

2008 Paper 5 Question 8

Databases

(a) What is the difference between a *key* and a *functional dependency*? [3 marks]

(b) The schema $R(A, B, C, D, E)$ has the following functional dependencies.

$$A, B \rightarrow C$$

$$B, C \rightarrow D$$

$$C, D \rightarrow E$$

$$D, E \rightarrow A$$

(i) What are all of the keys of R ? [3 marks]

(ii) Which functional dependencies violate Boyce–Codd Normal form (BCNF)? [3 marks]

(iii) Which functional dependencies violate Third Normal form (3NF)? [3 marks]

(iv) Find a lossless-join decomposition of R into BCNF relations. [8 marks]