

THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION Diploma

SYSTEMS DESIGN

2nd 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) Identify the important features in good screen menu and dialogue design. **(8 marks)**

- b) Suggest a screen menu and dialogue structure for the following situation:

A mail-order processing system is being converted from a batch processing system, where a number of operatives each undertake one clerical process in the chain of operations, to a logical screen-based system where each operative handles all clerical operations.

The process is as follows:

Customers can order goods from the mail order system by e-mail response from an Internet web-page form or by telephone. Credit worthiness is checked against company records for account customers or with the credit card company for credit card orders. A stock check is carried out and the customer informed if any item is not in stock and given the options of waiting, selecting an alternative, or cancelling the order for the out of stock item. When the order is agreed, the details are passed to the warehouse where items are selected, packaged, delivered to the customer by courier. The delivery note, signed by the customer, is acknowledged within the system and the customer is invoiced in the case of current account customers.

(17 marks)

2. a) Compare and contrast the following two process design techniques:

Decision Tables
Structured English

(10 marks)

- b) Produce the Structured English process description for the activities described in Question 1 b) above.

(15 marks)

3. Write short notes on the following, stating the relevance of each in systems design:

- a) Web page frames
b) Java beans
c) Applets
d) Cookies
e) JPEG images

(5 marks)

(5 marks)

(5 marks)

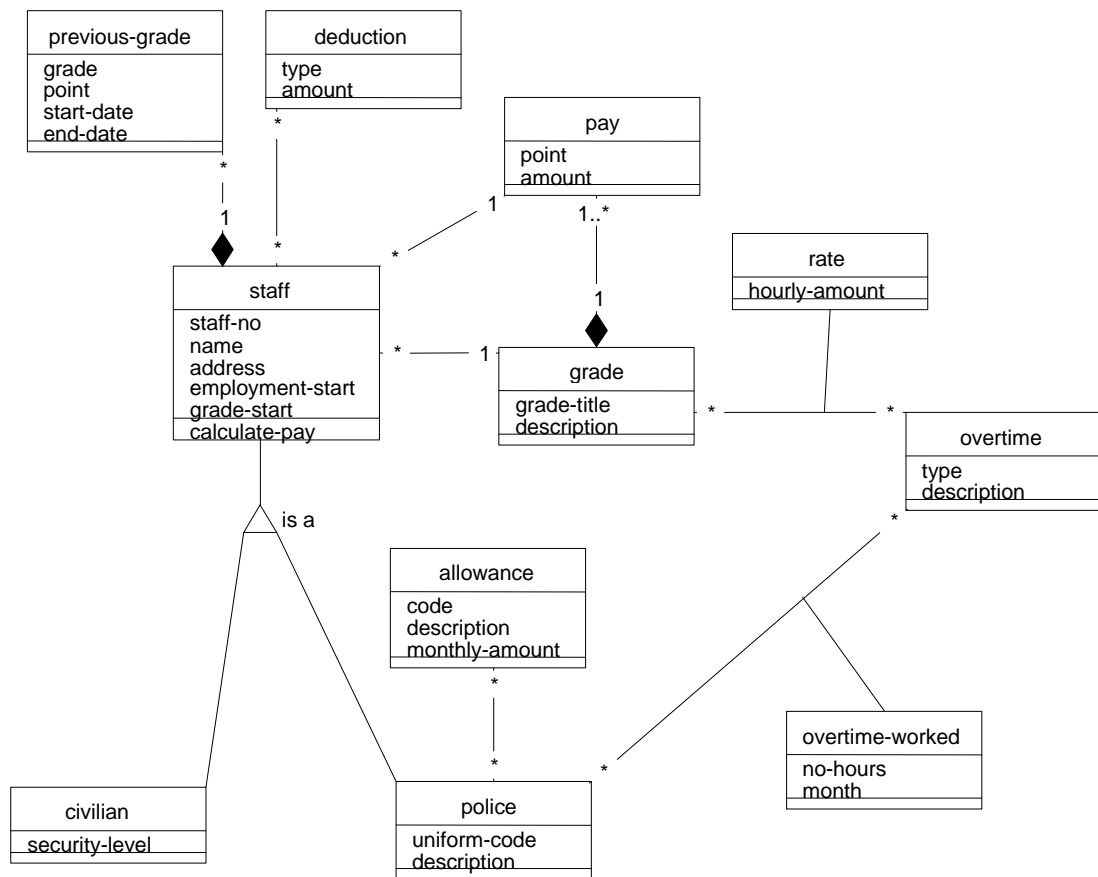
(5 marks)

(5 marks)

[Turn over

4. A regional police force wishes to set up a database to hold details of personnel for payroll purposes. Staff are divided into civilian and police staff. For each member of staff the database will hold staff-no, name, address, grade, payroll-point within grade, start-of-employment-date and start-of-current-grade-date. Each point on a pay grade has its own monthly pay figure. Civilian staff have a security-level-code which indicates the type of classified material that they may handle. A list of previous grade and points within grades, with start and end dates is also kept for each employee. Also a list of deductions such as union fees and healthcare plans is kept for each member of staff. Police staff have a uniform-code, which indicates the type of uniform they should wear. They also have a record of overtime for each month, held as number of hours and type of overtime. Each police grade has two hourly standard overtime rates: a standard overtime rate; and an extra-overtime rate. Each member of police staff also has a list of allowances, for instance dog handling, shift or clothing. Each allowance has a code, a description and a monthly amount. The main operation needed on the above database is to calculate monthly pay. The calculation will vary depending upon the type of employee.

The following is a class diagram for the above scenario.

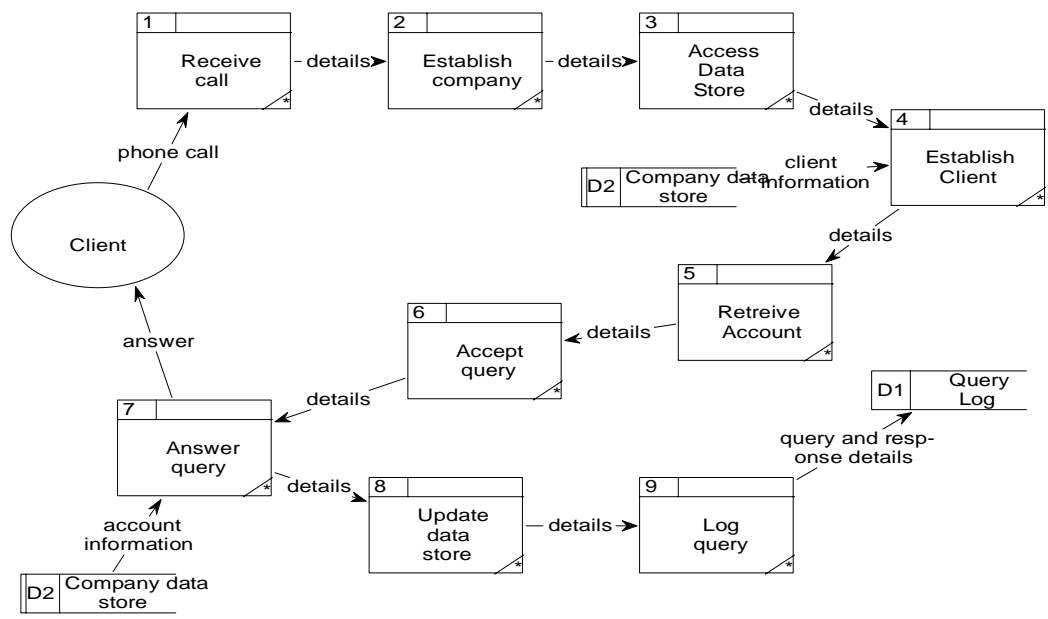


- a) Explain how a class diagram is, in general, mapped onto a relational model. Consider the concepts of generalisation, association and aggregation in your answer. **(10 marks)**
- b) Produce a relational model from the class diagram. **(10 marks)**
- c) Provide an outline algorithm for the operation “calculate-pay” in a relational context. State the role of SQL within the algorithm. **(5 marks)**

5. Describe and illustrate the following five diagram types in UML. For each of the diagram types, state its role in the systems design process.

- a) Use Case Diagram (5 marks)
- b) Collaboration Diagram (5 marks)
- c) Sequence Diagram (5 marks)
- d) State Diagram (5 marks)
- e) Activity Diagram (5 marks)

6. The following outline data flow diagram describes a business process for an operator at a call centre that handles enquiries for a number of different companies.



- a) Produce a structure chart from the diagram. (15 marks)
- b) State the main principles used to construct a structure chart from a data flow diagram. (6 marks)
- c) State any difficulties you encountered, or which might be encountered, when producing a structure chart from a data flow diagram. (4 marks)