Question 1:

1) First, EG->EG, with E->CA we have
   EG->EGCA, with CG->DI we have
   EG->EGCADI,
   Hence, EG->I holds.
2) Candidate keys are:
   AGJ and EGJ
3) 1NF since it only contains atomic attribute values.
   Not in 2NF since AJ->C violates 2NF, the non-prime attribute C is partially dependent on key {AGJ}.

4) The minimal cover F_m = {CG->DI, AG->B,ADI->EH,E->CA,AJ->BE,EJ->I}
   Or F_m = {CG->DI, AG->B,ADI->EH,E->CA,AJ->BEI}

5) Not lossless

	A	B	C	D	E	G	H	I	J
R1	b	b	a	b	a	a	b	a	b
R2	a	b	b	a	a	b	a	b	a
R3	b	a	b	b	a	a	a	b	b

First scan of F, we have:

	A	B	C	D	E	G	H	I	J
R1	a	a	a	b	a	a	b	a	b
R2	a	b	a	a	a	b	a	b	a
R3	a	a	a	b	a	a	a	a	b

Second scan of F, we have:

	A	B	C	D	E	G	H	I	J
R1	a	a	a	b	a	a	b	a	b
R2	a	b	a	a	a	b	a	b	a
R3	a	a	a	b	a	a	a	a	b

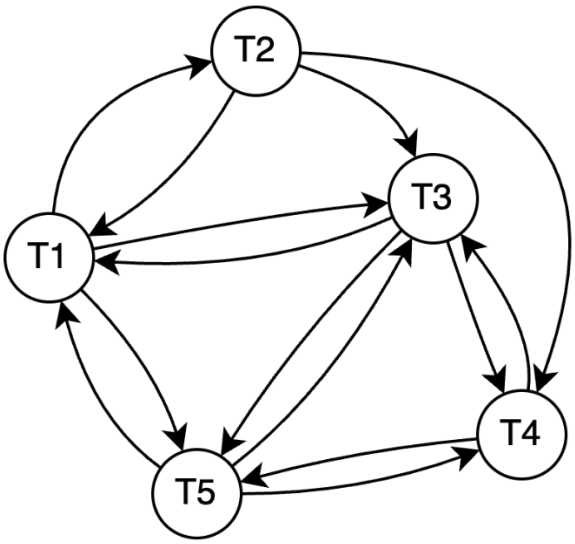
There is no change during the second scan. The result table doesn't contain a line with all columns marked with 'a'. Hence, the decomposition is not lossless.

6) R violates BCNF because of CG->DI, hence R is decomposed to
   R1(C,D,G,I) and R2(A,B,C,E,G,H,J),
   R2 violates BCNF because of AG->B, hence R2 is decomposed to
   R21(A,B,G) and R22(A,C,E,G,H,J),
   R22 violates BCNF because of E->AC, hence R22 is decomposed to
   R221(A,C,E) and R222(E,G,H,J)
   R222 violates BCNF because of EG->H, hence R222 is decomposed to
   R2221(E,G,H) and R2222(E,G,J)
   Hence, a BCNF decomposition of R is:
   R1(C,D,G,I)

R21(A,B,G)
R221(A,C,E)
R2221(E,G,H)
R2222(E,G,J)

Question 2:

1) T1, T5: Redo
   T3, T4: Undo
   T2: Do Nothing
2) The transaction schedule is not conflict serializable because its precedence graphs is not acyclic:



3) One possible schedule, regardless of T2 and T3, that must cause deadlock is shown below; in the deadlock, T1 waits for T5 for Y, T5 waits for T3 for Z, and T3 waits for T1 for X.

T1	WL(X)	R(X)	…				WL(Y)	R(Y)	W(Y)	W(X)	…			UL(X)	UL(Y)				
T2	…																		
T3			WL(Z)	R(Z)	…				WL(X)	R(X)	W(Z)	W(X)	…			UL(Z)	UL(X)		
T4	…																		
T5					WL(Y)	W(Y)	…				WL(Z)	R(Z)	W(Z)	…				UL(Y)	UL(Z)

Question 3:

1) LRU Policy

	P1	P2	P3	P2	P4	P5	P6	P6	P3	P7	P2	P3
Buffer1	P1	P1	P1	P1	P4	P4	P4	P4	P3	P3	P3	P3
Buffer2		P2	P2	P2	P2	P2	P6	P6	P6	P6	P2	P2
Buffer3			P3	P3	P3	P5	P5	P5	P5	P7	P7	P7

Fault	F	F	F		F	F	F		F	F	F	
Hit				H				H				H

9 page faults, 3 hits

2) MRU Policy

	P1	P2	P3	P2	P4	P5	P6	P6	P3	P7	P2	P3
Buffer1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1	P1
Buffer2		P2	P2	P2	P4	P5	P6	P6	P6	P6	P6	P6
Buffer3			P3	P3	P3	P3	P3	P3	P3	P7	P2	P3
Fault	F	F	F		F	F	F			F	F	F
Hit				H				H	H			

9 page faults, 3 hits

3) FIFO Policy

	P1	P2	P3	P2	P4	P5	P6	P6	P3	P7	P2	P3
Buffer1	P1	P1	P1	P1	P4	P4	P4	P4	P3	P3	P3	P3
Buffer2		P2	P2	P2	P2	P5	P5	P5	P5	P7	P7	P7
Buffer3			P3	P3	P3	P3	P6	P6	P6	P6	P2	P2
Fault	F	F	F		F	F	F		F	F	F	
Hit				H				H				H

9 page faults, 3 hits

4)

LRU,MRU, and FIFO all have the same page faults (9 faults and 3 hits), and they have the same performance.