1. Give an example of a recursive relationship and show it in an Entity-Relationship Diagram. (10%)

2. Explain how Entity-Relationship entities are transformed into relations. Draw the Entity-Relationship Diagram for the entities DEPARTMENT and EMPLOYEE, which have a 1:N relationship. Assume that a DEPARTMENT does not need to have any EMPLOYEE but that every EMPLOYEE does have a DEPARTMENT. Please define necessary attributes and transform this Diagram into relations. (15%)

3. Describe the DBA's responsibilities for (a) managing data structure, (b) managing data activity, and (c) managing the database management systems. (15%)

4. Explain the similarities and differences between the semantic object model and the Entity-Relationship model. (15%)

5. Define multi-value dependency. Give an example. Explain why multi-value dependencies are not a problem in relations with only two attributes. (15%)

6. Summarize the (a) consistency problem, (b) access control problem, and (c) coordination problem in processing downloaded databases. (15%)

7. Explain the difference between optimistic and pessimistic locking. In general, is optimistic or pessimistic locking preferred for Internet applications? Justify your answer. (15%)