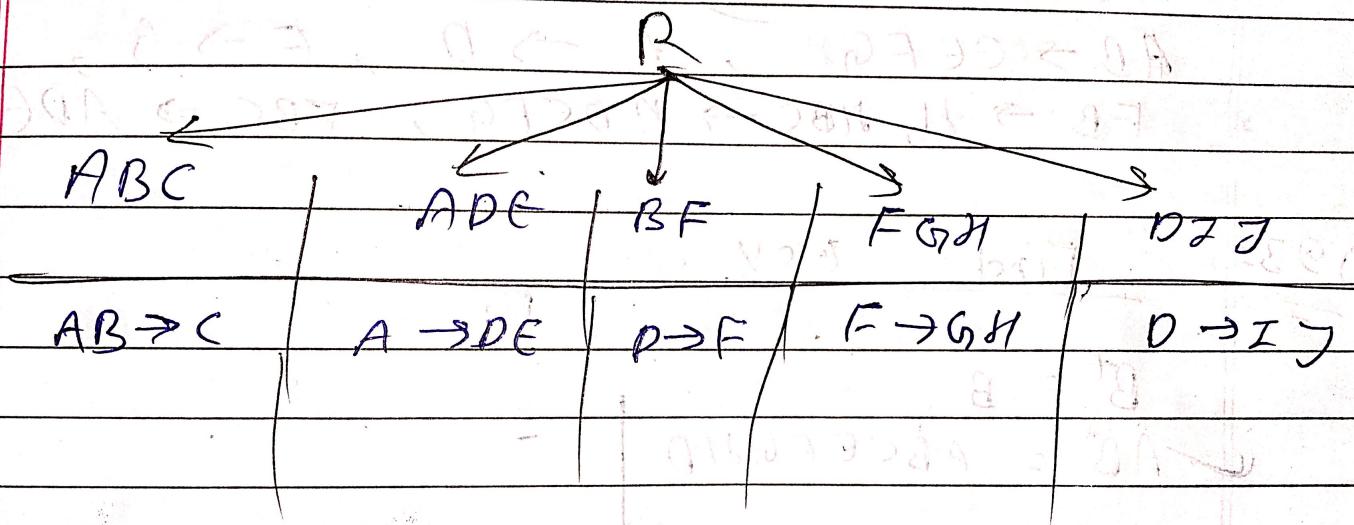


21. Consider the following FDs for the relation
 $R=ABCDEFHIJ$ and use FDs: $AB \rightarrow C$,
 $A \rightarrow DE$, $B \rightarrow F$, $F \rightarrow GH$, $D \rightarrow IJ$.

If 'R' is split into ABC , ADE , BF , FGH , DIJ
then this decomposition is.

- (a) Lossy and dependency preserving
- (b) Lossless and dependency preserving
- (c) Lossy and not dependency preserving
- (d) Lossy and not dependency preserving

(b) QL \Rightarrow R ($ABCDEFGHIJ$)
 $AB \rightarrow C, A \rightarrow DE, B \rightarrow F, F \rightarrow GH, D \rightarrow IJ$



$$B^+ = BF\bar{G}\bar{H}$$

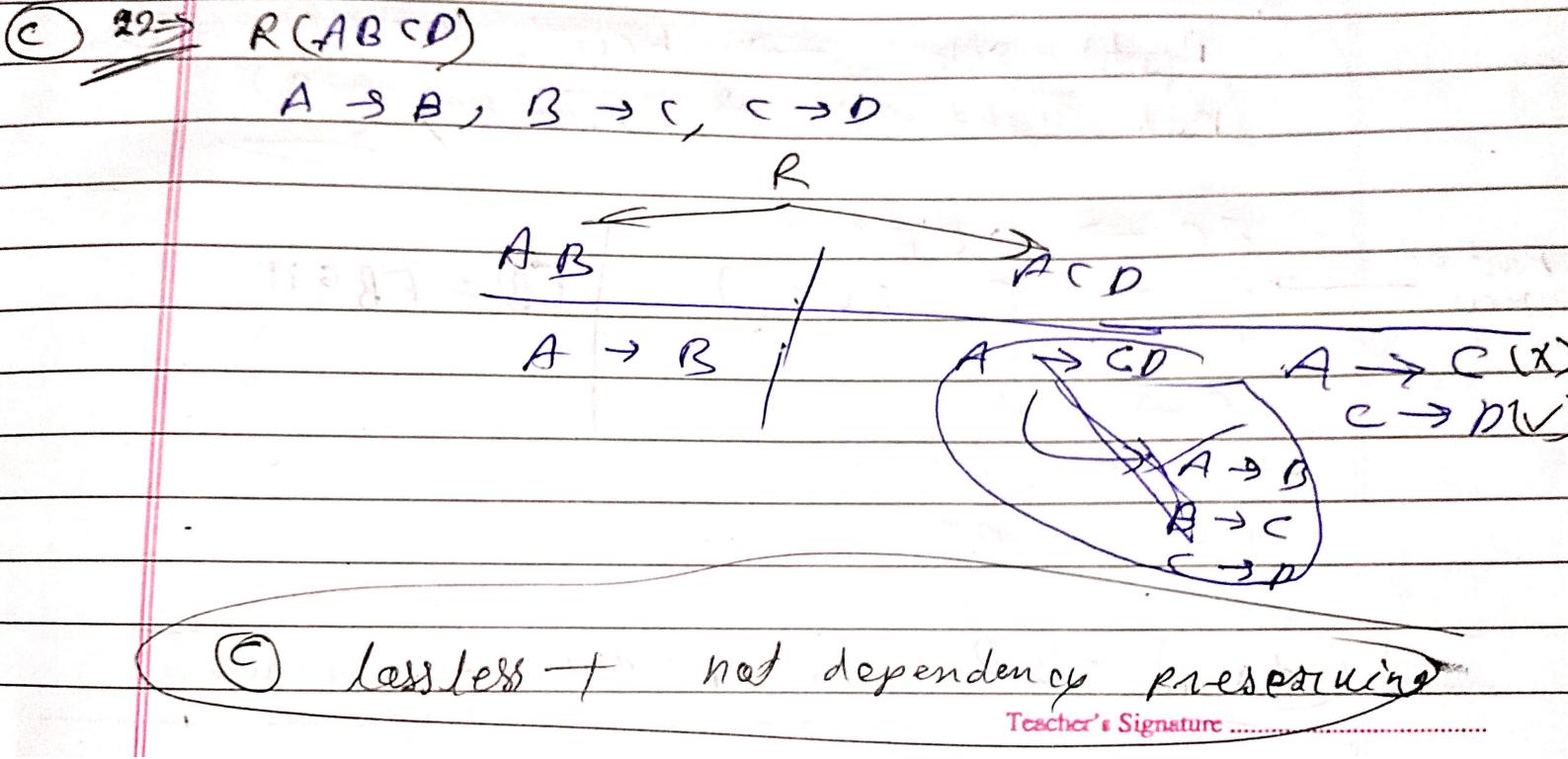
$$AB^+ = ABCDEF\bar{G}\bar{H}\bar{I}\bar{J} \rightarrow CK$$

(6)

Lattice + Dependency preserving

22. Suppose you are given a relation $R(ABCD)$ with the following sets of FDs, assuming they are the only dependencies that hold for R .
 $A \rightarrow B, B \rightarrow C, C \rightarrow D$; is decomposed into AB & ACD . Describe the decomposition.

- (a) It is lossy and not preserving dependencies
- (b) It is lossless and preserving dependencies
- (c) It is lossless and not preserving dependencies
- (d) It is lossy and preserving dependencies



Common Data Question for Q 23 & 24:

Consider relation R(ABCDEFGH)

FDs are $AB \rightarrow CEF GH$, $A \rightarrow D$, $F \rightarrow G$,
 $FB \rightarrow H$, $HBC \rightarrow ADEFG$, $FBC \rightarrow ADE$

23. Find the key for the relation.

- (a) HB
- (b) FB
- (c) AB
- (d) AC

Common - 23 Δ 24

$R(A \Delta (D \cap F \cap H))$

$AB \rightarrow CEFH$, $A \rightarrow D$, $E \rightarrow G$,
 $FB \rightarrow H$, $HBC \rightarrow AD \cap FG$, $FBC \rightarrow ADE$

② 23)

Find key

$$B^T = B$$

$$\checkmark AB^T = ABC \cap FGH \cap D$$

③ AB is c.k

24. Based on the key found in 23, find the Partial dependency

- (a) $FB \rightarrow H$
- (b) $F \rightarrow G$
- (c) $AB \rightarrow CEF GH$
- (d) $A \rightarrow D$

(d) 24)

Find p.d. in

23

P.d. \rightarrow Part of key \rightarrow non-key

Right side \rightarrow key (A C D E F G H)

Not right side \rightarrow non-key (B)

Part of key
 $A \rightarrow C E F G H$
 $A \rightarrow D$ (✓)
 $F \rightarrow G H$
 $F B \rightarrow H$
 $H B C \rightarrow A D E F G$
 $F B C \rightarrow A D E$

$$F B^T = F B G H$$

d

$A \rightarrow D$ is partial dependency

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25. What are essential properties of Functional dependencies (FD)?
- (a) There is a one to one Relationship between attributes in FDs
 - (b) FDs must be defined on schema
 - (c) FDs must be non-trival
 - (d) All of the above

Q 25 → Essential properties of FDs -

FDS →

- (a) There is a one to one relationship b/w attributes in FDS.
- (b) FDs must be defined on schema.
- (c) FDs must be non-trivial.

26. Consider a relation with five attributes ABCDE. You are given the following dependencies.

$A \rightarrow B$, $BC \rightarrow E$, $ED \rightarrow A$. Find the key(s) for the relation.

- (a) AED
- (b) CDE
- (c) Both (a) and (b)
- (d) Neither (a) nor (b)

⑥ 26

$R(ABCDE)$

$A \rightarrow B, BC \rightarrow E, ED \rightarrow A$

C.R

$\times CDT = CDAB \rightarrow \cancel{S}$

$\times DCT = CDEAB$

$\times AEDT = AED \rightarrow \cancel{S}$

⑦

$BCDEA$ is comdrat key

27. Suppose that we have the following three tuples in a legal instance of a relation schema with three attributes ABC as (1,2,3), (4,2,3) and (5,3,3). Then which of the following dependencies can you infer does not hold over schema

(a) $A \rightarrow B$ (b) $BC \rightarrow A$
(c) $B \rightarrow C$ (d) All the above

Mat haly

Q) $27 \Rightarrow$

	A	B	C	A) $A \rightarrow B$	(✓)
L	2	3	3	B $BC \rightarrow A$	(✗)
a	2	3	3	C) $B \rightarrow C$	(✓)
s	3	3	3	D) All	(✓)

28. Suppose that we decompose the schema
 $R = (ABCDE)$ into ABC and ADE . Find the
characteristics of the decomposition if the
following set of FDs holds

$$A \rightarrow BC \quad CD \rightarrow E \quad B \rightarrow D \quad E \rightarrow A$$

- (a) Lossy and dependency preserving decomposition
- (b) Lossy and not dependency preserving decomposition.
- (c) Lossless and not dependency preserving decomposition
- (d) Lossless and dependency preserving decomposition

Q 28

$R(A B C D E)$

$A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$

$E \rightarrow A$

$A B C$

$A D E$

$A^+ = ABCDE$

$A \rightarrow BC(\checkmark)$

$A \rightarrow DE(\times)$

Q 2

Lossless & Not dependency preserving

29. Consider the following set of functional dependencies on the relation (ABC),

$$\{A \rightarrow B, AB \rightarrow C, A \rightarrow BC, B \rightarrow C\}.$$

Find the canonical cover for the above FD set

(a) $\{A \rightarrow BC, B \rightarrow C\}$

(b) $\{A \rightarrow BC, AB \rightarrow C\}$

(c) $\{A \rightarrow BC, A \rightarrow B\}$

(d) $\{A \rightarrow B, B \rightarrow C\}$

(d) ~~$R(ABC)$~~ | $A \rightarrow B$, $AB \rightarrow C$, $A \rightarrow BC$, $B \rightarrow C$

Sol:

$A' \rightarrow \Theta$

~~$AB \rightarrow C$~~ $\Rightarrow A^+ = ABC$ (✓)

~~$A \rightarrow B$~~ $\Rightarrow B^+ = B$ (✗)

~~$A \rightarrow C$~~

$B \rightarrow C$

$$\begin{array}{l} A \rightarrow B \\ AB \rightarrow C \\ B \rightarrow C \end{array}$$



Redundancy

$$\begin{array}{l} A^T = ABC \\ B^T = BC \end{array}$$

(d)

$$A \rightarrow B, B \rightarrow C \rightarrow \text{Final}$$

Common Data Questions 30& 31:

Suppose that we have two sets of FDs, X and Y

$$X = \{B \rightarrow CD, AD \rightarrow E, B \rightarrow A\}$$

$$Y = \{B \rightarrow CDE, B \rightarrow ABC, AD \rightarrow E, E \rightarrow A\}$$

30. Find the equivalences of X and Y.

- (a) They are equivalent
- (b) They are not equivalent
- (c) We cannot say
- (d) None of the above

Common - 30 & 31

$$X = \{B \rightarrow CD, AD \rightarrow E, B \rightarrow A\}$$

$$Y = \{B \rightarrow CDE, B \rightarrow ABC, AD \rightarrow E, E \rightarrow A\}$$

X cover Y (✓)

$$B^t = BCDAE \quad (\checkmark)$$

$$AD^t = ADE \quad (\checkmark)$$

$$E^t = E \quad (\times)$$

Y cover X

$$B^t = BCDEABC \quad (\checkmark)$$

$$AD^t = ADE \quad (\checkmark)$$

$$B^t$$

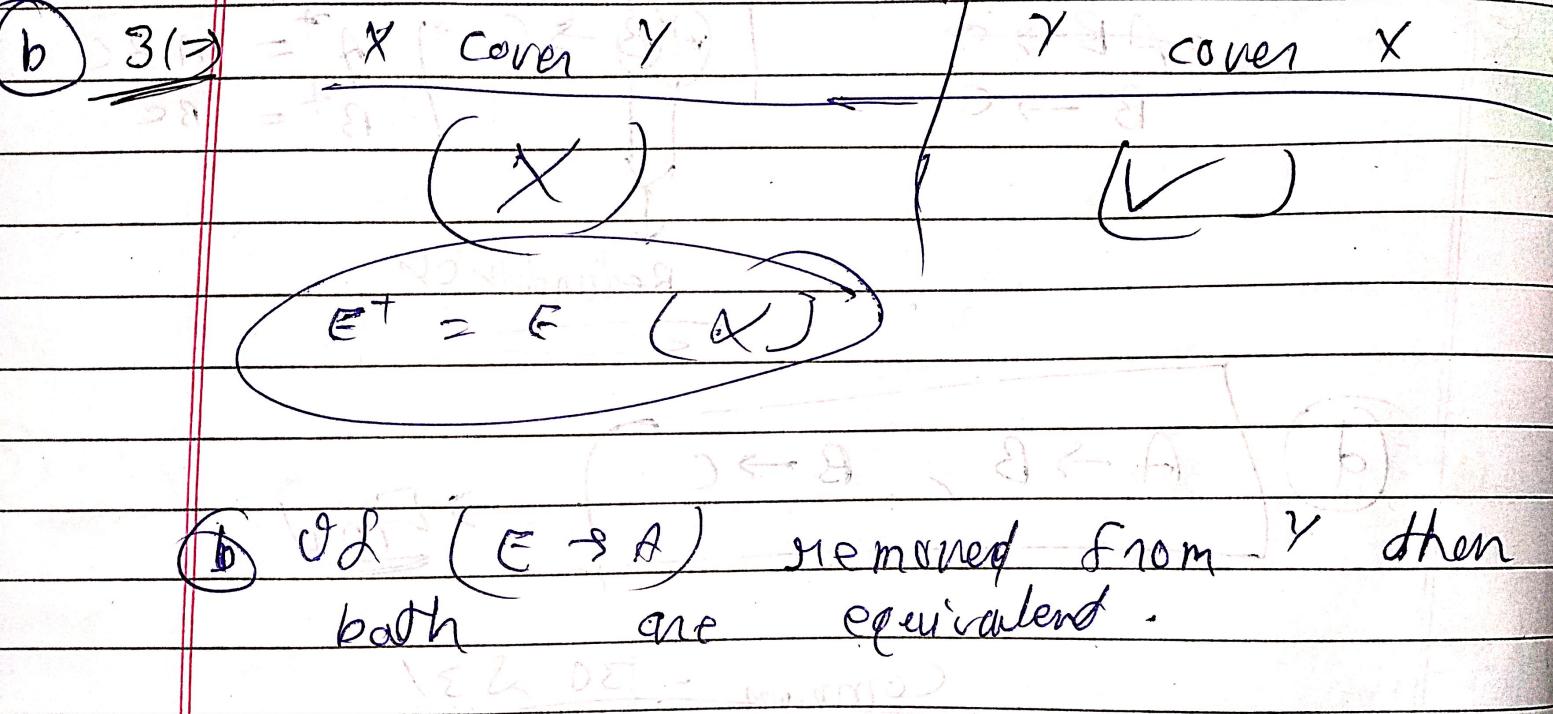
Y is not covered by X

X is covered by Y

(b) They are not equivalent.

31. What makes X and Y are equivalent or not equivalent?

- (a) Adding B → ABC to X makes them equivalent
- (b) Removing E → A from Y makes X and Y are equivalent
- (c) Removing B → ABC from Y makes X and Y are equivalent
- (d) We need not add or remove anything from X or Y to make them equivalent



32. Consider relation R(ABCDEFGH).

FDs are

$AB \rightarrow CEF GH$, $A \rightarrow D$, $F \rightarrow G$, $FB \rightarrow H$

$HBC \rightarrow ADEFG$, $FBC \rightarrow ADE$

Find the Partial dependency.

- | | |
|-----------------------------|-----------------------|
| (a) $FB \rightarrow H$ | (b) $F \rightarrow G$ |
| (c) $AB \rightarrow CEF GH$ | (d) $A \rightarrow D$ |

(d) 32 $R(A B C D E F G H)$

$A B \rightarrow C E F G H$, $A \rightarrow D$, $F \rightarrow G$, $F B \rightarrow H$,
 $H B C \rightarrow A D E F G$, $F B C \rightarrow A D E$

Solⁿ Partial dependency = ?

$$A B^f = A B C E F G H \quad D \rightarrow C \cdot K \cdot$$

$$F B^f = F B^f G H \quad \times$$

$$\textcircled{Q} \quad F B \rightarrow H$$

$$F \rightarrow G$$

$$A B \rightarrow C E F G H$$

$$A \rightarrow D \quad (\checkmark)$$

(d) $A \rightarrow D$ is P.D

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