

# THE BRITISH COMPUTER SOCIETY

## THE BCS PROFESSIONAL EXAMINATION Certificate

### INFORMATION SYSTEMS

17<sup>th</sup> October 2002, 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 small distribution warehouse which services all its dealers from one central warehouse needs to update its systems, with particular reference to E-commerce and E-business. These need to include on-line order processing, invoicing and payments. Six regional warehouses will be linked on-line to the central computer.

You have the responsibility of planning the analysis, design and implementation of the above system. Describe the stages and issues you would need to consider, using either a typical structured methodology, rapid application development or an object oriented approach. **(30 marks)**

2. a) Briefly describe and compare the main functions of the following, giving examples with which you are familiar:
- i) Spreadsheet Applications and Database Management Systems. **(5 marks)**
  - ii) Internet Service Providers and Multimedia Software **(5 marks)**
  - iii) Network Administrator and Database Administrator **(5 marks)**
- b) All the above need to deal with security of information. Provide a report detailing what measures you would take to ensure complete security of all aspects to do with information processing within an organisation. **(15 marks)**
3. a) A Computer Shop that sells hardware and software applications is to set up a Help Desk on its web site for customers with problems or complaints. Information received is to be stored on a database for subsequent solution and analysis.
- i) Draft the website screen(s) where the customer can record the details of the query/complaint. **(5 marks)**
  - ii) Describe the techniques you would suggest to make sure the screen is easy to use. **(10 marks)**
- b) Fact finding techniques such as interviews and questionnaires would be required to enable you to design the above system.
- i) Draft a memo to your manager describing the benefits and drawbacks of using these techniques **(12 marks)**
  - ii) Give an example of an 'open' question and a 'closed' question which could be used in your questionnaire. **(3 marks)**

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4. a) Data modelling techniques are used in data driven methodologies to build a stable data model.
- i) Describe the elements of a logical data model (entity-relationship model). **(6 marks)**
  - ii) Describe the three stages of normalisation. **(9 marks)**
- b) The following is a list of data items describing projects and personnel linked to those projects. Each project may have more than one person allocated to it. The date-joined refers to the date the person joined the project. The allocated-time indicates the length of time a person is allocated to a project. Each person is on a single job grade. One salary scale may apply to a number of grades, but a given grade will only apply to one salary scale.
- Project code
  - Project type
  - Project description
  - Personnel no
  - Name
  - Grade
  - Salary-scale
  - Date-joined
  - Allocated-time
- i) Produce a logical data model (entity-relationship model) depicting the above scenario. **(6 marks)**
  - ii) Produce a set of normalised relations in (3NF) third normal form. **(9 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. Explain the differences between the following terms that are used to describe the characteristics of a column in a database table:
- Data Type,
  - Primary Key,
  - Domain Constraints,
  - Null Values.
- (4 x 3 marks)**
6. With reference to a software package with which you are familiar, describe briefly THREE built-in software tools that could be used to support the software development life cycle of an information system.
- Explain how the different software tools integrate together during development.
- (12 marks)**
7. Describe THREE different project management techniques and state the advantages and disadvantages of each.
- (12 marks)**

8. With the aid of examples outline the main differences in modelling/describing an information system provided by each of the following design techniques:

- a) A High Level Data Flow Diagram versus a UML Use Case Diagram.
- b) An Entity Relationship Diagram versus an Object Oriented Class Diagram.

(2 x 6 marks)

9. Figure 1 (below) is an extract of a Table stored in a Relational Database. This Table is used in a Library and is intended to show the status of books; i.e. they can either be Reserved, On Loan or available for loan/reservation. A loan is indicated by an entry for the Borrower number and Borrower Name. The ISBN is a simplified representation of the international standard book number uniquely identifying all published material.

Outline how you would re-structure this information in order to solve the following problems:

- i) It is unclear how many copies of the same Book there are in the library.
- ii) It is difficult to add more than 2 co-authors for a book.
- iii) There is redundant duplication of data.
- iv) Information about the status of loans/reservations is missing and/or inconsistent.

(4 x 3 marks)

Author1	Author2	Book Title	ISBN	Borrower Number	Borrower Name	Return Date	Classification
K.Chan	D.Yeo	Visual Basic	233-7	RESERVED	S.King		602.758
K.Chan		Java Basics	233-9				621.7
K.Chan	J.Hope	Begin .NET	296-8	1090	P.Hill	1-9-02	611.490
D.Yeo		Visual Basic	253-9	1192	S.King	2-9-02	602.758
D.Yeo		Visual Basic	253-8				602.758
D.Yeo		Visual Basic	303-3	RESERVED	P.Hill		602.758

Figure 1. Library Loans/Reservations

10. Describe briefly THREE different ways in which the integrity of data in a computer system could be compromised when the same item of data is held simultaneously in different computers located at different places within the organisation. State the techniques that are used to preserve data integrity.

(4 x 3 marks)

11. Explain using diagrams, how the following indexing techniques accommodate the insertion of records to a file:

- a) B-tree indexed file
- b) Indexed Sequential file
- c) Inverted file
- d) Random or Hashed file

(4 x 3 marks)

- 12.** Suppose you were required to build a User Interface that allows a student to access a university library using the world wide web (WWW). Your user interface should support a user who wants to search for a book and then reserve a book which is held in the library catalogue. Assume the student has already logged in and has been authenticated as a member of the university library.

Sketch out an appropriate user interface and show how each of the following GUI controls would be used in your user interface:

- a)* Check box
- b)* Command Button
- c)* Drop down list
- d)* Radio or Option Buttons

**(4 x 3 marks)**