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DBMS Assignment-2

Q1 a) R(A, B, C, D, E)

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

$AE^+ = ABCD$

⇒ only 1 CK ie- AE

b) R(A, B, C, D, E)

$F = \{AD \to C,\ B \to A,\ C \to E,\ E \to BD\}$

$AD^+ = ADCEB$
$BD^+ = BDACE$
$E^+ = EBDAC$
$C^+ = CEBDA$
$D^+ = D$
$A^+ = A$
$B^+ = BA$

So, there are 4 CK ie- AD, BD, E, C

c) R(A, B, C, D, E, F, G, H, I, J)

$FD = \{ABD \to E,\ AB \to G,\ B \to I,\ C \to J,\ CJ \to I,\ G \to H\}$

$ABD^+ = ABDEGFH$
$AB^+ = ABGFH$
$B^+ = BF$
$C^+ = CJI$
$CJ^+ = CJI$
$G^+ = HG$

→ 1 candidate key ie- (ABCD)

d) R(ABCDEH)

$F = \{A \to B, BC \to D, E \to C, D \to A\}$

$A^+ = (A, B)$
$BC^+ = (B, C, D, A)$
$E^+ = (E, C)$
$D^+ = (A, D, B)$
$BCH^+ = (BCDEAH)$
$AEH^+ = (ABECHD)$
$DEH^+ = (DEHABC)$

So 3CK are there ie - BEH, AEH, DEH.

Q.2 ~~A~~ ABH → B (Trivial)

A → B
A → C

i) $FD = \{A \to BC, CD \to E, E \to C, D \to AEH, ABH \to DH, BC\}$

A → B
A → C
E → C
D → A
D → E
D → H
AH → D
$D^+ = \{AEHDBC$
$A^+ = ABC$

So minimal cover is -

$A \to B$
$A \to C$
$E \to C$
$D \to A$
$D \to E$
$D \to H$
$AH \to D$

So minimal cover is -

$\{A \to B, A \to C, E \to C, D \to A, D \to E, D \to H, AH \to D\}$

ii) $F\{AB \to C, C \to A, BC \to D, ADC \to , BE \to C, EC \to F, EC \to A, CF \to B, CE \to H, D \to E\}$

$AB \to C$
$C \to A$
$BC \to D$
$DC \to B$
$BE \to C$
$EC \to F$
$CF \to D$
$D \to E$

$AD^+ = ADE$
$CF^+ = CFDCBAF$
$BE^+ = BED$
$BC^+ = BCA$
$BE^+ = BE$
$CF^+ = CFA$
$EC = EC$
$E1 = CA$

$DC^+ = DCEAFB$

Canonical Cover -

$AB \to C$, $C \to A$, $BC \to D$, $DC \to B$, $BI \to C$, $EC \to F$, $CF \to D$, $D \to E$

Q-3(a) $FD_1 = \{ A \to C, AC \to D, E \to AD, E \to H \}$ → ✗

$FD_2 = \{ A \to C, E \to A, E \to D, E \to H \}$

~~$A \to H$~~

$AC^+ = ACH$

$A^+ = ACD$

Not Equivalent

b) $FD_1 = \{ A \to C, AC \to D, E \to A, E \to H \}$

$FD_2 = \{ A \to H, E \to C, E \to H \}$

is FD_1 covered by FD_2

$A^+ = AH$ (Not FD_2)

Not Equivalent

Q-8 R(A B C D)

	$AB \to C$	$AB \to D$	$D \to A$
BCNF	✓	✓	✓
3NF			
2NF			
1NF			

$AB^+ = ABCD$
$DB^+ = DBAC$

So, 2CK, Prime(ABD)

(3NF)

ABC	ABD	
$AB \to C$	$AB \to D$	(BCNF)
BCNF	$D \to A$	(3NF)

So, 3NF

Q7 R(ABCDE)

	$AB \to C$	$BC \to A$	$AC \to B$
BCNF			
3NF			
2NF		✓	✓
INF	✓		

$DB^+ = ABCD$
$ABDE \to CK$
So,
(ABCDE)
ABC → BCDE

$AB \to C$
$BC \to A$
$AC \to B$

$BC^+ = CBA$
↳ CK

(ABC) U (BCDE) → {AB → C, BC → A, AC → B}
So, BCNF

Q5 R = (A B C D E G)

F = {AB → C, BC → A, AC → B, B → D, E → G, AD → E}

F1 : ABC

F2 : BD

F3 : ADEG

AB → C
BC → A
AC → B

B → D

E → G
AD → E

F1 ∩ F2 = B

B+ = B D So CK of F2
ABC D ∩ ADEG = AD
AB+ = ADEG → CK of F3 so Lossless.

AB → C
E → G

BC → A
AD → E

AC → B

B → D

ABC

(ADE) ✗

ADEG

AB → C
BC → A
AC → B

E → G
AD → E

ABC ∩ ADEG = A
A+ = A = lossy

8.6 i) R(ABCDEGH)

FD = {AB→C, AC→B, AD→E, B→D, BC→A, E→

AB ∪ BC ∪ ABDE ∪ EG

{AB→D, AD→E, AB→G, B→D, BE→D, E→G}

F = {AB→C, AC→B, AD→E, B→D, BC→A, E→G}

AB⁺ = ABDG

⇒ This decomp. is not preserved & Lossy is missing.

b)

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

⇒ AB→C, AC→B, BC→A, AD→E, AC→DE, AD→G

To cu B→D, E→G

Q4 R(A,B,C,D)

F = {A → B, B → C, C →
D = { AB, BC, CD)
AB ⇒ A → B

BC ⇒ B → C, C →
CD ⇒ C → D, D → C
B → A
C → B (C → D, D →
.D → C (D → B, B

AB ∪ BC ∪ CD

{A → B, B → C, C → B

D^+ = DCB