① Find the minimum number of tables required for the following ER-diagram in relation model

Total participation of M in R1

Total participation of N in P2
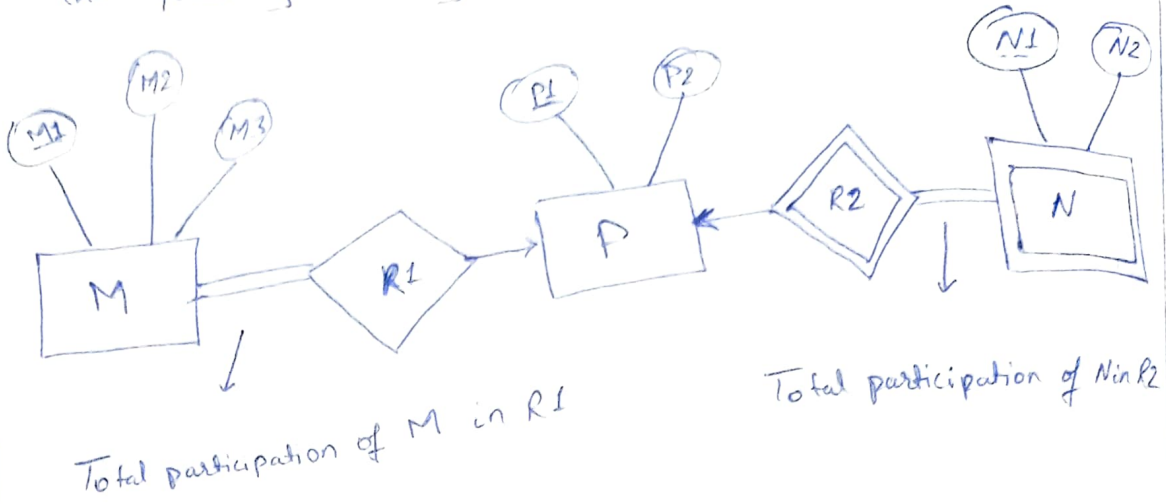
- R1 is an entity set. It may either share similar values and have attributes of the exact nature to P.

- R2 is also entity set but identifing entity set It may either share similar value and have attributes of the exact nature to P.
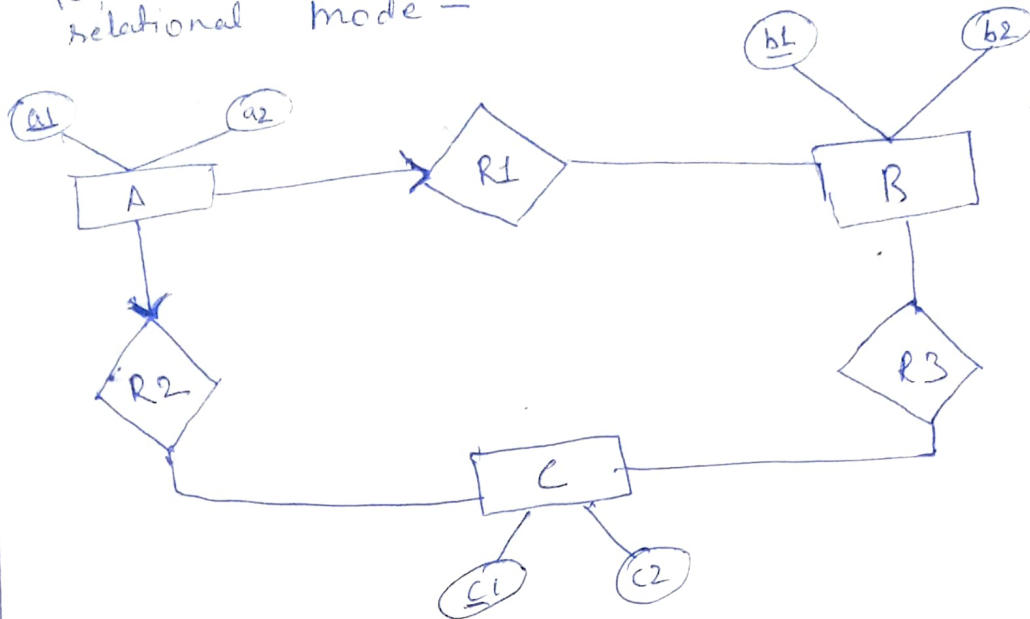
According to above diagram it Requied 3 tables.

M (M1 , M2, M3, P1)

P (P1 , P2)

N (N1 , N2, P1)

② Find the minimum number of tables required to represent the given ER-diagram in relational mode —

Applying the rules: minimum 4 tables will be required

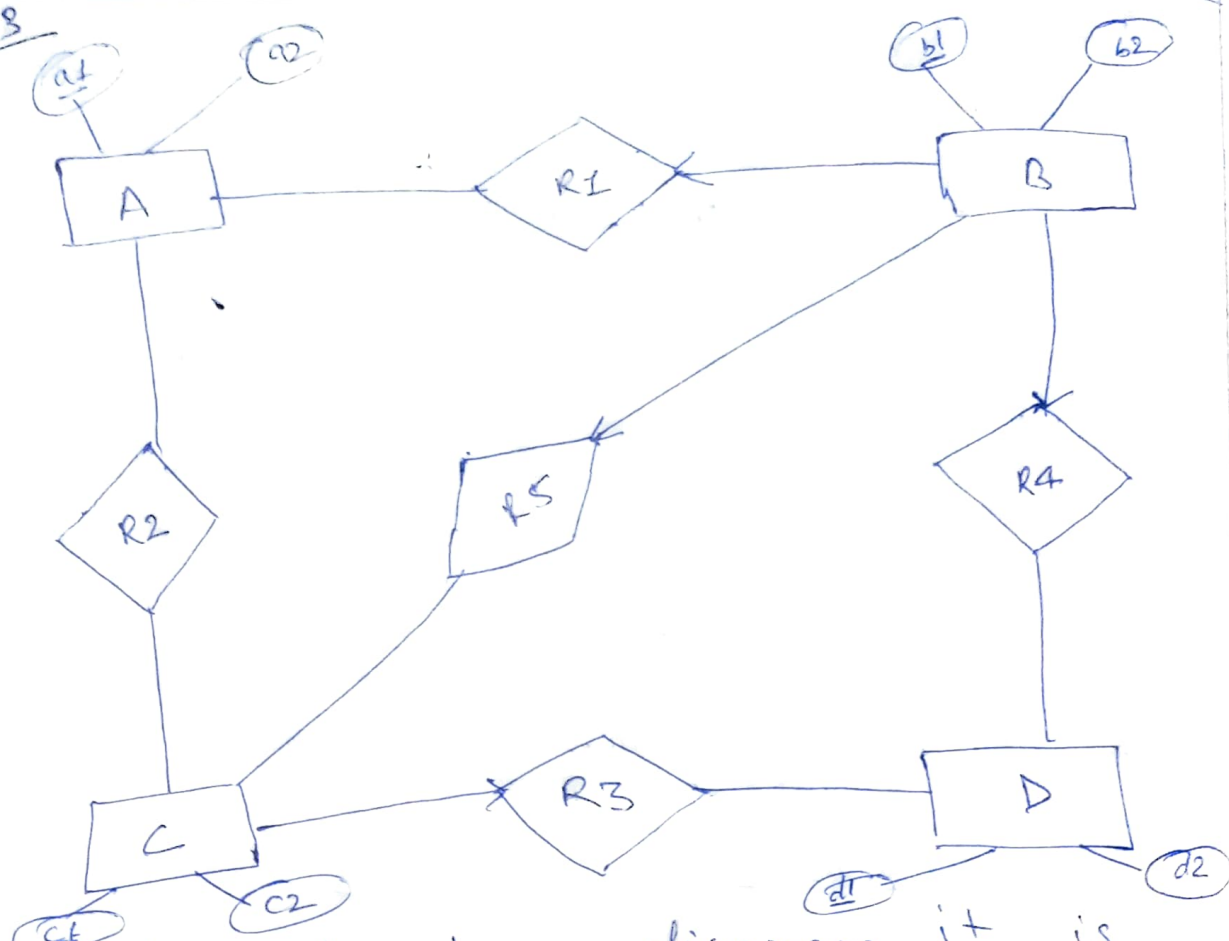$A\_R1\_R2(\underline{a_1}, a_2, \underline{b_1}, \underline{c_1})$ (Key Attribute)

$B (\underline{b_1}, b_2)$

$c (\underline{c_1}, c_2)$

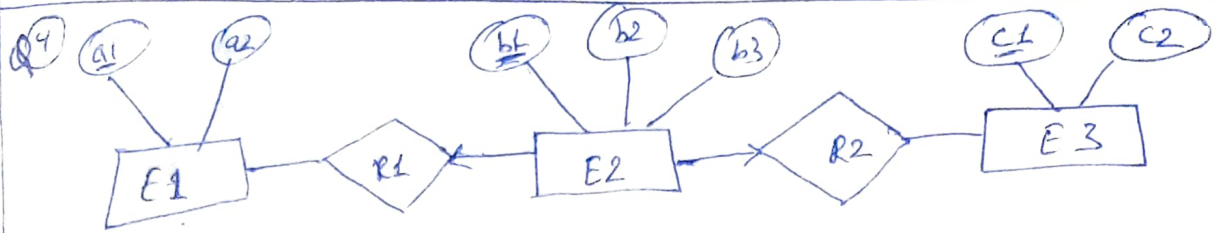$R3 (\underline{b_1}, \underline{c_1})$ (Because there is no directly set that's why we create table).

Q3
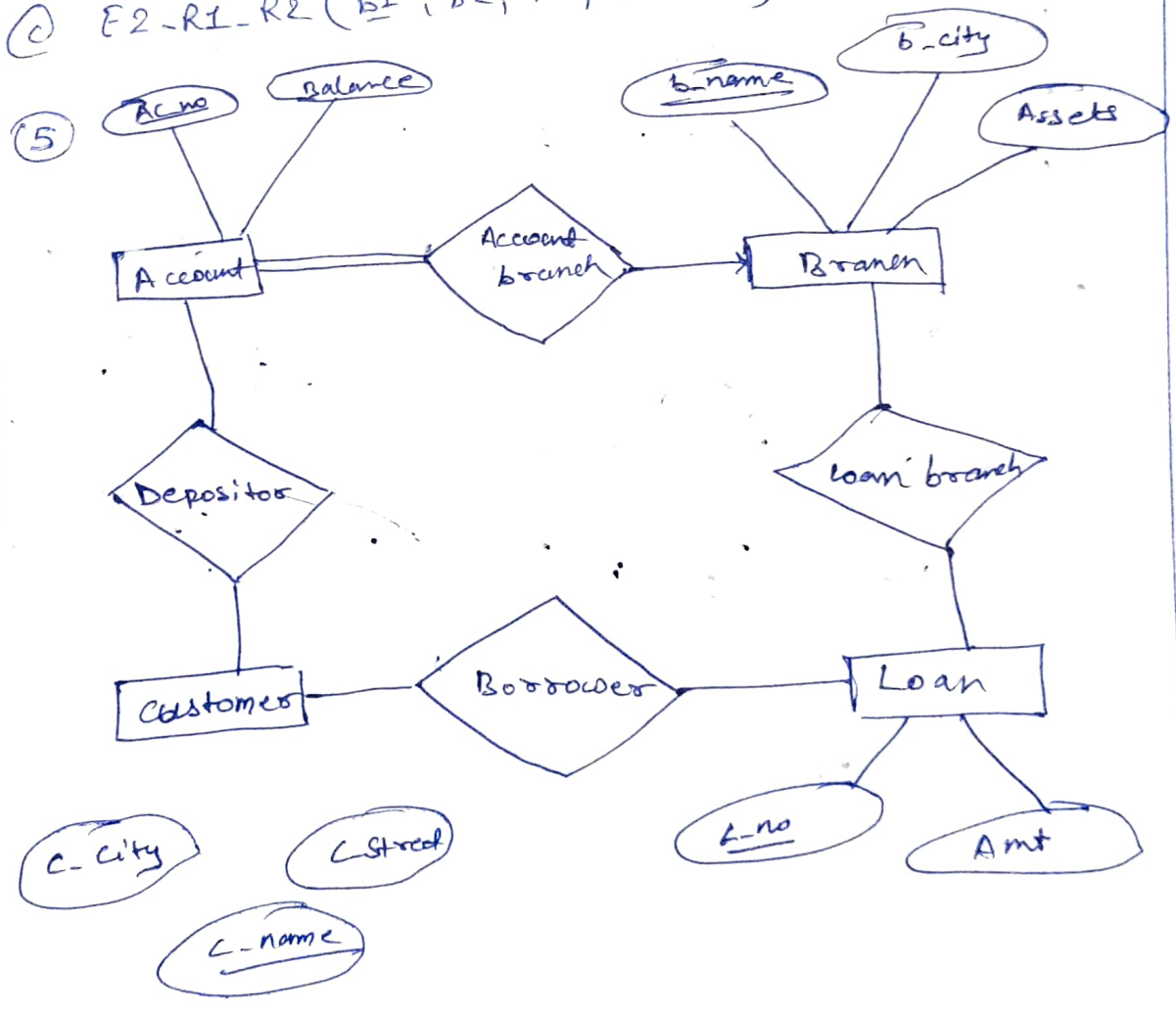

According to above diagram it is .
required

@ A (a1, a2)

ⓑ D (d1, d2)

ⓒ ~~B.R1_R5_R4~~ (b1, b2, a1, c1, d1)   (Key Attributes)

ⓓ R2 (a1, c1)   (Key Attributes)

ⓔ C_R3 (c1, c2, d1)   (Key Attributes)

Q⁴ a1 a2   b1 b2 b3   c1 c2

E1 — R1 — E2 — R2 — E3

According to above diagram it is
required .3 tables because from E2
two set Relation's set which are
stabilised Relation with R1 and R2
and these Relation set stabilised
with E1 and E3 Respectívily.

(a) E1 (a1 , a2)

(b) E3 (c1, c2)

(c) E2_R1_R2 (b1 , b2, b3, c1 , a1) (Key Attributes)

⑤

Account (Ac_no, Balance)

Account branch → Branch (b_name, b_city, Assets)

Depositor

Customer — Borrower — Loan (L_no, Amt)

Loan branch

c_city c_street c_name

As we known that when table relation set (→) tends to another table then no need to create anothe table for that relation set.

On the other hand in case of one-to-one relation it need to create table for that relation

Applying the rules that we have learnt, minimum 6 tables will be required.

- Account (Ac_no , Balance , b_name)

- Branch (b-name , b_city , Assets)

- Loan (L-no , Amt , b_name)

- Borrower (C-name , L-no)

- Customer (C-name , C-street , C-city)

- Depositor (C-name , Ac_no).

⑥ Convert/reduce the ER Diagram given in figure 1 below;
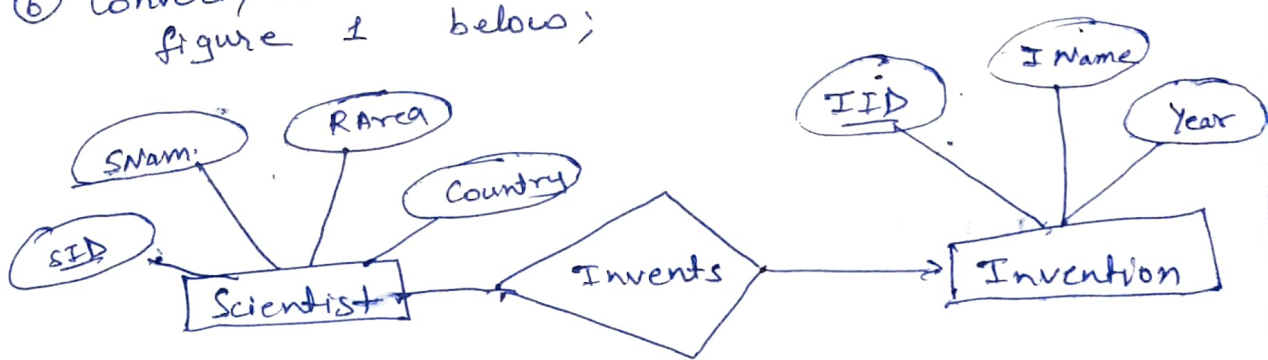
ER-diagram with One-to-One relationship

Solution Entity Sets and relationship sets

Name	Entity set/Relationship set	Type
Scients	Entity set	strong entity set
Invention	Entity set	strong entity set
Invents	Relationship set	Many-to-Many. Relan

Entity Set Scientist

Attributes	Attributes Type	Description
SID	Simple and Primary Key	Scientist ID
sName	comp Simple	Scientist Name
RArea	Simple	Research Area
Country	Simple	Country.

Entity set Invention

Attributes	Attributes Type	Description
IID	Simple and Primary Key	Invention ID
IName	Simple	Name of the Invention
Year	simple	Year of invention.

Relationship set :— The association between two or more entity sets is termed as relationship set.

A relationship may be either converted into a separate table or not. That can be decided based on the type of the relationship. Only many-to-many relationship needs to be created as separate table here, we are given a many-to-many relationship. That means,

- One entity (record/row) of Scientist is related to one or more entities (records/rows) of Invention entity set (that is, one scientist may have one or more inventions) and;

- One entity (record/row) of Invention is related to one or more entities (records/rows) of Scientist entity set (that is, one or more scientists may have invented one thing collectively).

To reduce the relationship Invents into relational schema, we need to create a separate table for Invents, because Invents is many-to-many relationship set. Hence, create a table Invents with the primary keys of participating entity sets (both, Scientist and Invention) as the attribute.

Then we have,

$$Invents \ (\underline{SID}, \underline{IID})$$

Here, SID and IID are both foreign keys and collectively forms the primary key of Invents table.

finally we have following relation shemas.

○ Scientist (<u>SID</u>, sName, Country)
  ~~Scientist~~

- Invention (<u>IID</u>, IName, Year)

- Invents (<u>SID</u>, <u>IID</u>).

Assignmen-8.2

Q1 Production tracking is important in may manufacturing environments (e.g. the pharmaceuticals industry, chidr-dustry etc) The following ER Diagram captures important information in the tracking of production, Specifically, the ER diagram captures relationship between production lots (or batches), individual production units, and raw materials.
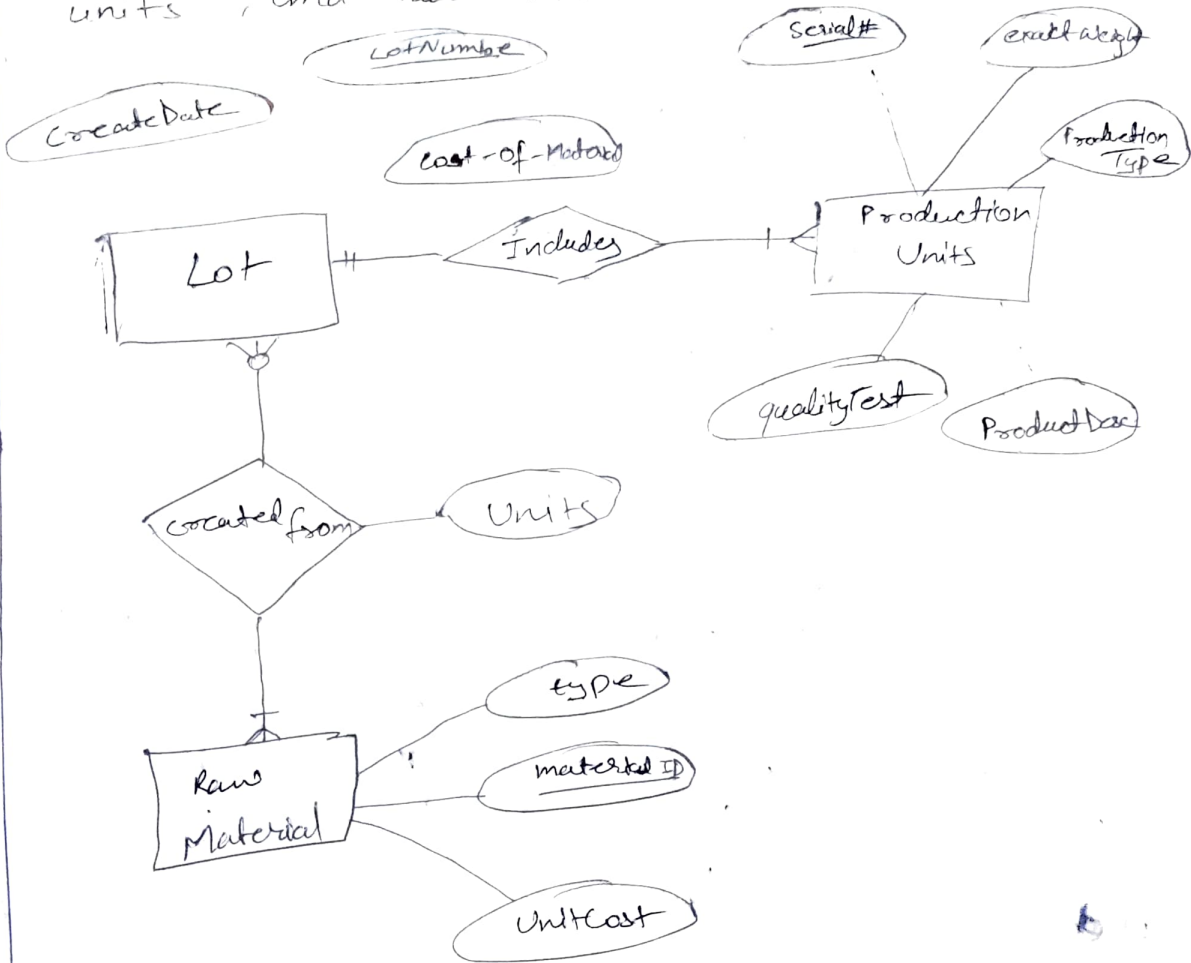
@ Convert the ER Diagram into a relational databases schema Be certain to indicate the primary keys and referential any integrity constraints.

Sol <u>Production Units</u>

Serial#	Extract weight	Product Type	Product Date	Quntity Test?	Lot

Lot

| Lot Number	CreateDate	cost of Materials

Raw Materials:

Material ID	Type	UnitCost

(b) Identify, an attribute in the above ER-Diagram that might represent a composite attribute, and explain why/how it might represent a composite attribute.

Sol: Many attributes can be represented as composite attributes one of example is
create date might be stored as both date and time.
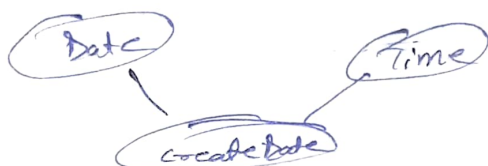
(c) Identify an attribute in the ER diagram that could represent a derived attribute, and explain why/how it might represent a derived attribute.

Sol: Cos of Material (accociated with the Lot entity) most likely represents a derived attribute. The Cost of Materials could be computed based on the materials unit cost (from the raw material entity) and the number of unit required from a lot (on the relationship).

The ER/reational database diagram contains several instances of data redundancy. Identify one instance where a data redundancy issue exits.

Sol: Data redundancy can occurs at production description and production type as they are being stored for each and every production unit. The production description could be stored

(e) Sol: The current reprentation of "row materials are used in a to many lots", implies that raw materials can be in the system without being designated for a specific lot. If the minimum cardinality was changed to 1. this would imply that all row materials must be designated as related to at least one lot.

(f) The table is in BCNF

Ques 2 Use the ER to Relational mapping algorithm to map the following ER diagram into a relational database system design

(a) Mention details of each intermediate step :-

(i) Mapping of Regular Entity types :-

sol We have 4 regular entity types:—
Bank, Account, Loan, Customer and they each will have repeated tables :—

Bank

code	Name	Address

Account

Acct-No	Balance	Type

Loan

Loan-no	Amount	Type

Customer

SSn	Name	Phono	Address

(ii) Mapping of weak entity types :—
Here, Bank-branch is weak entity:-

Bank Branch

Branch-no	Address	code

(iii) Mapping of Binary 1:1 Relational Types :-
Here, no relation is 1:1
⇒ No requirement of Mapping

(iv) Mapping of Binary 1:N Relationship Type :—
Bank-Branch

Branch-no	Address	Bank-code

Loan

Loan-no	Amount	Type	Branch-no	Bank-code

Account

Acct-no	Balance	Type	Branch-no	Bank-code

(v) Mapping of Binary M:N Relationship Type :-

A.C.

Acct-no	SSn

L.C

Loan-no	SSn

(vi) Mapping of multivalued attributes :-
we do not have any multivalued attributes.

(vii) Mapping of N-array Relationship Types :-
There are no N-ary Relationships.

(viii) final Result :-
After following all the steps, we got a
total :-

Bank (code, Name, Address)
Customer (SSn, Name, Phone, Addr)
Bank_Branch (Branch-No, code, Addr)
Loan (Loan-no, Branch-No, code, Amount, Type)
Account (Acct-no, Branch-no, code, Balance, Type)
A.C (Accet-NO, SSn)
L.C (Loan-NO, SSn)

(b) After are getting the final result identify the
normal form of the table.

The tables are in BCNF.