A1: Prime attribute is: A,D; Non-prime are: B, C

A2: Use the edge diagram. You will find the keys are SP and SQ

The first functional dependency S->NC is a prime ->non-prime where prime is part of a key. So it is not in 2NF.

Decompose:

R1(SNC) R2(SPQXY)

R1 determines S->NC. The key is S.

R2 determines P->XY, SP->Q and Q->P. The key is still SP and SQ.

In R2 we have a partial dependency so decompose into

R3(PXY) R4(PSQ)

R3 determines P->XY. They key is P

R4 determines SP->Q and Q->P. The key is SP and SQ. This is the key relation of the algorithm.

The 2NF and 3NF decomposition is R1(SNC) R3(PXY) R4(PSQ).

3.

Relation R(A,B,C,D,E).

BCD -->E, BDE --> C, BE --> D, BE --> A

Keys are BE and BCD. Prime attributes are {B,C,D,E}.  The relation is not in BCNF.

ABD --> C, ACD --> E, ACE --> B, BC --> E

Keys are ABD and ACD. Prime attributes are {A,B,C,D}. The relation is not in BCNF.

BE --> D, B --> E, D --> E, CD --> A

Key is BCE. Prime attributes {B,C,E}. The relation is not in BCNF.

BDE --> A, AC --> E, B --> C, DE --> A

Key is BDE. Prime attributes {B,D,E} Relation is not in 2NF.