

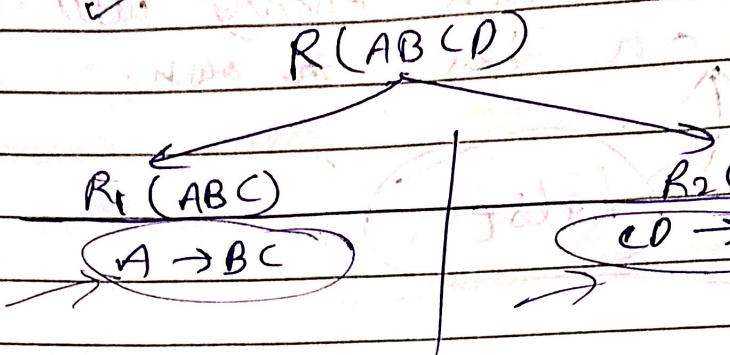
01. A relation $R(ABCD)$ with dependencies $A \rightarrow BC$, $CD \rightarrow B$. The relation is decomposed into $R_1(ABC)$ and $R_2(BCD)$. Which of the following combination is correct?
- (I) Loss less decomposition
 - (II) Lossy decomposition
 - (III) Dependency preserving
 - (IV) Not dependency preserving
- (a) I and III
 - (b) I and IV
 - (c) II and III
 - (d) II and IV

(c)

\Rightarrow

$R(ABCD)$

FD's $\rightarrow A \rightarrow BC, CD \rightarrow B$



RHS $\rightarrow BC$

Not in Right Side $\rightarrow AD$.

$$(AD^T) = ADBC \rightarrow CK$$

(c) Dependency preserving
Lazy

Lazy because $R_1 \downarrow R_2$ both combine
not get R .

Q2. Find the no. of candidate keys for relation

R (A B C D E F) with fd set

$$F = \{A \rightarrow C, AB \rightarrow D, B \rightarrow D, C \rightarrow E, E \rightarrow A, D \rightarrow B\}$$

- (a) 3 (b) 4 (c) 5 (d) 6

Q 2)

$$R(A \bar{B} C D \bar{E} F)$$

$$C.RI=2$$

$$F = A \rightarrow C \quad (A \rightarrow D) \quad (B \rightarrow D) \quad (C \rightarrow E) \quad (E \rightarrow A) \quad (D \rightarrow B)$$

$$AB \rightarrow D$$

$$B \rightarrow D$$

$$C \rightarrow E$$

$$E \rightarrow A$$

$$D \rightarrow B$$

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$$R.H.S. \rightarrow CDEAB$$

$$\text{Not} \rightarrow F$$

$$X F^+ = F$$

$$X FA^+ = FACE$$

$$X FB^+ = FBD$$

$$X FC^+ = FCEA$$

$$X FD^+ = FDB$$

$$X FE^+ = FEAC$$

$$FAB^+ = FABDCE \rightarrow 1$$

$$X FAC^+ = FACE$$

$$FAD^+ = FADBCE \rightarrow 2$$

$$X FAE^+ = FAEC$$

$$FB^+ = FBDECA \rightarrow 3$$

$$X FBD^+ = FBD$$

$$FBE^+ = FBEDAC \rightarrow 4$$

$$FC^+ = FCDEBA \rightarrow 5$$

$$X FCE^+ = FCCEA$$

$$FO^+ = FDEBAC \rightarrow 6$$

Total 6

Candidate key

Q3. Consider two sets of functional dependencies

$F \& G$ if $F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$,
then the equivalent of G is

- (a) $G = \{A \rightarrow CD, E \rightarrow AH\}$
- (b) $G = \{A \rightarrow CH, E \rightarrow ADH\}$
- (c) $G = \{A \rightarrow CD, E \rightarrow H\}$
- (d) $G = \{A \rightarrow AH, E \rightarrow CH\}$

(a) 3)

Set F & G

$F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\}$

G is?

Solⁿ

$A \rightarrow C$

$A(C) \rightarrow D$

$E \rightarrow A$

$E \rightarrow D (\times)$

$E \rightarrow H$

$\cancel{A(C)} \rightarrow D$

$C^+ = C$

$A^+ = ACD$

Redundancy

$A \rightarrow C \rightarrow A \rightarrow CD$

$A \rightarrow D$

$E \rightarrow A$

$E \rightarrow D$

$E \rightarrow H$

~~SADH~~

if $(E \rightarrow A) \rightarrow \text{Delete}(\times)$ $(E \rightarrow D) \rightarrow \text{Delete}(\checkmark)$

$G^+ = ED \rightarrow EACD$

$E \rightarrow H \rightarrow \text{Delete}(\times)$

$E \rightarrow EH$

Final

$A \rightarrow C$

$A \rightarrow D \rightarrow A \rightarrow CD, E \rightarrow AH$

$E \rightarrow A$

$E \rightarrow H$

04. Suppose that we have the following four tuples in a relation S with three attributes ABC: (1, 2, 3) (4, 2, 3) (5, 3, 3,) (5, 3, 4) which of the following functional and multi valued dependencies does hold over relation 'S'.

1. $B \rightarrow C$

3. $BC \rightarrow A$

2. $AB \rightarrow C$

4. $AC \rightarrow B$

① 43

A	B	C	
1	2	3	A) $B \rightarrow C$ X
2	3	1	B) $AB \rightarrow C$ X
3	1	2	C) $BC \rightarrow A$ X
4	3	2	D) $(AC \rightarrow B)$ ✓

$A \rightarrow$ wrong at - $3 \rightarrow 3$ ✓
 $3 \rightarrow 4$ ✓

B) wrong at - $5, 3 \rightarrow 3$
 $5, 3 \rightarrow 4$

c) wrong at - $2, 3 \rightarrow 1$
 $2, 3 \rightarrow 4$

05. Consider the relation $R = ABCDEG$ and
 $F = \{AB \rightarrow C, AC \rightarrow B, AD \rightarrow E, B \rightarrow D, BC \rightarrow A,$
 $E \rightarrow G\}$,

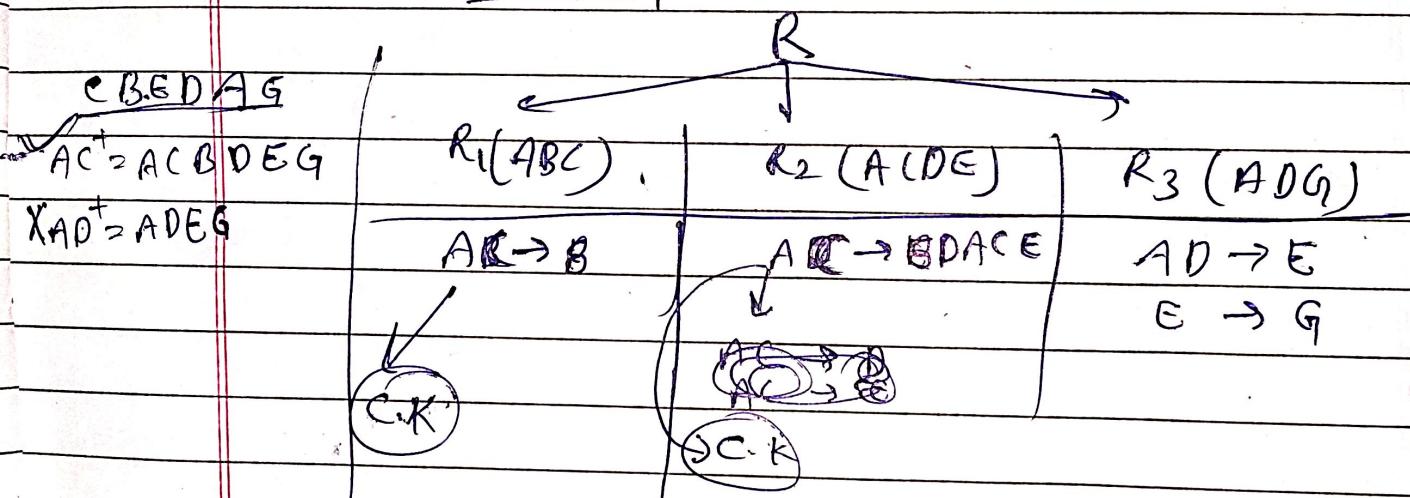
then the decomposition

$\{ABC, ACDE, ADG\}$

- (a) is lossless and not dependency preserving
- (b) is not loss less and dependency preserving
- (c) is loss less and dependency preserving
- (d) is not loss less and not dependency preserving

(C) 5 \Rightarrow R(ABCD $\bar{E}\bar{G}$)

$F = \{AB \rightarrow C, AC \rightarrow B, AD \rightarrow E, B \rightarrow D, BC \rightarrow A, E \rightarrow G\}$



(C) Lossless + Dependency Preserving

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06. $R(A, B, C, D)$ with FD's

$$F = \{A \rightarrow B, A \rightarrow C, A \rightarrow D\}$$

Decomposed into

$R_1(A, B, D)$ with FD's

$F_1 = \{A \rightarrow B, A \rightarrow D\}$ and

$R_2(B, C)$ with FD's

$$F_2 = \{ \}$$

Then find which statement is true:

- (a) This is not dependency – preserving relation
- (b) This is dependency – preserving relation
- (c) This is partially dependency preserving relation
- (d) This is non-decomposable relation with full dependency preserving

Q) 63

$R(ABCD)$

$F_1 P_S \rightarrow \{S \rightarrow B, A \rightarrow C, P \rightarrow D\}$

$R_1(ABD)$

$F_2 P_S \rightarrow \{A \rightarrow B, A \rightarrow D\}$

$R_2(BC)$

$F_2 P_S \rightarrow \{S\}$

$R(ABCD)$

$R_1(ABD)$

$A \rightarrow B$

$A \rightarrow D$

$R_2(BC)$

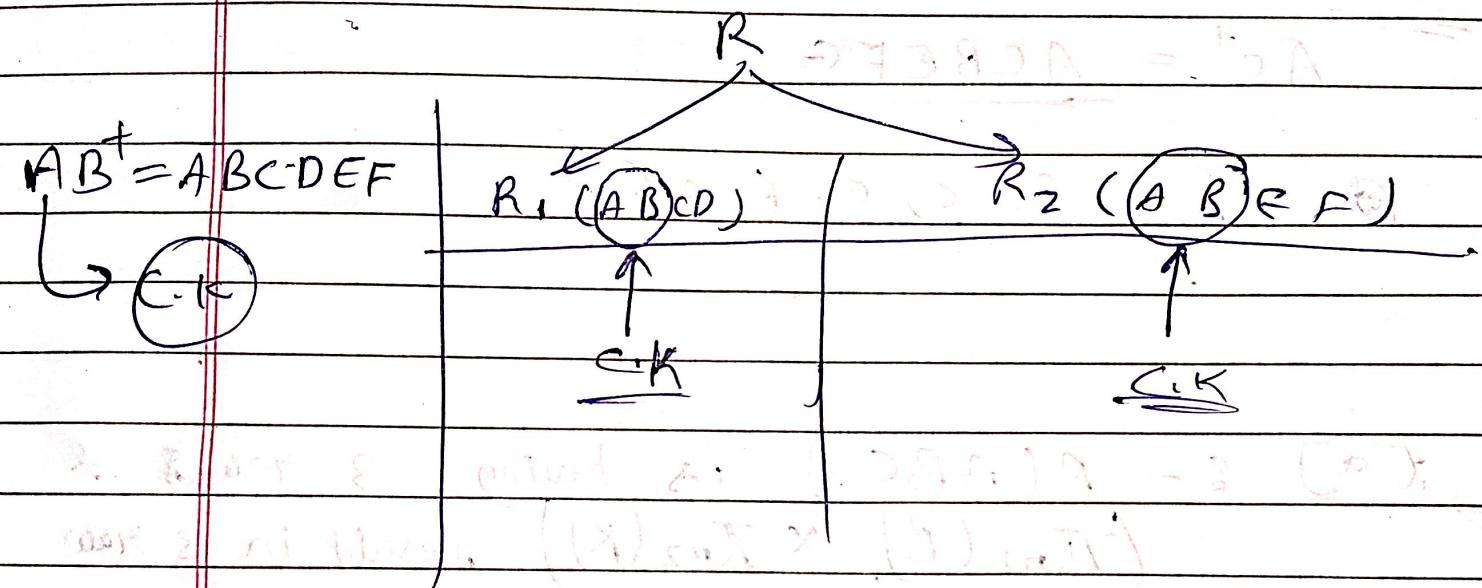
07. The Relation $R(ABCDEF)$ and the FDset $F2\{A \rightarrow C, BC \rightarrow D, BE \rightarrow F, D \rightarrow E\}$ is decomposed into two tables $R_1(ABCD)$ and $R_2(ABEF)$.

Which of the following is a true statement?

- (a) The decomposition lossless Join and dependency preserving.
- (b) The decomposition is lossless Join but not dependency preserving
- (c) The decomposition is dependency preserving and lossy
- (d) The decomposition is not dependency preserving and lossy

(C) 73 $R(A B C D E F)$, $A \rightarrow C$, $B C \rightarrow D$, $B E \rightarrow F$, $D \rightarrow E$

$FD_s = \{ A \rightarrow C, B C \rightarrow D, B E \rightarrow F, D \rightarrow E \}$



(C)

Dependency preserving & lossy

08. Find out the number of candidates keys for the table R(ABCDEFG) and Fd set

$$F = \{AB \rightarrow CDEFG, D \rightarrow B, C \rightarrow AD, E \rightarrow F, EF \rightarrow D, G \rightarrow EF, F \rightarrow E\}$$

- (a) 5 (b) 4 (c) 6 (d) 7

~~C.K ?~~

(C) 8 $\Rightarrow R(ABCDEF)$

$FP_S \rightarrow \{AB \rightarrow CDEFG; D \rightarrow B, C \rightarrow AD, E \rightarrow F, EF \rightarrow D, G \rightarrow EF, F \rightarrow E\}$

Sol^+

$\checkmark AB^+ = ABCDEF$

$\checkmark C^+ = CADBEG$

$\checkmark AD^+ = ADBCD EFG$

$\checkmark AEF^+ = AEFDBC$

$\checkmark AFT^+ = AFEDBC$

$\checkmark AG^+ = AGEFDC$

(C) Total

(G) C.K

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09. A functional dependency set

$$F = \{A \rightarrow B, BC \rightarrow E, ED \rightarrow A, EF \rightarrow G, E \rightarrow F\}.$$

Find out the closure of (AC)

- (a) {A, B, C, D, E, F, G}
- (b) {A, B, C, D, E, F}
- (c) {A, B, C, D, E, G}
- (d) {A, B, C, E, F, G}

④ g)

$$F = \{ A \rightarrow B, BC \rightarrow E, ED \rightarrow A, EF \rightarrow G, E \rightarrow F \}$$

5d

$$Ac^+ = \underline{ACBEG}$$

⑤ $\{ A, B, C, E, F, G \}$

10. Assertion[a]: A Relation R(ABC) is having 3 rows and $(\Pi_{r1}(R) \times \Pi_{r2}(R))$ results in 3 rows.

Reason [r]: Natural Join joins two tables based on all common columns with equality conditions.

- (a) Both (a) and (r) are true and (r) is the correct reason for (a).
- (b) Both (a) and (r) are true but (r) is not the correct reason for (a).
- (c) Both (a) and (r) are false.
- (d) (a) is true but (r) is false.

- Ques :-
- (a) $\pi_{n1}(R) \times \pi_{n2}(R)$ result in 3 rows & 3 columns.
- (b) Natural Joins joins 2 tables based on all common columns with equality condition.
- (c) Both (a) & (b) true \rightarrow (c) is correct
reason for (a) :-

11. A relation $R(ABC)$ is having following 4 tuples : $(1,2,3)$, $(4,2,3)$, $(5,3,3)$ and $(2,4,4)$. Which of the following dependencies can you infer doesn't hold over relation R ?

- (a) $A \rightarrow B$
- (b) $B \rightarrow C$
- (c) $AB \rightarrow C$
- (d) $C \rightarrow B$

~~False()~~

1	A	B	C	A) A → B ✓
1	2	3.		B) B → C ✓
4	2	3		C) A → B → C ✓
5	3	3		D) (A → B) → C ✗
2	8	9		E) (B → C) → B ✗

~~(d)~~ False at

$$\begin{array}{l} 3 \rightarrow 2 \\ 3 \rightarrow 2 \\ 3 \rightarrow 3 \end{array}$$

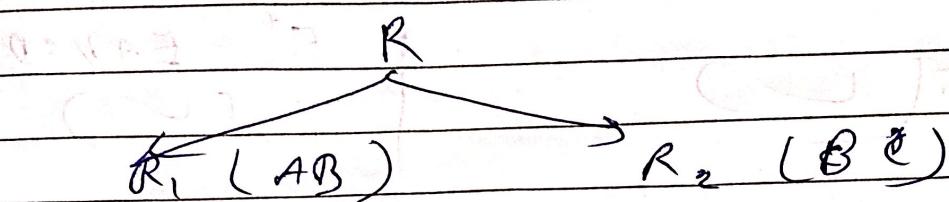
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12. A relation $R(ABC)$ is having following tuples $(S_1, P_1, J_2), (S_1, P_2, J_1), (S_2, P_1, J_1)$ and (S_1, P_1, J_1) . The above relation R is decomposed into two relations $R_1(AB)$ and $R_2(BC)$. The effect of joining R_1 and R_2 over B will result in which of the following spurious tuple.

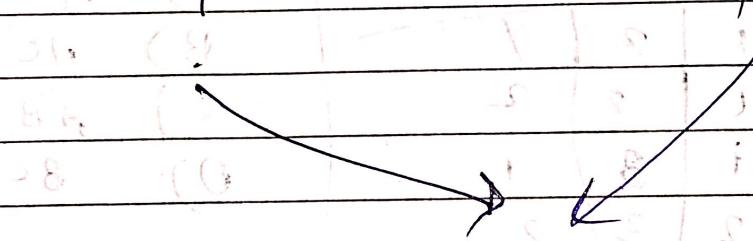
- (a) (S_2, P_2, J_1)
- (b) (S_1, P_2, J_1)
- (c) (S_2, P_1, J_2)
- (d) (S_2, P_2, J_2)

Q 12 →

	A	B	C
S ₁	P ₁	J ₂	
S ₁	P ₂	J ₁	
S ₂	P ₁	J ₁	
S ₂	P ₁	J ₁	



	A	B	R ₁	B	C	R ₂
S ₁	P ₁			P ₁	J ₂	
S ₁	P ₂			P ₂	J ₁	
S ₂	P ₁			P ₁	J ₁	
S ₂	P ₁			P ₁	J ₁	



	A	B	C
S ₁	P ₁	J ₂	(✓)
S ₁	P ₁	J ₁	(✓)
S ₁	P ₂	J ₁	(✓)
S ₂	P ₁	J ₂	(✗)
S ₂	P ₁	J ₁	(✓)

extra

Q

S₂, P₁, J₂

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13. Consider the following sets of functional dependencies:

$$F = \{A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H\} \text{ and}$$
$$G = \{A \rightarrow CD, E \rightarrow AH\}.$$

Which of the following is true?

- (a) F covers G
- (b) G covers F
- (c) F and G are equivalent
- (d) none of the above

$$\textcircled{C} \quad \begin{aligned} J_3 &\Rightarrow F = \{ A \rightarrow C, AC \rightarrow D, E \rightarrow AD, E \rightarrow H \} \\ &G = \{ A \rightarrow CD, E \rightarrow AH \} \end{aligned}$$

$$\begin{array}{c} F \text{ cover } G \\ A^+ \Rightarrow A \subset D \\ E^+ = EADH \end{array}$$

$$\begin{aligned} A^f &= ACD \\ AC^+ &= ACD \\ E^f &= EA \vee CD \end{aligned}$$

⑤ ()

(✓)

$$C \neq F \equiv G$$

14. A relation $R(ABC)$ is having the tuples $(1, 2, 1), (1, 2, 2), (1, 3, 1)$ and $(2, 3, 2)$. Which of the following functional dependency holds good?

- (a) $A \rightarrow BC$
- (b) $AC \rightarrow B$
- (c) $AB \rightarrow C$
- (d) $BC \rightarrow A$

Q) 19

	A	B	C	
i	2	1		A) $A \rightarrow BC$ (x)
i	2	2		B) $AC \rightarrow B$ (x)
i	3	1		C) $AB \rightarrow C$ (x)
2	3	2		D) $BC \rightarrow A$ (✓)

15. Find what FD is violated by the Relation

$R = \{ \}$ i.e. empty relation

- (a) All FDs
- (b) Does not violate FDs
- (c) Cannot say
- (d) None of the above

- ⑥ 153 FD₃ is violated by Relation R = S4
- ⑥ Does not violated by FP₈

16. Under what condition, a table may have partial dependencies

- (a) If table consists one prime attribute
- (b) If table consists only one attribute
- (c) If table consists only two attributes
- (d) If table consists two prime attributes

Q) Under what condition, a table may have partial dependency?

A) If table consist 2 prime attribute

P, D is part of C.R \rightarrow non-C.R

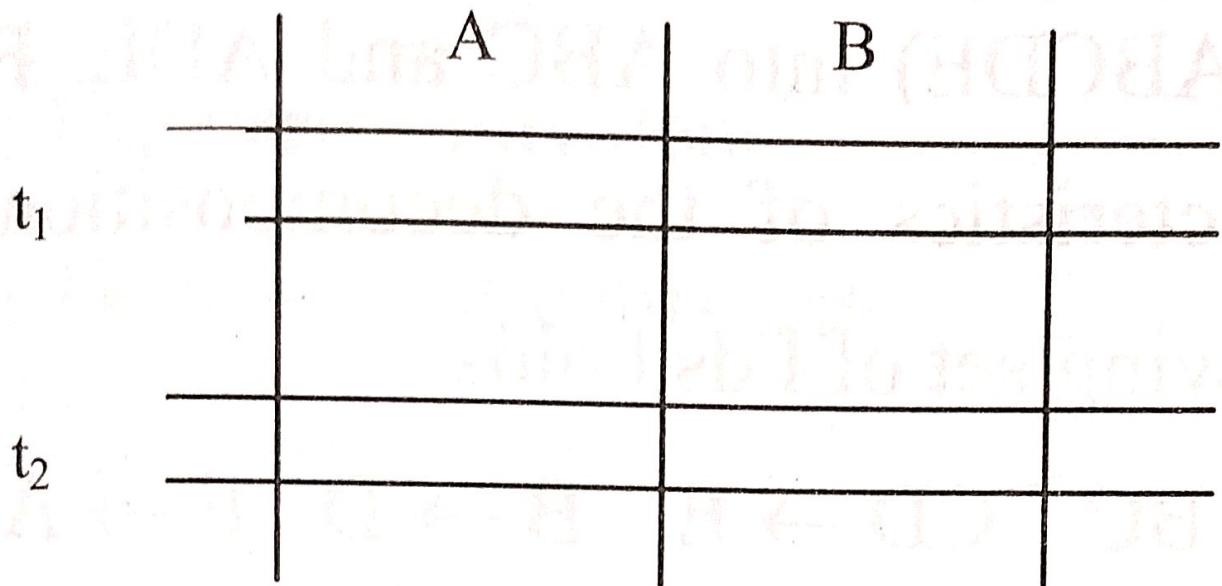
17. Which one of the following functional dependencies are satisfied by all relations in a Database?

- (a) Completely non trivial FDs
- (b) Non trivial FDs
- (c) Trivial FDs
- (d) None

c) \Rightarrow which FDs are satisfied all relation in a dataset.

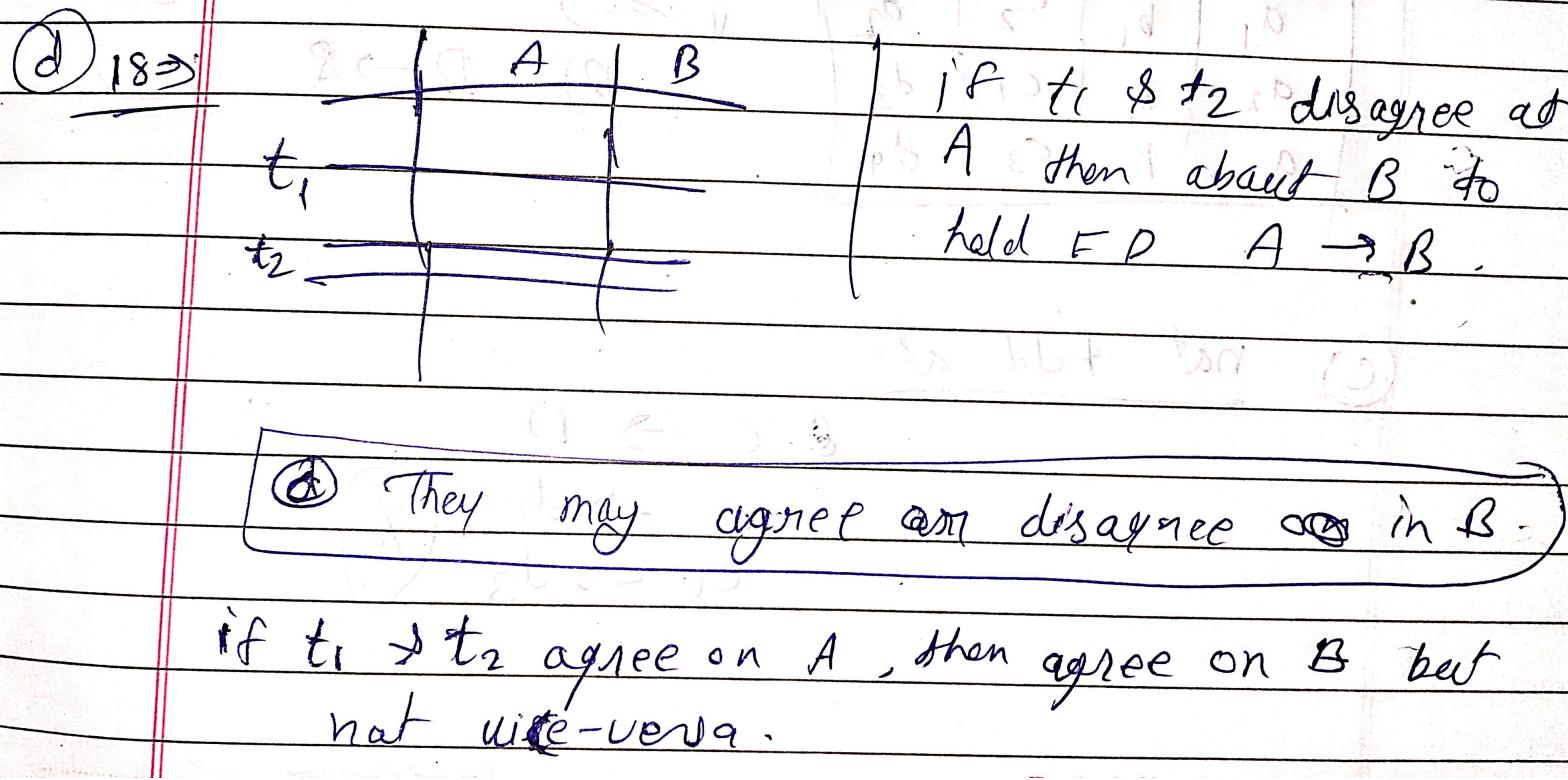
c) Trivial FDs satisfied all relations.

18.



If t_1 and t_2 disagree at A then what about B to hold the FD $A \rightarrow B$, pick the appropriate answer.

- (a) They must disagree in B
- (b) They must agree in B
- (c) They need not disagree in B
- (d) They may agree or disagree in B



19. State under what condition in the following relation, the FD $BC \rightarrow D$ is violated?

$R =$

A	B	C	D	E
a	2	3	4	5
a	2	3	6	5
a	2	3	6	6
a	2	3	4	

- (a) If $a = 2$
- (b) If $a = 3$
- (c) For all values of a
- (d) For none of the values of A

(c) ~~19~~ FDs - $BC \rightarrow D$ violates, violated

	A	B	C	D	G
$R =$	0	2	3	4	5
	0	2	3	6	5
	0	2	3	6	6
	2	2	3	9	

$BC \rightarrow D$

(c) For all value of d, $BC \rightarrow D$ violated.

20. Find what dependency may not hold on the following relation?

A	B	C	D
a ₁	b ₁	c ₁	d ₁
a ₁	b ₁	c ₂	d ₂
a ₂	b ₁	c ₁	d ₃
a ₂	b ₁	c ₃	d ₄

- (a) A → B
- (b) D → ABC
- (c) C → D
- (d) D → B

not held

① 20)

A	B	C	D
a ₁	b ₁	c ₁	d ₁
a ₁	b ₁	c ₂	d ₂
a ₂	b ₁	c ₁	d ₃
a ₂	b ₁	c ₃	d ₄

A) $A \rightarrow B$ ✓

B) $D \rightarrow ABC$ ✓

C) $C \rightarrow D$ ✗

D) $D \rightarrow B$ ✓

(c) not held ab

Q. C \rightarrow D

c₁ \rightarrow d₁

c₁ \rightarrow d₃

