

**THE BRITISH COMPUTER SOCIETY**  
**THE BCS PROFESSIONAL EXAMINATION**  
**Diploma**

**SYSTEMS DESIGN**

2<sup>nd</sup> May 2003, 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) Briefly explain the design issues that should be considered during the physical design of a Relational Database for EACH of the following:
  - i) data types (4 marks)
  - ii) derived (calculated) attributes (4 marks)
  - iii) referential integrity (4 marks)
  - iv) null values (4 marks)
- b) When designing the physical tables it may be necessary to denormalize the given normalized tables in order to optimise for efficient data processing.
  - i) Explain with an example what is meant by the term denormalization. (5 marks)
  - ii) State TWO disadvantages of denormalizing tables. (4 marks)
2. Explain how EACH of the following would be used in Systems Design. Support your answer with an annotated diagram in each case:
  - a) class diagram (8 marks)
  - b) sequence diagram (8 marks)
  - c) collaboration diagram (9 marks)
3. Identify and explain typical activities that might be undertaken at the design stage of an Information System. Include in your answer a consideration of both UML and Structured Design activities. (25 marks)
4. Describe each of the following and give an example of how each may be used in a web based implementation:
  - a) HTML (5 marks)
  - b) Java (5 marks)
  - c) JavaScript (5 marks)
  - d) SQL (5 marks)
  - e) A CGI scripting language (5 marks)

**Turn over]**

5. a) Modern user interface technology enables a wide range of graphical and multi-media features to be incorporated into an interface. Outline how these features can help make the interface more usable. **(5 marks)**
- b) An office information system is to be used in a large open-plan office to help staff respond to customer phone calls and letters. Describe the advantages and disadvantages of using the following in such a situation:
- i) Colour **(4 marks)**
  - ii) Sound **(4 marks)**
  - iii) Animation **(4 marks)**
  - iv) Voice input **(4 marks)**
  - v) Touch input **(4 marks)**
6. The illustration below shows a paper form for claiming expenses. The amount claimed for car travel is calculated by multiplying the miles travelled by the mileage rate. Taxable expenses are entered, and the tax paid is calculated by multiplying the taxable expenses by the current tax rate.

**EXPENSE CLAIM**

Name \_\_\_\_\_ Project \_\_\_\_\_

Personnel No \_\_\_\_\_

Date of claim \_\_\_\_\_ Method of payment:  Cash

Car Reg. No \_\_\_\_\_  Cheque

Mileage Rate \_\_\_\_\_  Bank Transfer

Date	Description	Use of own car		Purchases		
		Miles	Claimed	Untaxable	Taxable	Tax

Totals:

Total amount claimed:

Total miles this year

From last claim:

Signed (Employee) \_\_\_\_\_ This claim:

Authorised (Manager) \_\_\_\_\_ Total:

- a) Draw the screens you would need to automate this system, and show how they are linked **(8 marks)**
- b) Explain and justify any changes you have made compared with the paper-based system. **(7 marks)**
- c) List FIVE validations your system could perform. **(5 marks)**
- d) List FIVE advantages of your screen based system compared to the paper one. **(5 marks)**