1. Candidate keys are S and U, therefore no BCNF violations in any of both tables.

2. Done in class (check lecture notes).

3.
$ABCDE$: $C \to BDE$ is a violation
Decompose: $BCDE$, AC
AC is in BCNF
$BCDE$: $D \to BE$ is a violation
Decompose: BDE, CD
BDE is in BCNF
CD is in BCNF

Final decomposition: BDE, CD, AC

Projections:

B	D	E
1	3	2
2	1	2
3	2	5

,

C	D
2	3
3	1
5	2
7	2
1	3
4	1

,

A	C
1	2
1	3
1	5
2	2
2	3
2	7
3	1
3	4
3	5

$BDE \bowtie CD =$

B	C	D	E
1	2	3	2
2	3	1	2
3	5	2	5
3	7	2	5
1	1	3	2
2	4	1	2

, $(BDE \bowtie CD) \bowtie AC =$

A	B	C	D	E
1	1	2	3	2
1	2	3	1	2
1	3	5	2	5
2	1	2	3	2
2	2	3	1	2
2	3	7	2	5
3	1	1	3	2
3	2	4	1	2
3	3	5	2	5

4.
Compute all closures for each combination of $ACEF$
Remove from the right hand side those attributes that are not in $ACEF$ we are left with:

	BCNF violation	3NF violation
$C \to E$	yes	
$C \to F$	yes	yes
$E \to F$	yes	yes
$AC \to E$		
$AC \to F$		
$AE \to C$		
$AE \to F$		
$CE \to F$	yes	yes
$CF \to E$	yes	
$ACE \to F$		
$ACF \to E$		
$AEF \to C$		

Keys: AC, AE
Prime attributes: A, C, E

5.

To find a minimal cover, notice that $TP \rightarrow I$, so the left-hand side TPI should just be TP, but then it is redundant. Therefore we get:

$L \rightarrow I$	keep
$TP \rightarrow L$	keep
$TI \rightarrow P$	keep
$LS \rightarrow G$	keep
$TS \rightarrow P$	keep

Since the only candidate key is ST, then one possible 3NF decomposition is:

IL, LPT, IPT, GLS, TPS