

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION Professional Graduate Diploma

PROGRAMMING PARADIGMS

11th May 2001 – 10.00 a.m. – 1.00 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. When one first encounters a new programming language, the first question is usually: “What can this language ‘do’?” - Ben-Ari 1996

Choose two different programming language types (such as data-oriented, imperative, object-oriented) and:

- a) Compare and contrast what each language type can do; **(15 marks)**
b) Evaluate what type of applications they are most suitable for. **(10 marks)**

2. The IT Division of a large catalogue (mail order) company has traditionally used COBOL for developing and maintaining its Customer Order System. The system no longer fully meets the business needs of the company and a new system has been proposed. The Division is considering developing the application code in an object-oriented programming language.

With reference to an object-oriented programming language with which you are familiar, write a report that discusses the advantages and disadvantages of using such a language. Illustrate your answer with appropriate examples. **(25 marks)**

3. a) Describe four important tools typically found in an Interactive Development Environment (IDE). **(10 marks)**
b) Discuss how these tools improve the productivity of programmers and the quality of the code they produce. **(15 marks)**

4. a) Higher-order functions can be found within the implementation of applicative (functional) programming languages. Define the nature of higher-order functions and provide illustrative examples of their role within a functional programming language with which you are familiar. **(12 marks)**
b) In addition to defining functions and evaluating expressions, a functional programming language can contain declarations. Discuss the nature of declarations within a functional programming language and comment upon any similarities or differences that might exist between declarations in a functional and an imperative programming language. **(13 marks)**

5. In order to support concurrency, a programming language needs mechanisms to handle process synchronisation and communication. Describe the problems to which this need gives rise and some of the solutions proposed, discussing their strengths and weaknesses. **(25 marks)**