Answer #1:

Every conversion into BCNF may not be dependency preserving

Proof: We only need to give a counter example: Consider the following schema;

a b c and c->b

Clearly the above schema is in 3NF, because ab->c is a superkey dependency and ,from c->b we can see that b-c=b, which is a subset of the primary key (such dependency is also allowed in 3NF).

But, the above schema is not in BCNF because c->b is neither super-key nor trivial dependency.

So we decompose above schema , keeping it lossless.

Only possible lossless decomposition is: ac and cb. (because, their intersection c is primary key for the 2nd table).

But clearly the dependency ab->c is lost.

Hence, proved.

Answer #2:

UnitID (PK)	Topic	Book	Room	Date	TutorID(FK)
U1	GMT	Deumlich	629	23.02.03	Tut1
U2	GIn	Zehnder	631	18.11.02	Tut3
U4	AVQ	SwissTopo	621	04.07.03	Tut5
U5	PhF	Dümmlers	632	05.05.03	Tut3

TutorID (PK)	TutEmail
Tut1	tut1@fhbb.ch
Tut3	tut3@fhbb.ch
Tut5	tut5@fhbb.ch

StudentID (PK)	TutorID(FK)	Grade
St1	Tut1	4.7
St1	Tut3	5.1
St4	Tut1	4.3
St2	Tut3	4.9
St2	Tut5	5.0

UnitID (PK)	StudentID (PK)	TutorID(PK)
U1	St1	Tut1
U2	St1	Tut3
U1	St4	Tut1
U5	St2	Tut3
U4	St2	Tut5

Answer #3:

ProjectName (PK)	Budget
Project1	1 kk $
Project2	1.5 kk $

ProjectManager (PK)	Position	TeamSize
Manager1	CTO	15
Manager2	CTO2	12

ProjectName (PK)	ProjectManager (PK)
Project1	Manager1
Project2	Manager2

Answer #4:

Group (PK)	Speciality
g1	s1
g2	s2

Speciality (PK)	Faculty
s1	f1
s2	f2

Answer #5:

ProjectID (PK)	Curator	TeamSize
p1	e1	100
p2	e2	120

ProjectGroupsNumber (PK)	TeamSize (FK)
5	100
6	120

ProjectID (PK)	Department (PK)
p1	d1
p2	d2

Answer #6:

The three design goals are lossless-join decompositions, dependency preserving decompositions, and minimization of repetition of information. They are desirable, so we can maintain an accurate database, check correctness of updates quickly, and use the smallest amount of space possible.