Task 1:

FD1: {A} → {B,C} FD2: {C} → {A,D} FD3: {D,E} → {F}

a) Decomposition of FD1 : A → B , A → C
   Decomposition of FD2 : C → A , C → D
   Transitivity of C → A and A → B, then C → B

b) Decomposition of FD1 : A → B , A → C
   Decomposition of FD2 : C → A , C → D
   Transitivity of A → C and C → D, then AE → F

Task 2:

a) X = { A }
   X^+ = { A, B, C, D, F }

b) X = { C, E }
   X^+ = { A, B, C, D, E, F }

Task 3:

FD1: {A,B} → {C,D,E,F} FD2: {E} → {F} FD3: {D} → {B}

a) {A,B} because {A,B} → {A,B,C,D,E,F}, which means every attribute in R.

b) FD2, and FD3.

c) FD2 => R1{A,B,C,D,E} with FD1 and FD3,R2{E,F} with FD2
   R1 is still not in BCNF because of FD3, while R2 is in BCNF.

   FD3 => R1A{A,C,D,E} with FD1, R1B{D,B} with FD3, R2{E,F} with FD2
   All of them are in BCNF now.

Task 4:

FD1: {A,B,C} → {D,E} FD2: {B,C,D} → {A,E} FD3: {C} → {D}

a) Decomposition of FD1 : A →D, A→E, B→D, B→E, C→D, C→E
   Decomposition of FD2 : B →A, B→E, C→A, C→E, D→A, D→E
   X = {A,B,C} => X^+ = {A,B,C,D,E} => super key
   X = {B,C,D} => X^+ = {A,B,C,D,E} => super key
   X = C => X^+ = { A, D, E } => Not super key => Violates BCNF condition.

b) FD3 => R1{C,D} with FD3, R2{A,B,C,E} with FD1 and FD2. Both are in BCNF.