__/__/__

Assignment - 2

(1) CK

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

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

$[A]^+ = \{A, B, C, D\}$

So, only 1 AE is a candidate key.

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

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

$[AD]^+ = (A, D, C, E, B)$ chk Minimal

$[BD]^+ = (B, D, A, C, E)$ $(D)^+ = (D)$

$(A)^+ = (A)$

$(E)^+ = (E, B, D, A, C)$

$(B)^+ = (B, A)$

$[C]^+ = (C, E, B, D, A)$

So, 4 CK AD, BD, E, C

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

$FD = (ABD \to E,\ AB \to G,\ B \to F,\ C \to J,\ CJ \to I,$

$G \to H)$

$(ABD)^+ = (A, B, D, E, G, F, H)$

$(AB)^+ = (A, B, G, F, H)$

$(B)^+ = (B, F)$

$(C)^+ = (C, J, I)$

$(CJ)^+ = (C, J, I)$

$(G)^+ = (H, G)$

~~ABDCJ~~ ABDC is candidate key

$R(A, B, C, D, E, H)$

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

$[A]^+ = (A, B)$

$[BC]^+ = (B, C, D, A)$.

$[E]^+ = (E, C)$

$(D)^+ = (A, D, B)$

$[BEH]^+ = (B, C, D, E, A, H)$

$(AEH)^+ = (A, B, E, C, H, D)$

$(DEH)^+ = (D, E, H, A, B, C)$

so, 3 CK BEH, AEH, DEH

Scanned with CamScanner

A B C D E H

Minimal Cover

2) (i) FD = { A → BC, CD → E, E → C, D → AEH, ABH → BD, DH → BC }

A → B, A → C, ~~CD → E~~, E → C, D → A, D → E
D → H, ~~ABH → B~~, ABH → D, BH → B,

DH → C

ABH → B (trivial)

$[A]^+ = (A, B, C)$

$[CD]^+ = (C, D, E, C, A, E, H, B)$

$[D]^+ = D, A, E, H, C, B.$

A → B
A → C
~~CD → E~~ extraneous.
E → C
D → A
D → E
D → H
~~ABH → B~~ (trivial)
~~ABH → D~~ → AH → D
~~DH → B~~ (extraneous)
~~DH → C~~ (extraneous)

Scanned with CamScanner

$(D)^+ = (A, E, H, D, B, C)$,

$(A)^+ = A, B, C.$

$(AB)^+ = (A, B, C)$

So Minimal Cover

$(A \to B,\ A \to C,\ E \to C,\ D \to A,\ D \to E,$
$D \to H,\ AH \to D,\ )$

$(A)^+ = A, B, C)$ $(E)^+ = C, E.$

$(B)^+ = (B)$

4) F { AB → C, C → A, BC → D, ADC → B,

BE → C, EC → F, EC → A, CF → B, CF → D,

D → E }

AB → C	AB → C ✓
C → A ✓	C → A ✓
BC → D	BC → D ✓
~~ADC → B~~ ✗	DC → B ✓
BE → C	BE → C ✓
EC → F	EC → F ✓
~~EC → A~~	
CF → B	~~CF → B~~
CF → D	CF → D ✓
D → E ✓	D → E ✓

$(AD)^+ = (A, D, E)$

$(CF)^+ = C, F, D, E, B, A, F,$

$(DC)^+ = (D, C, E, A, F, B)$

DC → B.

$(BE)^+ = B, E, C, D, E$

~~$(A)^+ = A$.~~

$(C)^+ = C, A,$

$(BC)^+ = B, C, E.$ A.

~~$(EE)^+ = C, F, D, E$~~

$(BE)^+ = B, E$

$(EC) = E, C.$

$CF \to C, F, A.$

DOMS

Canonical cover

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

Q3:- $FD_1 = \{A \to C,\ AC \to D,\ E \to AD,\ E \to H\}$

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

$\cancel{(AC)^+ = A, C, H}$ $(AC)^+ = A, C, H$
$(A)^+ = A, C, D$

~~No equivalent.~~

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

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

A chk $A \to C$ from FD_1 in FD_2

$(A)^+ = (A, H)$

$\boxed{\text{NO Equivalent}}$

Scanned with CamScanner

(ii) $FD_1 = (A \to C,\ AC \to D,\ E \to A,\ E$
$E \to H)$

$FD_2 = (A \to H,\ E \to C,\ E \to H)$

is FD1 is covered by FD2

$(A)^+ = (A, H)$ (w.r.t FD_2)

$\boxed{\text{Not equilent}}$

(4) $R(A, B, C, D)$

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

$D = (AB,\ BC,\ CD)$

$AB \Rightarrow A \to B$

$BC \Rightarrow B \to C,\ C \to B$

$CD \to C \to D,\ D \to C$

$B \to A$ ~~$B \to C \to D \to B$~~

$C \to B$ ✓ $(C \to D, D \to B)$

$D \to C$ ✓ $(D \to B, B \to C)$

$AB \cup BC \cup CD$

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

$[D]^+ = (D, C, B)$

$\boxed{\text{So preserved.}}$

(5) $R = (A, B, C, D, EG)$

$F \Rightarrow \{AB \to C; BC \to A, AC \to B, B \to D, E \to G, AD \to E\}$

F_1	F_2	F_3
ABC,	BD	$ADEG$
$AB \to C$	$B \to D$	$E \to G$
$BC \to A$		$AD \to E$
$AC \to B$		

$F_1 \cap F_2 = B$.

$[B]^+ = B, D$ so, candidate key of F_2

~~A~~$BCD \cap ADEG = AD$

$(AD)^+ = (A, D, E, G) \Rightarrow$ candidate key of F_3

so lossless.

AB → C   BC → A   AC → B B → D,

E → G AD → E.

ADG

D → G

ABC   ~~ADE~~   ADEG

AB → C   E → G

BC → A   AD → E

AC → B

ABC ∩ ADEG = A.

$[A]^+ = (A)$ lossy

Q6) R (A, B, C, D, E, G, H)

FD = { AB → C, AC → B, AD → E, B → D,
~~BD~~ BC → A, E → G }

AB	BC	ABDE	EG
		~~AB → E~~ AB → D	
		AD → E AB → G	E → G
		B → D BE → D	

~~Lossy as there is NOT all Attributes~~

~~and decomposition is NOT preserved.~~

Scanned with CamScanner

AB ∪ BC ∪ ABDE ∪ EG

{AB → D, AD → E, AB → G, B → D, ~~BE → D~~, E → G}

F = {A~~B~~ → C, ~~AC~~ → B, ~~AD → E~~,

B → D, BC → A, E → G}

$[AB]^+ = A, B, D, G,$

⇒ In This Decomposition is not preserved and lossy becoz H is missing

ii) ABC ACDE ADG

AB → C AD → E AD → G

~~[illegible]~~

~~AC → B~~

BC → A ~~[illegible]~~

AC → D, E

/ /

ABC ∪ ACDE ∪ ADG

⇒ $AB \to C$, $AC \to B$, $BC \to A$, $AD \to G$, $AC \to DE$

$AD \to G$

To see $B \to D$, $E \to G$.

$(B)^+ = B$ it is lossy and Decomposition is not preserved.

Q7:- R(A, B, C, D, E)

$AB \to C \to D$

	$AB \to C$	$BC \to A$	$AC \to B$
BCNF			
3NF			
2NF		✓	✓
1NF	✓		

CK

$(AB)^+ = A, B, C, D$

$(ABDE) \to CK$.

So, $(ABCDE)$

ABC BCDE

$AB \rightarrow C$

$BC \rightarrow A$

$AC \rightarrow B$

$(BC)^+ = C, B, A.$

Candidate key

$(ABC) \cup (BCDE) \Rightarrow \{AB \rightarrow C, BC \rightarrow A, AC \rightarrow B\}$

So, BCNF,

DOMS

8) $R(A, B, C, D)$

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

$(AB)^+ = (A, B, C, D)$

$(DB)^+ = (D, B, A, C)$

So, 2 CK. Prime (A, B, D)

3NF

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

So, 3NF