# THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATION
Certificate

## INFORMATION SYSTEMS

18th April 2005, 10.00 a.m.-12.00 p.m.
Time: TWO hours

### SECTION A

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

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

**1.** A database has to be constructed for a new in-patient system in a hospital. Each ward in the hospital has its own name. The number of beds in each ward is also recorded. Each ward has a fixed number of nurses. Each nurse only works in one ward. Patient details are recorded when they arrive and this includes name, address, telephone number, date of birth, doctor's name and marital status. When admitted to the ward, each patient is assigned a consultant who is responsible for the treatment of his/her patients. Consultants are specialists in one area. The patient's temperature, blood pressure and weight are recorded.

*a)* Construct a logical data model (entity relationship model) for the above case study. Identify the relationships between each entity and show how you resolve any many to many relationships. **(10 marks)**

*b)* Construct an object model for the above case study. Include appropriate methods for each object. **(10 marks)**

*c)* Design a set of input screens which will:
*i)* record the patient details
*ii)* allocate a consultant
*iii)* assign a nurse to a ward **(10 marks)**

**2.** There are several analysis and design methods and techniques used in the development of information systems.

*a)* Explain what is meant by prototyping giving examples of THREE different approaches. **(10 marks)**

*b)* Define what is meant by a hard and a soft system methodology, giving examples of each. **(5 marks)**

*c)* Briefly describe the phases and techniques used in a structured methodology with which you are familiar. **(15 marks)**

**3.** *a)* All types of organisations need to store their information for day to day and periodic processing, statistical analysis, historical analysis and in some case legal requirements.

*i)* Describe the main features of a database management system. **(8 marks)**

*ii)* Briefly discuss the main differences between the traditional database architectures - hierarchical, network, relational and object oriented database management systems. Give examples of each showing a typical physical implementation. **(12 marks)**

*b)* The following is a set of data items describing projects and the employees linked to these projects:

Project code
Project type
Project description
Employee No
Name
Grade
Salary scale
Date employee joined project
Time employee allocated to project

Each project may have one or more employees allocated to it. Each person is on a single job grade. One salary scale may apply to a number of grades but a given grade will only have one salary scale.

Produce a set of 3NF (third normal form) relations from these data items. You should show each stage i.e. 1NF, 2NF and 3NF and explain the rules for each stage. **(10 marks)**

**4.** *a)* You have been asked to supervise the installation of a new financial package, which has been developed by your staff. Draft a memo to your Financial Director explaining to him:
*i)* How you have ensured a good quality system,
*ii)* Measures you have taken to deal with security, legal and ethical issues. **(14 marks)**

*b)* There are several methods you could use to implement/install this system depending on the current situation. Describe THREE methods you could use, giving examples of which you would use in a given situation:
*i)* The current system is manual.
*ii)* The current system is a very large complex system.
*iii)* The system will be implemented in many different locations. **(6 marks)**

*c)* As well as taking on existing data, write a report containing details of other issues, which you must consider to ensure a satisfactory implementation. **(10 marks)**

## SECTION B

Answer FIVE questions out of EIGHT. All questions carry equal marks.

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

**5.** Microsoft Access and Oracle are considered to be Relational Database Management Systems. Discuss how these, or similar RDBMSs, help to enforce good database design.

**(6 marks for areas, 6 marks for discussion)**

**6.** Testing is often seen as the least important aspect of any project.

*a)* Comment on whether you agree or disagree with this statement (and why). **(2 marks)**

*b)* Discuss what testing strategies you would implement to ensure the quality of an application developed as an Internet Shopping Site (similar in style to the Amazon group of on-line shops). **(10 marks)**

**7.** CASE tools are often seen as a means of automating functions within projects. Discuss the areas in which CASE tools can assist in producing documentation. **(12 marks)**

**8.** It is 3:30 p.m. on a Friday afternoon and the database server has just crashed. Outline the backup strategy that needs to be in place to ensure the recovery of all data that would have been processed (including all transaction that would have successfully completed by 3:29 p.m.). **(12 marks)**

**9.** Define what is meant by the following terms and how they are used.

*a)* ODBC
*b)* ASP
*c)* HTML
*d)* XML **(4 x 3 marks)**

**10.** Outline the typical stages of a project and what documentation and deliverables you would expect to be produced at each stage. **(1/2 mark for each stage, to a maximum of 3 marks)**
**(9 marks for discussion of documentation and deliverables)**

**11.** The requirements of Special Needs users (blind, partially-sighted, deaf etc.) may not be always included in the design of a multimedia web site. Comment on what features can be incorporated into the web site to assist this group of users. **(12 marks)**

**12.** You have just implemented a new database management system to replace a text based application. Discuss the area of security with respect to the application and database, and what areas of concern there may be.

(It is expected that you will discuss a range of areas not simply focusing on users). **(12 marks)**