

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION Certificate

TECHNOLOGY

19th April 2004, 2.30 p.m.-4.30 p.m.
Time: TWO hours

SECTION A

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

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

1.
 - a) The central processing unit (CPU) of a computer is made up of *registers*, *buses*, one or more *ALUs*, and a *control unit*. Explain the role of each of the elements in *italic font* in a CPU. **(10 marks)**
 - b) Draw the diagram of a basic von Neumann computer at the bus/register/ALU level. **(5 marks)**
 - c) Using the diagram in part *b*), explain how an instruction is read from memory and executed. **(15 marks)**
2. A computer transfers a block of data between its main store (i.e., memory) and its hard disk drive.
 - a) Describe the role of a typical operating system in this data transaction. **(10 marks)**
 - b) The data transfer may start when the disk requests a transfer by generating an interrupt. Explain the role of interrupts in I/O transactions and describe the sequence of events that might take place when the disk interrupts the computer. **(10 marks)**
 - c) Data may be transferred from the main store to the disk by means of DMA. Explain the meaning of DMA and how it is used to transfer data to (or from) a disk drive. **(10 marks)**
3. "Errors" can arise in a computer from a variety of causes. Such errors may lead to loss of data, incorrect operation, or even system crashes.

Describe the types of error that can occur in a computer and explain how they can be dealt with and how the error can either be corrected or the system prevented from crashing.

Note: In this context we exclude errors of accuracy and precision in the sense they are used by numerical mathematicians. **(30 marks)**

4. Compare and contrast the inkjet (bubble jet) and laser printers.

Your answer should cover their principles of operation, durability, reliability, and operating costs. You should also explain the type of applications for which each printer is best fitted in both the home and small office.

(30 marks)

Turn over]

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) Briefly explain the difference between machine language and assembly language. **(6 marks)**
b) An instruction includes an "op-code" and an "operand". What is the significance of each term? **(6 marks)**
6. a) What is meant by an overflow in binary arithmetic and how does it occur? **(4 marks)**
b) Carry out the following sums using 7 bit binary two's complement, and state whether an overflow occurs or not, and why.
i) $65 + 72$ **(4 marks)**
ii) $123 - 65$ **(4 marks)**
7. In computer data handling, explain each of the following:
i) Character
ii) Byte
iii) Word
iv) File
v) Record
vi) Field **(12 marks)**
8. Explain the following concepts in data communication, and give appropriate examples in each case:
i) Simplex
ii) Half-Duplex
iii) Full-Duplex **(12 marks)**
9. a) Explain how a stack can be used to support the subroutine call/return mechanism and the passing of parameters. Use examples to illustrate your answer. **(6 marks)**
b) Briefly describe the operation of virtual memory. **(6 marks)**
10. Explain the following concepts from network communication: token, physical topology, logical topology. Give examples as appropriate. **(12 marks)**
11. Describe the following terms related to computer processing: deadlock, pipeline, multi-tasking, parallel processing. **(12 marks)**

12. The following are services available on the Internet. Describe each and comment on their use.

- i) FTP
- ii) Chat Rooms
- iii) SPAM
- iv) Telnet

(12 marks)