Exercise 1

A university DB contains information about professors (identified by SIN) and courses (identified by course ID). Professors teach courses; each of the following situations concerns the Teaches relationship set.

List all candidate keys of the Teaches relationship set.
 a. Professors can teach the same course in several semesters, and each offering must be recorded.
 b. Professors can teach the same course in several semesters, but only the most recent such offering needs to be records. Assume the above Situation (b) applies in all subsequent situations.

List all the keys possible in each of the following situations.

c. Every professor teaches a course, and every course is taught by some professor.
d. Every professor teaches exactly one course, and every course is taught by exactly one professor.

Answer:
Professor : SIN is the primary key
Course: CID is primary key
Semester: SID is primary key

Relationship set
Teaches :associated with professor , course and semester
Cardinality constraints: m to m
Candidate key: {SIN,CID,SID}
1b) Semester does not need to be an entity set here. Teaches is a binary relation between professor and course. Semester is attribute of teaches. The key o f teaches is {SIN, CID}.
 1c) This means total participation from professors and total participation from courses. Because it is still m-to-m, the candidate key remains {SIN, CID}.
1d) This time the relationship is 1-to-1. There are now two candidate keys: either {SIN} or {CID}