THE BRITISH COMPUTER SOCIETY

THE BCS PROFESSIONAL EXAMINATIONS
BCS Level 6 Professional Graduate Diploma in IT

KNOWLEDGE BASED SYSTEMS

21st April 2008, 2.30 p.m.-5.30 p.m.
Answer THREE questions out of FIVE. All questions carry equal marks.
Time: THREE hours.

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

Calculators are **NOT** allowed in this examination.

1. Development of any industrial level software system requires careful management in order to ensure that an effective product is produced. Describe a project management framework that is suitable for the construction of an interactive web based intelligent system by addressing the following tasks:

   i.   Identify all the main stakeholders involved in the project, and explain their respective roles and responsibilities in the construction of an intelligent knowledge based system.

   (10 marks)

   ii.   Identify a suitable project management and software development methodology, and describe the main phases in the development process as they relate to knowledge engineering in particular.

   (15 marks)

2. Knowledge elicitation involves modelling the knowledge used by an expert to solve problems. Consider an example application domain and construct a knowledge base for the domain by completing the following tasks:

   i.   Describe briefly general methods that could be applied to elicit the knowledge needed to solve a small complex problem.

   (5 marks)

   ii.   Explain why it would be difficult to develop a KBS for a domain in which there was a considerable reliance on tacit and implicit knowledge.

   (5 marks)

   iii.   Present an example knowledge base using a knowledge representation formalism of your choice. Ensure that it is adequately annotated with a textual explanation of how it could be used to solve problems.

   (15 marks)

3. Data mining is arguably one of the most successful applications of artificial intelligence in business.

   i.   Discuss how it has successfully made the transition from research laboratory to eBusiness applications. Focus on the real business problems that the technology addresses and the benefits perceived to have been realised.

   (20 marks)

   ii.   Comment briefly on the reasons for an apparent disproportionately low use of KBS compared to conventional systems in solving business problems.

   (5 marks)

4. AI technologies each offer different advantages and limitations. Select two opposing technologies and undertake the following analysis:

   i.   Compare and contrast their features and indicate criteria that could be applied to help select the most suitable technology for a given application.

   (15 marks)

   ii.   Consider how the two chosen technologies could be combined to produce a hybrid system that would, in principle, overcome the limitations inherent in each individually.

   (10 marks)

5 There are many alternative ways to solve a problem:

   i.   Explain both brute-force and heuristic search methods and discuss their relative merits with the aid of suitable examples.

   (10 marks)

   ii.   Explain the difference between inductive and deductive reasoning.

   (5 marks)

   iii. With the aid of an illustrative example, describe how a problem could be solved using analogical reasoning.

   (10 marks)