THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION
Diploma

SYSTEMS SOFTWARE

12th May 2003, 10.00 a.m.-12.00 noon
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)* Explain what is meant by the phrase *run-time error detection.*
(5 marks)
   b) List three different types of error that can be detected at run time and describe in each case how the compiled code handles the error. **(15 marks)**

   c) Discuss the costs and benefits of run-time error detection. **(5 marks)**

2. *a)* Describe the facilities provided by a typical single-user operating system
     i) for applications programs *and*
     ii) for users. **(13 marks)**

   b) What further facilities are provided by a multi-user operating system? **(12 marks)**

3. *a)* What information is transferred between a computer and
     i) a typical input device;
     ii) a typical output device? **(12 marks)**

   b) Describe, with examples, the management of this information by the operating system. **(13 marks)**

4. *a)* Describe the organisation of a typical memory hierarchy in a stand-alone single-user operating system.
(5 marks)

   b) For what reasons are data transferred between levels in this hierarchy? How are these transfers organised?
(20 marks)

5. *a)* Describe the components of a typical operating system and the way in which they are organised. **(15 marks)**

   b) What information is transferred between the components, and for what reasons? **(10 marks)**

6. The syntax of an identifier in a certain programming language is described in Backus Normal Form by the following:

<identifier> ::= <capital_letter>|
    <capital_letter> <rest>
<capital_letter>::= A|B|C| . . . |Z
<rest> ::= <letter_string>|<letter_string><digit_string>
<letter>::=<capital_letter>|a|b|c| . . . |z
<letter_string>::=<letter>|<letter><letter_string>
<digit>::=0|1|2| . . . |9
<digit_string>::=<digit>|<digit><digit_string>

a) Describe precisely in normal English what are the permissible forms of an identifier. **(5 marks)**

b) Develop a finite state machine that will recognize identifiers of this type. **(15 marks)**

c) Demonstrate the operation of your machine by describing how it will deal with the following character strings:
    ExY89
    P5q **(5 marks)**