# THE BRITISH COMPUTER SOCIETY

# THE BCS PROFESSIONAL EXAMINATIONS Certificate

## TECHNOLOGY

17th October 2005, 2.30 p.m.-4.30 p.m. Time: TWO hours

Both Section A and Section B carry 50% of the marks. You are advised to spend about 1 hour on Section A (30 minutes per question) and 1 hour on Section B (12 minutes per question).

#### SECTION A

Answer TWO questions out of FOUR. You are advised to spend about 1 hour on Section A (30 minutes per question)

All questions carry equal marks.

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

**1.** A computer is able to execute the following code:

X = 12; Z = X + Y; IF Z > 4 THEN P = 2;

Note: This is *pseudocode* and does not represent any particular high-level language, although its meaning should be clear to the reader.

- a) Show how this high-level construct might be represented in the assembly language of a computer. (You may select a specific microprocessor or you may use a hypothetical 'teaching' computer). You must explain what each of the low-level (i.e., assembly language) instructions you have used does. (10 marks)
- b) With the aid of diagrams, explain how the low-level instructions you used in part *a*) are executed. Your explanation should describe the fetch/execute cycle and the way in which information flows in the processor as instructions are executed. You should use a diagram to describe the execution of one instruction (of your own choice) in your program in detail. (20 marks)
- **2.** *a)* How is a personal computer connected to the internet?

Your answer should include a brief description of the various systems (or technologies) that can be used to connect a personal computer to the internet. Your answer should also include a brief description of the performance (speed) of these technologies. (10 marks)

*b)* The internet makes it very easy to communicate with other computer users and to access data stored on other systems. However, the same internet brings with it dangers due to malicious programs such as viruses.

Explain what the computer user can do in order to avoid the dangers of the internet. Your answer should discuss the range of problems that the internet presents and the type of solutions available to deal with each of these problems. You should state briefly what this software does (i.e., how it works). (20 marks)

**3.** Those who buy computers (especially large organizations such as government departments) have to buy the best computer they can for the available money.

<i>a</i> )	What factors govern the performance of a computer? Your answer should in-	clude both hardware and
	software considerations and you should consider the entire computer system.	You do not have to consider
	the performance of external peripherals such as printers.	(12 marks)

b)	Explain how the performance of two computers may be compared?	(10 marks)

- c) Why is it difficult to compare the performance of two computers accurately? (8 marks)
- 4. In recent years, the personal computer has become the centre of the multimedia revolution.
  - *a)* In the context of home computing explain the meaning of the term *multimedia* and describe how it is affecting both domestic and small business computer users. (14 marks)
  - b) What developments in computer technology have led to an increase in multimedia applications?

(10 marks)

*c)* What developments in multimedia technology are likely to appear over the next two years and how do you think they will affect the computer user? (6 marks)

### **SECTION B**

### Answer FIVE questions out of EIGHT. You are advised to spend about 1 hour on Section B (12 minutes per question).

All questions carry equal marks.

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

5. The OSI (Open Systems Interconnection) is a standard description or 'reference model' for how messages should be transmitted between any two points in a telecommunication network.

Using a diagram, briefly describe the seven layers of the OSI model.	(12 marks)
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- 6. With the aid of diagrams, explain the operation of a hard disk drive. (12 marks)
- 7. Using suitable examples, explain the following terms in the context of computer security:

a)	Firewall	(4 marks)
b)	Anti virus software	(4 marks)
c)	File backup	(4 marks)

**8.** Carry out the following operations:

a)	Convert $10.101_{10}$ to binary	(3 marks)
<i>b</i> )	Convert 10101011 <sub>2</sub> to decimal	(3 marks)
c)	$B2F_{16} + 4AC_{16}$	(3 marks)
d)	10011001 OR 11110101	(3 marks)

9. Briefly describe each of the following terms and state their roles in a computer system:

	a) b) c)	Interrupts Virtual memory Registers	(3 x 4 marks)
10.	Diff	ferentiate between the following hardware items:	
	a)	Laser printer and ink jet printer	(4 marks)
	b)	Hard disc and DVD	(4 marks)
	c)	Program Counter and Memory Buffer Register	(4 marks)

11. Since the introduction of the Personal Computer, there have been a lot of developments in operating systems.

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Using examples,	describe and ex	plain the changes t	hat have been made to	operating systems.	(12 marks)

**12.** Cache Memory can significantly increase the processing capacity of a computer.

<i>a</i> )	What is cache memory?	(6 marks)
b)	Explain how cache memory improves the performance of a computer.	(6 marks)