THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION
Professional Graduate Diploma

PROGRAMMING PARADIGMS

19th April 2005, 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. Choose FIVE features of the object-oriented paradigm that you think are important. Describe what they are and discuss why you think they are important. Within your discussion, give examples of them, either with code or a diagram. **(5 x 5 marks)**

2. A software house wishes to choose a single programming paradigm for all future developments. The company specialises in both database applications and artificial intelligence projects. It is faced with the variety of programming paradigms now available: logic programming, functional programming, imperative programming or object-oriented programming, any of which could be chosen as the single programming paradigm.

Choose TWO different programming paradigms and evaluate their strengths and weaknesses for such a company. Within your discussion explain why it might be difficult to choose a single paradigm for all future developments. **(25 marks)**

3. *a)* When using compound types within an applicative (functional) programming language, constructors, pattern matching and recursion all have a role. Using illustrative examples, discuss their roles within a functional programming language with which you are familiar. **(15 marks)**

b) Within the context of functional programming, lazy evaluation offers significant advantages over that of eager evaluation. Distinguish between these types of evaluation, and describe what these advantages are. **(10 marks)**

4. *a)* What two major abstractions characterise logic programming, and how are these compromised in the implementation of practical logic programming languages? **(12 marks)**

b) Logic programming and other programming paradigms such as object-oriented programming and functional programming each have their own advantages. Many languages have attempted to capitalise upon the individual strengths of these programming paradigms by integrating them into one language. Present arguments for and against such integration. **(13 marks)**

5. *a)* "Synchronisation and communication are an important activity within programming languages that support concurrency." Explain why this statement is true. **(10 marks)**

b) When a sequential program has executed its last statement, it terminates. What is the problem of program termination within the context of concurrent programming? Describe TWO solutions to this problem. **(15 marks)**