

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION Diploma

SOFTWARE DEVELOPMENT ENVIRONMENTS

4th May 2001 – 2.30 p.m. – 4.30 p.m.

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

Time: Two hours.

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

1.
 - a) Write down eight components of the software development lifecycle and then explain why the production of software is not just an eight stage linear process but instead the word ‘cycle’ is used. **(10 marks)**
 - b) Explain, with examples, why the process of describing what a program is to do, designing the program and writing it are three separate activities. **(15 marks)**
2.
 - a) Under operating system W, programmers might have a compiler for language J and an interpreter for language P. Explain the role of each of the programs W, J and P. **(9 marks)**
 - b) When writing a program in a particular programming language a programmer might write a section that reads some data, performs some mathematical calculations and outputs some results. Construct a small example program in a language of your choice and identify where your program would make use of system libraries. **(8 marks)**
 - c) Describe a situation in which it would be beneficial for the programmer to create their own library and describe the processes by which a library is first created and then used. **(8 marks)**
3.
 - a) Write guidelines for novice programmers to enable them to recognise when to use a procedure (or function or subroutine) in a program. Explain how it is possible to have a programmer write a procedure for inclusion in a larger program without being aware of the details of the larger program. **(13 marks)**
 - b) A procedural design for a computer program has split the problem into a sequence of task A followed by task B. Task B has been further broken down into a selection between tasks B1 and B2. Task B1 is an iteration with a test at the beginning. Task B2 is an iteration with a test at the end. Present this design BOTH as a diagram (flowchart) AND in procedural code (in a language of your choice). **(12 marks)**
4.
 - a) Describe FIVE editing features of program development environments specifically targeted at assisting the programmer to write code. **(10 marks)**
 - b) As part of a much larger program, a programmer has written a function to determine the sum of a sequence of integers. Unfortunately, within the function the “total” variable used to retain the sum of the values encountered so far has not been initialised correctly. Discuss how you would find this error using the debugging tools available in a program development environment with which you are familiar. **(15 marks)**

5. a) Software to control the nuclear reactor of a major power station is to be developed. Describe the operation of a suitable **tool** (i.e. **not** a technique such as black- or white-box testing) which could be used to assist in testing the software prior to installation in a live environment. Your answer should address advantages and disadvantages associated with using the tool. **(10 marks)**
- b) Software testing strategies are often divided into the general stages of unit testing, module testing, sub-system testing, system testing and acceptance testing. Explain the role of each of these individual stages, identifying the types of error likely to be detected. **(15 marks)**
6. a) Discuss FIVE attributes associated with high quality software. Specify how each can be achieved. **(15 marks)**
- b) Describe ONE standard for program documentation with which you are familiar. Your answer should include a rationale for each issue it addresses. **(10 marks)**