) Describe the main stages of the compilation process, showing the purpose of each stage. **(20 marks)**

3. Some of the problems associated with managing a computer network are related to the security of data and equipment. Describe the potential security problems with networking and identify possible solutions to these problems. **(30 marks)**

4. *a)* In view of current trends in computing technology, discuss changes you foresee in the way computers will be *used* in the future. You are not required to state the obvious, such as faster speeds and more memory. **(15 marks)**

b) The Internet has grown to an extent that it is now difficult to control the activities taking place. Discuss ways you think illegal and unethical activities can be curbed on the Internet. **(15 marks)**

NOW PLEASE ANSWER QUESTIONS FROM SECTION B OVERLEAF ➔

SECTION B

Answer FIVE questions out of EIGHT. All questions carry equal marks.

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

5. *a)* What is meant by the bandwidth of a bus when referring to computer systems? **(6 marks)**

b) State two ways by which the bandwidth of a bus can be increased. **(6 marks)**

6. *a)* What is the difference between machine language and assembly language? **(6 marks)**

b) An instruction comprises an "op-code" and an "operand". Explain the significance of each. **(6 marks)**

7. *a)* State what *RAM* and *ROM* stand for, and describe the characteristics of each. What is each used for in a computer system? **(8 marks)**

b) What is the purpose of a modem? Briefly explain how it operates. **(4 marks)**

8. What is meant by a network topology? Describe three typical network topologies giving one advantage and one disadvantage of each topology. **(12 marks)**

9. *a)* Define each of the following number representations: *fixed-point, floating-point, sign-magnitude, two's compliment.* **(8 marks)**

b) Convert the following base-ten number to hexadecimal: 462 **(4 marks)**

10. *a)* Write a Boolean expression for the exclusive-OR (XOR) operation. Show how it can be implemented with AND, OR and NOT gates. **(6 marks)**
Note: The XOR operation is true if either input is true but not both.

b) A three-input digital circuit gives a TRUE output when a majority (i.e. 2 or more) of the inputs are TRUE. Draw the circuit implementation. **(6 marks)**

11. Data transfer to and from peripherals may be handled in one of three modes: Programmed I/O, Interrupt-driven I/O and Direct Memory Access (DMA). Describe the characteristics of each transfer mode. **(12 marks)**

12. *a)* Define what is meant by a page, a frame and a page-fault in the operation of virtual memory. **(6 marks)**

b) A virtual memory system has an address space of 256K words, a memory space of 16K words and a frame size of 4K words. How many pages and frames are there? **(6 marks)**