

COMPUTER SCIENCE TRIPOS Part IB – 2013 – Paper 4

5 Databases (TGG)

The lectures defined Boyce-Codd Normal Form (BCNF) as follows. A relational schema R is in BCNF if for every functional dependency $\mathbf{X} \rightarrow A$ either

- $A \in \mathbf{X}$, or
 - \mathbf{X} is a superkey for R
- (a) Present a relational schema (with functional dependencies) that is not in BCNF and explain how BCNF is violated. [3 marks]
- (b) Describe a problem that could be encountered in a database implementing your schema. [3 marks]
- (c) Decompose your schema into smaller relations that are in BCNF. Justify your answer. [3 marks]
- (d) Discuss one cost and one benefit involved in the kind of schema normalisation performed in (c). [2 marks]
- (e) Is every BCNF schema free from the problem you described in (b)? Explain your answer. [3 marks]
- (f) Describe a scenario in which the relations you describe in (c) are derived directly from an Entity/Relationship (ER) model. [6 marks]