THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION
Professional Graduate Diploma

SOFTWARE ENGINEERING

22nd April 2004, 2.30 p.m.-5.30 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. *a)* Give THREE reasons for using the black-box style of testing. **(8 marks)**

b) The following is a code fragment from the abstract definition of a table with a maximum size, and methods for insertion and reading of a value in the table, and for obtaining the size of the table.

```
module TABLE;
exports
        type Table-Type(max_size: NATURAL);
        no more than max_size entries may be stored in a table;
        procedure Insert (Table: in out Table-Type; ELEMENT: in ElementType);
        procedure Read (Table: in out Table-Type; ELEMENT: in ElementType);
        function Size(Table: in Table-Type) return NATURAL;
        provides the current size of the table
        .
        .
        .
end TABLE
```

With reference to this abstract definition, illustrate how you would design a testing scheme based on black box testing. Include specification of the test cases you need to use. **(17 marks)**

2. The following is an outline specification for a development project to create a web-site.

"ECICE - European Chemical Industries Centre of Excellence - is a technology transfer institute that aims to improve industrial practices in process industries. This project is about developing an information-rich web presence for ECICE. In particular, research should be made into ECICE customer behaviour, to determine why they value the services offered by ECICE. These values should be the key criteria to guide the creation of ECICE 's web image."

a) Discuss the criteria you would use to determine the life cycle model that the development of this project should follow, and make a recommendation about selecting a suitable life cycle model. **(10 marks)**

b) Designers often select website functionality to meet the needs of potential customers. Identify, with reasons, THREE examples of functionality that would assist good communication between the ECICE website and its potential customers. **(5 marks)**

c) Derive TWO quality criteria that should be monitored closely during the development of this project. **(10 marks)**

3. *a)* Compare and contrast the methods of software project estimating known as *size-related estimates* and *function-related estimates*. **(6 marks)**

b) In your view, what key practice should underpin any use of estimating systems for the planning of software development projects. **(4 marks)**

c) A software company has asked you to create a process improvement programme for them.

i) State THREE categories of process classification you would use. **(5 marks)**

ii) State THREE types of process metrics you would use. **(5 marks)**

iii) Discuss TWO critical success factors that will determine the outcome of this programme, with your reasons. **(5 marks)**

4. As chief software architect, you have been commissioned to develop an integrated web-enabled bill payment system for a private telecommunications company. The timetable for implementation is short and some concerns were raised by your client about the lack of benefits in deriving a software model before any system development takes place.

Write a detailed report that aims to assure the client of the benefits of constructing a prototype. The report should also provide details of the approach, methods, and tools you intend to adopt in the construction of the first bill payment prototype. **(25 marks)**

5. A local bank has given you the requirements specification for a system to manage customer accounts. In particular, the specification identifies the data, the processes, and the user interface expected. The data include name, address, current balance, and the transaction type, and amount. Likewise, the processes include the creation, update, and deletion of customer accounts, and deposit and withdrawal transactions keyed in at a terminal.

Based on the information given, use an appropriate design method to define and develop design outlines for the following deliverables:

i) data design
ii) architectural design
iii) interface design
iv) component-level design **(25 marks)**