

# THE BRITISH COMPUTER SOCIETY

## THE BCS PROFESSIONAL EXAMINATION Professional Graduate Diploma

### ADVANCED DATABASE MANAGEMENT SYSTEMS

26<sup>th</sup> April 2001 – 10.00 a.m. – 1.00 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.*

1. One of the problems in distributed database system management is deadlock detection.

Consider the following strategy for building a wait-for graph in a centralised system:

“If transaction  $T_i$  is waiting for a data item held by  $T_j$ , make  $T_i$  and  $T_j$  nodes in the wait-for graph and draw an edge from  $T_i$  to  $T_j$ ”

- a) Explain why deadlock detection is a problem in distributed systems. **(5 marks)**
- b) Explain how the strategy stated above can be used to detect deadlock in centralised systems. **(4 marks)**
- c) State why the given strategy is not suitable for distributed systems and discuss how it might be amended and used to detect deadlock in such systems. Provide outline algorithms for deadlock detection for two distributed database system topologies. **(16 marks)**
2. It is usually worth a database management system expending considerable effort in determining the best method of executing a query before actually executing the query. Discuss the role and process of query optimisation in database management systems. **(25 marks)**
3. Explain how one might judge whether a database management system was based on the relational data model. **(25 marks)**
4. Discuss the features that should be supported by a temporal database management system. **(25 marks)**
5. Compare and contrast the features and origins of object-oriented versus object-relational database systems. **(25 marks)**