

① a) *

$$\left\{ \begin{array}{l} AB \rightarrow C \\ C \rightarrow A \\ BC \rightarrow D \\ ACD \rightarrow B \xrightarrow{A \text{ extra}} CD \rightarrow B \xrightarrow{B \text{ extra}} X \\ BE \rightarrow C \\ CE \rightarrow FA \xrightarrow{A \text{ extra}} CE \rightarrow F \\ CF \rightarrow BD \xrightarrow{D \text{ extra}} CF \rightarrow B \\ D \rightarrow EF \end{array} \right.$$

$$FD = \left\{ \begin{array}{l} AB \rightarrow C \\ C \rightarrow A \\ BC \rightarrow D \\ BE \rightarrow C \\ CE \rightarrow F \\ CF \rightarrow B \\ D \rightarrow EF \end{array} \right.$$

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$$\left\{ \begin{array}{l} B \rightarrow C \\ A \rightarrow E \xrightarrow{E \text{ extra}} X \\ C \rightarrow E \\ A \rightarrow B \\ A \rightarrow C \xrightarrow{C \text{ extra}} X \\ B \rightarrow E \xrightarrow{E \text{ extra}} X \end{array} \right.$$

$$F_2D = \left\{ \begin{array}{l} B \rightarrow C \\ C \rightarrow E \\ A \rightarrow B \end{array} \right.$$

b) $R_1 : AB, BC, BD, BE, CD, CE, CF$
 $R_2 : AD$

④ a) False. Example: $R(A, B, C), F = \{AB \rightarrow C\}$, $\text{key}' : AB$

b) True. 3NF و BCNF هما نفس الشيء

c) False. Example: $R(A, B, C, D), F = \{AB \rightarrow C, C \rightarrow B\}$ $\text{key}' : AB, AC$
 3NF و BCNF هما نفس الشيء

13) a) $3NF \rightarrow 4NF$ $B \rightarrow D$ \Rightarrow $B \rightarrow D$ \Rightarrow $4NF$
 not a superkey multivalued dependency

b) $R_1 \cap R_2 = A$ $A \rightarrow BC \Rightarrow A \rightarrow ABC \Rightarrow$ lossless

c) $(F \cup F_1)^+ \neq F^+ \Rightarrow$ Join Dependency Preserving

نحوه اولی: $B \rightarrow D, CD \rightarrow E$ را در نظر بگیریم.

d) $R_1 \cap R_2 = C$, $C \not\rightarrow R_1$, $C \not\rightarrow R_2 \Rightarrow$ lossy

| A | B | C | D | E |
|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 |
| 6 | 7 | 8 | 9 | 0 |

| A | B | C |
|---|---|---|
| 1 | Y | M |
| 4 | V | A |

| C | D | E |
|---|---|---|
| W | F | A |
| W | 9 | 0 |

| A | B | C | D | E |
|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |
| 1 | 1 | 1 | 1 | 1 |

مے اطمینان حاصل ہے

e) $R_L = (B, D)$ $R_T = (A, B, C, E)$

Ⓚ a) BCNF. $A \rightarrow F, F \rightarrow G, C \rightarrow D, A \rightarrow G, A \rightarrow B$
BNF. $A \rightarrow F, A \rightarrow G, F \rightarrow G, C \rightarrow D$

b) $\left\{ \begin{array}{l} BC \rightarrow A \\ BC \rightarrow E \\ A \rightarrow F \\ A \rightarrow B \\ F \rightarrow G \\ C \rightarrow D \end{array} \right.$

c) $\left\{ \begin{array}{l} F \rightarrow G \\ A \rightarrow BF \\ C \rightarrow D \\ AC \rightarrow E \end{array} \right.$

② a) Book : Author Name, Copy Number, ISBN → title Number, title, Publish year, author Name, author Nationality.

ISBN \rightarrow CoPyNumber, title, Publish year, AuthorName, AuthorNationality
AuthorName \rightarrow AuthorNationality

Author Name \rightarrow Author Nationality

Customer: Customer Number \rightarrow ID Number, Name, Address, Phone, Book Number
 ID Number \rightarrow Customer Number, Name, Address, Phone

Borrow: title Number, copy Number \rightarrow Customer Number, Date, Borrower Name
 Customer Number \rightarrow Borrower Name

b) Book: Author Name \rightarrow Author Nationality \Rightarrow 4NF , 3NF , BCNF
 Customer: 4NF , 3NF , BCNF

Borrow: Customer Number \rightarrow Borrower Name \Rightarrow 4NF , 3NF , BCNF

c) redundancy, incompleteness, data loss, too many "joins"

d) Book: $R_1 = (\text{Author Name, Copy Number, ISBN, title Number})$
 $R_2 = (\text{ISBN, Title, Copy number, Publish year, Author Name, Author Nationality})$

Borrow: $R_1 = (\text{title Number, copy Number, Customer Number, Date})$
 $R_2 = (\text{Customer Number, Borrower Name})$

e) Book: $R_1 = (\text{ISBN, title, copy Number, Publish year, Author Name, Author Nationality})$
 $R_2 = (\text{ISBN, title Number})$

Borrow: $R_1 = (\text{title Number, copy Number, Customer Number, Date})$
 $R_2 = (\text{Customer Number, Borrower Name})$

* تو به کسی که این جواب ها تها جوابی درت مسائل نیست و فقط به بحثه نموده
 از یک جواب در اختیار شما قرار داده است.