

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

**INFORMATION SYSTEMS**

19<sup>th</sup> April 2001 – 10.00 a.m. – 12.00 p.m.  
Time: 2 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. You have been appointed to investigate the admissions processes of a local college and to design an on-line system.

*Students apply to the College to study for a particular award. They may make more than one application but can only be offered one full-time course provided they have the appropriate qualifications. They complete the application form and submit it to the College Admissions Office where the form is checked to make sure it is completed correctly. If there are any errors then the forms are returned to the student for amendment. Once the forms are correct they are passed to the Academic Admissions Tutor who has three options: to make an offer for one course, offer an alternative course or reject the application. The student is sent a letter indicating the tutor's decision and is asked to accept or reject any offer made. Once the offer has been accepted, the student details are entered on to the Admissions File. At the start of the course, students are registered by the Admissions Office and are allocated to a tutor group. Each tutor group has the same timetable for lectures but a different timetable for tutorials. Only one lecturer teaches a lecture, whereas a different lecturer teaches each tutorial.*

- a) Draw a Context Diagram and a set of Data Flow Diagrams to depict the above system. **(10 marks)**
- b) Draw a Data Model identifying the main Entities and Relationships, indicating the degree of relationship and optionality. **(10 marks)**
- c) Design a set of screens which would be used by:
  - i) the student to apply for a course
  - ii) the Admissions Tutor to make an offer
  - iii) the student to accept/reject the offer **(10 marks)**

2. A methodology has been defined as 'a recommended collection of rules, tools, techniques, documentation, management and training for the development of information systems'.

- a) Give the main reasons why a methodology is a requirement for information systems development within the business environment. **(5 marks)**
- b) Describe the main stages within a structured methodology with which you are familiar. Identify the main techniques used at each stage. **(15 marks)**
- c) When investigating a system, a feasibility study should be carried out to ascertain the problems and requirements of the existing and proposed new system. Identify the issues that would normally be included in a feasibility report. **(10 marks)**

**[Turn over**

3. Information is said to be the most powerful resource within a business organisation.
- a) Discuss how information flows in a typical organisation hierarchy, giving examples of the type of information at each level. **(6 marks)**
  - b) Define what is meant by each of the following:
    - i) Executive Information System
    - ii) Management Information System
    - iii) Transaction Processing System **(9 marks)**
  - c) Draft a memorandum to the Information Systems Manager of a large retail company describing what measures you would take to ensure complete security of all the information held on the computers. **(15 marks)**
4. Your company has been advised that it is losing its business as it is failing to keep up to date with new technology.
- a) You have been asked to prepare a report explaining how the Internet and the introduction of database management systems, multimedia and object oriented technology have been used by companies to increase their competitive advantage. Draft the report requested. **(15 marks)**
  - b) The introduction of new technology will require new staff appointments. Briefly describe the functions of the following:
    - i) Network Administrator
    - ii) Database Administrator **(10 marks)**
  - c) As a member of the British Computer Society explain how the Society's Code of Conduct might impact on the introduction of new technology. **(5 marks)**

NOW PLEASE ANSWER QUESTIONS FROM SECTION B OVERLEAF →

## 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. Certain terms associated with data modelling are often used interchangeably. Explain precisely the differences between each of the following pairs of terms:
- a) Entity Type and Class
  - b) Generalisation and Aggregation
  - c) Conceptual models and Logical models
- (3 x 4 marks)**
6. a) Explain what is meant when a web site presents 'static' information content in its web pages. **(4 marks)**
- b) What technology is needed, and why, to enable a web site to present 'dynamic' information content in its web pages? **(8 marks)**
7. The following methods are frequently chosen to design information systems:
- a structured method (e.g. YOURDON)
  - an object oriented method (e.g. Unified Modelling Language (UML))
  - a Rapid Application Development approach
- Describe the distinctive principles and the motivations behind these methods. **(12 marks)**
8. Suppose you are about to develop an information system. There are different types of software tools and many products that you could use. Describe the functionality you would expect to be provided by **ONE** of the following types of software tools:
- a) A CASE tool (products include Rational Rose, Symmetry, Visio) OR
  - b) A Web Authoring tool (products include Dreamweaver, Flash, FrontPage) OR
  - c) A Report Generator (products include Crystal, RPG3)
- Your answer should refer to either one of the products listed above or one of your own choice. **(12 marks)**
9. Explain the meaning of the following relational database terms:
- a) Compound or Composite Key
  - b) Join condition
  - c) Schema
  - d) Null value
- (4 x 3 marks)**

**10** Facts about the real world can be expressed as binary relationships using the notation:

Relation(Attribute1,Attribute2)

where Attribute1 represents a unique Identifier and Attribute2 represents a variable which is functionally dependent on Attribute1.

Consider the following binary relationships:

PersonName(45023,"Bill Fernandez")  
PersonName(67121,"Owen Smith")  
CarRegNo(712,"TVR545W")  
CarMake(712,"Ford")  
CarMake(709,"BMW")  
CarEngine("E3430/7",712)  
CarEngine("E9745/4",709)  
CarEngine("E9745/2",709)  
EngineSize("E9745/2",1.6)  
EngineSize("E3430/7",1.8)  
EngineSize("E9745/4",1.9)

a) Using the above facts derive the following information:

- i) What is the engine size of the car registered as "TVR545W"?
- ii) What engine sizes can be fitted in a "BMW"? **(4 marks)**

b) Express the following facts as binary relationships:

- i) The fact that cars made by "Ford" have either a model name of "Galaxy" or "Scorpio"
- ii) The fact that "Bill Fernandez" owns both a "Galaxy" and a "Scorpio". **(8 marks)**

**11** Design a user interface for the following scenario:

*You are required to simulate a point of sales checkout in a busy supermarket. Assume there is no bar code reader, therefore the checkout operator has to manually key in the product code of the goods purchased, and the quantity purchased. A data file is used to retrieve the product description and the price of a product purchased. The product code is located on the product packaging above the bar code. After a valid product code and quantity has been entered, the description and cost is displayed. This is repeated for each product purchased. A running total of the customer purchases will also be displayed and a final total produced for each customer. Your display should be refreshed ready to process further customers.*

Your design should include:

- A diagram showing the structure of your user interface.
- A series of sketches showing the interaction between the checkout operator and your user interface. **(12 marks)**

**12** The data held in corporate databases is a valuable resource and may contain sensitive information which needs protecting. Describe the techniques that are used to protect corporate databases from the following threats:

- theft by employees
- accidental loss
- corruption of operational data arising from the failure of the hard disk containing the data **(12 marks)**