

# THE BRITISH COMPUTER SOCIETY

## THE BCS PROFESSIONAL EXAMINATION Professional Graduate Diploma

### PROGRAMMING PARADIGMS

20th April 2004, 2.30 p.m.-4.30 p.m.

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

Time: THREE hours.

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

1. The merger of two international computer service companies in the UK and USA has led to the management of the new company consolidating their programming provision. For efficiency reasons, they have decided to standardise on using one programming paradigm for all future projects. The work they carry out is usually for information systems and database projects.

The employees from both companies have a mixed background of programming experience; at the moment there is no favoured programming paradigm.

Write a report for the management recommending a short-list of two programming paradigms to consider adopting. Give the strengths and weaknesses of both approaches, and say why the chosen paradigms would be appropriate in this environment and what type of applications they would be most suitable for. **(25 marks)**

2. The manager of an IT department has decided to buy the company's team of programmers an Interactive Development Environment (IDE).
- a) Describe what features an IDE should have to support a team of ten programmers. **(10 marks)**
- b) The manager needs to justify the expense to the Finance Director. What benefits will the IDE bring to offset the costs? **(15 marks)**

3. a) Most modern programming languages, imperative and applicative (functional), support exception handling. Why is exception handling necessary, and what problems are associated with providing this facility? **(12 marks)**

- b) A functional programming language can contain declarations in addition to defining functions and evaluating expressions. Discuss the nature of declarations within a functional programming language.

Choose a specific functional language and a specific imperative language and compare and contrast the use of declarations in them. **(13 marks)**

4. a) Pure logic programming is built upon a small number of basic concepts. Describe these concepts and discuss the compromises that have to be made when the pure logic programming paradigm is implemented in a real logic programming language. **(12 marks)**

- b) "Logic programming should be integrated with other programming paradigms such as functional programming".

Comment upon this statement, presenting arguments for and against such integration. **(13 marks)**

**Turn over]**

5. a) Within the context of multi-programming operating systems, multi-tasking operating systems, and embedded systems, describe what is meant by the term *concurrency*. Illustrate your answer with examples for each system. **(10 marks)**
- b) If a programming language claims to support concurrency, it must provide solutions to the problems of process synchronisation and inter-process communication. Explain the nature of these problems and discuss some of the proposed solutions. **(15 marks)**