2008 Paper 12 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.

$$
\begin{aligned}
A,\ B &\ \rightarrow\ C \\
B,\ C &\ \rightarrow\ D \\
C,\ D &\ \rightarrow\ E \\
D,\ E &\ \rightarrow\ A
\end{aligned}
$$

(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]

1