33. Consider a relation with five attributes ABCDEG. You are given the following dependencies. AB $\rightarrow$ C, AC$\rightarrow$ B, AD $\rightarrow$ E, B $\rightarrow$ D, BC $\rightarrow$ A, E $\rightarrow$ G. If relation is decomposed into AB, BC, ABDE, EG, then find the characteristics of this decomposition.

(a) Not lossless, not preserve FDs.

(b) Not lossless, preserve FDs.

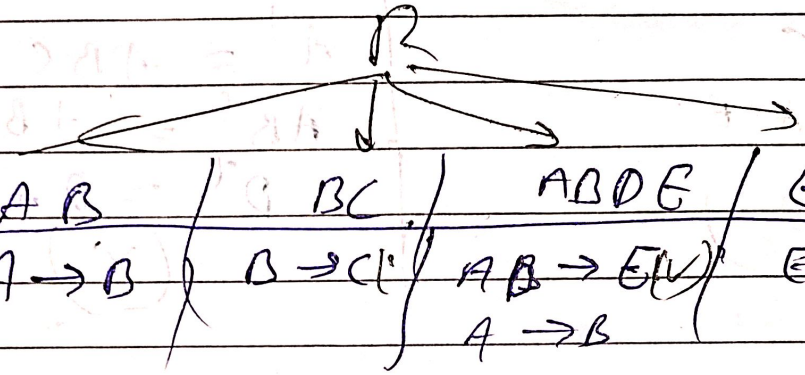
(c) Lossless, preserve FDs.

(d) Lossless, not preserve FDs.

Q33 ⇒ R(A B C D E G)

~~B → D, BC → A, E → G, AD → E, B → D, BC → A~~
~~E → G,~~

AB → C, AC → B, AD → E, B → D, BC → A,
E → G



(a) Not lossless & Not dependency preserv

34. The relation R(ABCDEF) with the set of Fds F= {A $\rightarrow$ CE, B $\rightarrow$ D, C $\rightarrow$ AD, BD $\rightarrow$ EF}. Find the closure of AB

(a) ABCE
(b) ACED
(c) ABCDE
(d) None

(d) 34) R(ABCDEF)

$A \to CE$, $B \to D$, $C \to AD$, $BD \to EF$.

$AB^+ = ABCEDF$

(d) No option (None)

35. Consider two dependency sets F and G,

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

$G = \{A \rightarrow BC, D \rightarrow AB\}$

(a) F covers G only

(b) G covers F only

(c) F & G are equal

(d) can't say

(a) 35) $F = A \to B,\ AB \to C,\ D \to AC,\ D \to E$ (X)

$G = A \to BC,\ D \to AB$

F cover G

$A^+ = ABC$

$D^+ = DACB$

(✓)

G cover F

$A^+ = ABC$

$AB^+ = ABC$

$D^+ = DABC$

(X)

(a) F cover G only

36. Consider the following two sets of FDs:

1. $A \rightarrow C, E \rightarrow AD, C \rightarrow D, E \rightarrow H,$
2. $A \rightarrow CD, E \rightarrow AH, D \rightarrow C,$

Which of the above FDs makes these two sets are not equivalent?

(a) $C \rightarrow D$

(b) $E \rightarrow AH$ in set 2, $C \rightarrow D$ in set 1

(c) $D \rightarrow C$ in set 2 and $C \rightarrow D$ in set 1

(d) $A \rightarrow C$ in set 1 and $C \rightarrow D$ in set 2

(c) 36 ⇒ (1) $A \to C$, $E \to AD$, $C \to D$, $E \to H$
(2) $A \to CD$, $E \to AH$, $D \to C$

which FDs set not equivalent

Soln (c) $C \to D$ (set-1)
$D \to C$ (set-2)

37. Find the irreducible set for the following Fds

$A \rightarrow BC$, $ABE \rightarrow CDGH$,

$C \rightarrow GD$, $D \rightarrow G$, $E \rightarrow F$

(a) $A \rightarrow BC$, $ABE \rightarrow CDGH$, $C \rightarrow GD$, $D \rightarrow G$, $E \rightarrow F$

(b) $A \rightarrow BC$, $AE \rightarrow H$, $C \rightarrow D$, $D \rightarrow G$, $E \rightarrow F$

(c) $A \rightarrow BC$, $AB \rightarrow CGH$, $C \rightarrow G$, $D \rightarrow G$, $G \rightarrow F$

(d) $A \rightarrow BC$, $BE \rightarrow CDGH$, $C \rightarrow GD$, $D \rightarrow G$, $G \rightarrow F$

(b) 37=8 Find irreducible.

$A \to BC$
$ABE \to CDGH$
$C \to GD$
$D \to G$
$E \to F$

Soln

$A \to B$ → $A^+ = ACGD$ — not B, not C
$A \to C$ → $A^+ = AB$.
~~$ABE \to C$~~ → $ABE^+ = ABEC$.
~~$ABE \to D$~~ $ABE^+ = ABECD$
~~$ABE \to G$~~ $ABE^+ = ABECDG$
$ABE \to H$
~~$E \to G$~~ → $C^+ = CDG$.
$C \to D$
$D \to G$
$E \to F$

$A \to BC$
$ABE \to H$
$C \to D$
$D \to G$
$E \to F$

$ABE \to H$ | ~~BE~~.
$AE^+ = AEBCF$ DG

(b) $A \to BC$, $AE \to H$, $C \to D$, $D \to G$, $E \to F$

Teacher's Signature .....

Common data for Q38, Q39:

Consider R = ABCDEFGHIJK, with Functional dependencies

$ABD \rightarrow E$, $AB \rightarrow G$, $B \rightarrow F$, $C \rightarrow J$,

$CJ \rightarrow I$, $G \rightarrow H$.

38. What is the key for the relation?

(a) ABD (b) ABDK

(c) ABCD (d) None of the above

39. Which one of the following FD can be derived from the above table R?

(a) $A \rightarrow BC$ (b) $C \rightarrow H$

(c) $AC \rightarrow I$ (d) $AGH \rightarrow F$

Common 38 & 39

R = A B C D E F G H I J K

ABD → E, AB → G, B → F, C → J, CJ → I, G → H

(d) (38)

ABCDK = ABCDKEGFHJI → (C.K)

ABCD = ABCDEGFJIH → (X)

ABDK = ABDKEGFH → (A)

(d) None

(e) 39 →

A → BC	A^+ = ABCG
C → H	C^+ = CH
AC → I	AC = ACIJ (✓)
AGH → F	AGH^+ = AGHF

(c) AC → I possible

because AC^+ contain I

40. Functional dependencies (F) on relational Schema R= (ABCDE) are $A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$ Compute the canonical cover F_c

(a) $A \rightarrow B$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$

(b) $A \rightarrow BC$, $CD \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$

(c) $A \rightarrow BC$, $D \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$

(d) $A \rightarrow BC$, $C \rightarrow E$, $B \rightarrow D$, $E \rightarrow A$

(b) 40⇒ $R = ABCDE$

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

Soln

$A \to B$

$A \to BC$

$CD \to E$

$B \to D$

$E \to A$

$A^+ = AC$

$A^+ = ABD$

No redundant element.

So: (b) $A \to BC$, $CD \to E$, $B \to D$, $E \to A$

41. Which one of the following instances of R(ABCDE) not violates BC→D ?

(a) R=(a,2,3,4,5)(2,a,3,4,5)(a,2,3,6,5) if a = 2.

(b) R = (a,2,3,4,5) (2,a,3,4,5) (a,2,3,6,5) if a = 3.

(c) R = (a,2,3,4,5) (2,a,3,4,5) (a,2,3,a,5) if a = 4.

(d) R = (a,2,3,4,5) (2,a,3,4,5) (a,2,3,6,5) if a = any value.

(C) q1-3 R(ABCDE) not violated $BC \rightarrow D$

A)

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

B)

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

C)

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

D)

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

42. Which of the following FD sets generates maximum possible number of superkeys for the Relation R(A, B, C)?

(a) $A \rightarrow B, B \rightarrow C$

(b) $A \rightarrow B, B \rightarrow C, C \rightarrow A$

(c) $AB \rightarrow C, BC \rightarrow A, AC \rightarrow B$

(d) None of these

(b) 42⇒ R(ABC)

Soln

A) A → B
B → C

C.R

$A^+ = ABC$
$B^+ = BC$

B) A → B
B → C
C → A

$A^+ = ABC$
$B^+ = BCA$
$C^+ = CAB$
$AB^+ = ABC$
$AC^+ = ACB$
$ABC^+ = ABC$
$BC^+ = BCA$

7 Super key

q S.K

$AB^+ = ABC$
$AC = ACB$
$ABC = ABC$
$BC^+ = BC$

(c) AB → C
BC → A
AC → B

$AB^+ = ABC$
$BC^+ = BCA$
$AC^+ = ACB$
$ABC^+ = ABC$

q Super key

(b) 7 S.K max

(d) 43) R(ABCD) ⟶
not lossless + dependency preserving

(a) $A \to B$, B
$B \to C$
$C \to D$

(b) $A \to B$
$B \to A$
$AC \to D$

(c) $AB \to C$
$C \to A$
$C \to D$

in option (b), D ✗ C
can't derived
A in option (a),
B can't derived.

43) R(ABCD) → not lossless + dependency + BCNF

(a) $A \to B$, $B \to C$, $C \to D$

$A^+ = ABCD$ (C.K)

$B^+ = BCD$

$C^+ = CD$

(b) $A \to B$, $B \to A$, $AC \to D$

$A^+ = AB$

$B^+ = BAD$

$AC^+ = ACDB$

(c) $AB \to C$, $C \to A$, $C \to D$

$AB^+ = ABC$

$C^+ = CAD$

44. A table with 3 attributes consists 4 rows (1, 2, 3), (5, 2, 3), (6, 3, 3), (9, 2, 8).

Which of the following dependency holds well?

(a) $B \rightarrow C$

(b) $BC \rightarrow A$

(c) $A \rightarrow C$

(d) None

(C) 44

A	B	C
1	2 → 3	
5	2 → 3	
6	3 → 3	
9	2	8

A) $B \rightarrow C$ (X)
B) $BC \rightarrow A$ (X)
C) $A \rightarrow C$ (✓)
D) None

(C) $A \rightarrow C$

45. Set of functional dependencies for R (ABCD) is $AB \rightarrow C$, $AB \rightarrow D$, $C \rightarrow A$, $D \rightarrow B$, total number of candidate keys for the relation is

(a) 1

(b) 4

(c) 3

(d) 2

(b) Q5 → R(ABCD)

AB → C, AB → D, C → A, D → B

Soln

A^+ = A → ✗

B^+ = ____ ✗

C^+ = CA ✗

D^+ = DB ✗

(1) AB^+ = ABCD (✓)

AC^+ = AC

(2) AD^+ = ADBC (✓)

(3) BC^+ = BCAD (✓)

BD^+ = BD

(4) CD^+ = CDAB (✓)

(b) Q Candidate Key

46. If R= (ABCDEHG) with FDs = AD $\rightarrow$ E, AB$\rightarrow$C, B$\rightarrow$D, AC$\rightarrow$B, E$\rightarrow$G, BC$\rightarrow$A then what is the key for the relation?

(a) AC

(b) ACEH

(c) BD

(d) BEGD

(b) 46⇒ $R = ABCDEHG$

$AD \to E$, $AB \to C$, $B \to D$, $AC \to B$, $E \to G$, $BC \to A$

Sol^n

$H^+ = H$

H include in b option only

(b) ACGH is CK

47. Assume we have three instances of a relation R with three attributes (A, B, C), they are (1, 2, 3), (4, 2, 3), (5, 3, 3). Which of the following dependencies does not hold over schema R?

(a) $B \rightarrow C$

(b) $A \rightarrow B$

(c) $BC \rightarrow A$

(d) $AB \rightarrow C$

Not hold

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A	B	C
1	2	3
4	2	3
5	3	3

A) $B \Rightarrow C$

B) $A \rightarrow B$

C) $BC \rightarrow A$

D) $AB \rightarrow C$

© $BC \rightarrow A$ not hold

Teacher's Sign