

⇒ collection of interrelated data.

Redundency



doing same work multiple times & in multiple places

integrity

authorized person
environment
work

3 contion:

Atomicity

↓
doing all steps/transaction
or not doing any of them.

if any of this not done
previous will be undone

level of abstraction

Data semantic
→ type

Main component of RDBms Relational model

Table

entity relationship model

Main component of ER model

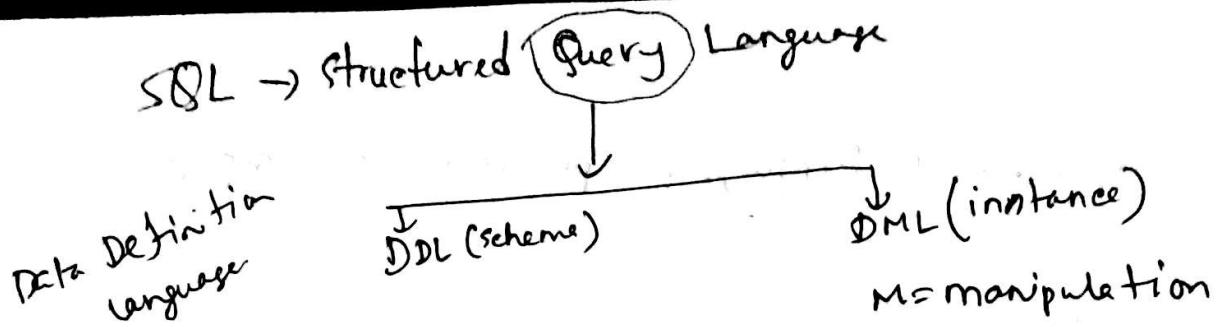
→ Entity

→ Attribute

→ Relation

Schema → structure

instance → value



DDL operation

Drop → structure or table
 table or column or row
Rename → table or column or row
Truncate → table or column or row
ALTER → Row structure

Drop → structure or table
 table or column or row
 change rows (FT)
 Rename → table or column or row
 change rows (FT) etc.
 Truncate → table or column or row
 structure for eval
 Row structure
 change rows (FT)

Data Manipulation language

insert → row add new
 row or value up to 2³⁰

update → existing update
 condition use same row
 delete row add new column

delete → condition use same row
 delete row add new column

merge → same type two table
 merge

Procedural language: programming language

⑥

Declarative non

SQL

Database Design

mcq question

DataBase

where

=
≤
<
≥
≤ =

between... and

In
like
Is NULL

Between... And

where colname between lo-val . and high value

"In"
where col name In(val1, val2.)

"Like"
% ⇒ 0 - ∞
_ ⇒ 1 - 1

where colname like 'value'

where first_name like 'A%' ;
'%e' ;
'---'

select first_name, commission_pct
from employees where commi

and

or
not

salary > 2000 and salary < 3000
department_id = 20 or department_id = 50

Database theory "05/10/26"

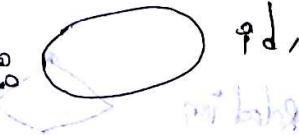
ER Diagram

Entity:



student, faculty,

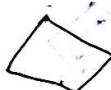
Attribute:



id,

name

Relation:



register, teach, enroll

Entity: An entity is an object that exists and distinguishable from other objects.

entity

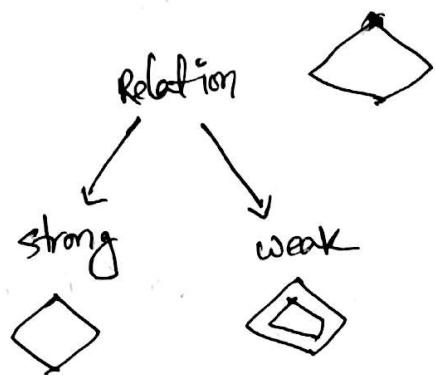
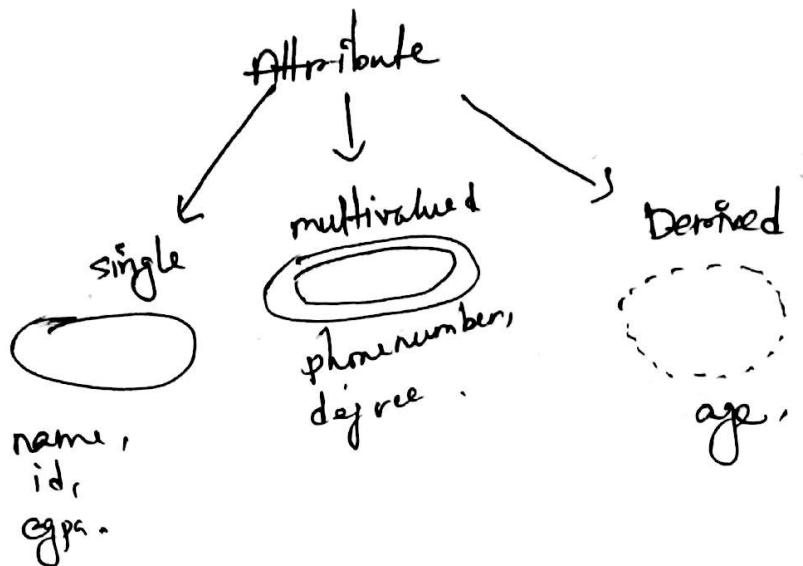
weak



independent



dependent



composite attribute.

• Target pointer

→ Key attribute

→ Identify each instance and its number or string.

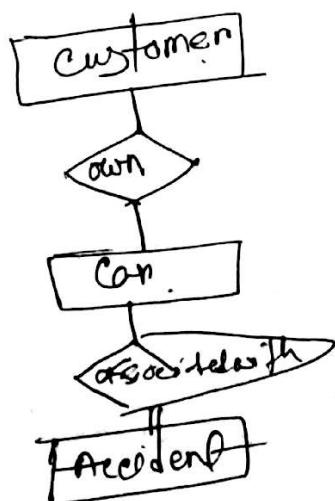
er diagram
key attribute $\underline{\text{is}}$ \rightarrow underline is 2501

flight id	date	no. of P
P23	22-10-16	20
256	22-09-16	16
123	23-09-16	20

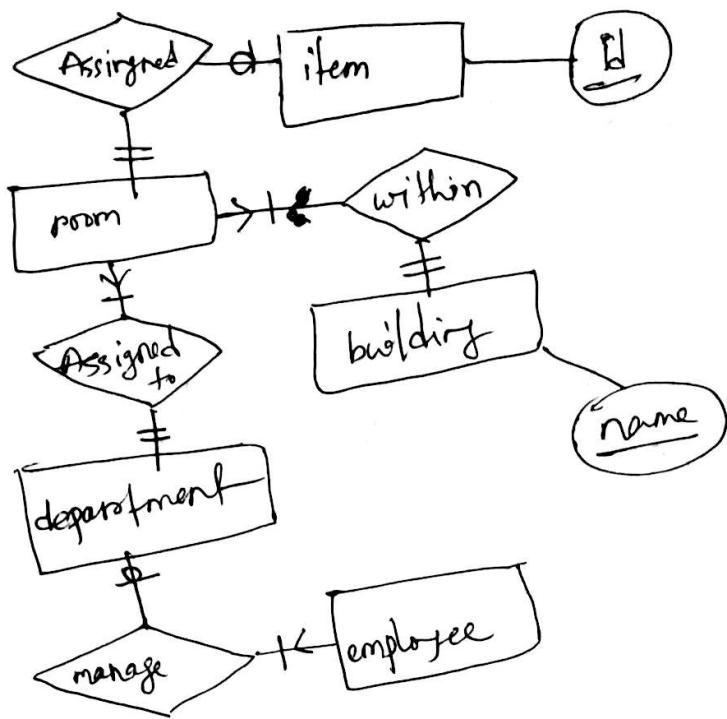
composite key attribute,

student - id	Semester - id	registration date
26789	Fall-16	22-09-16
26789	Summer 17	

Sub obj = entity
verb = relation



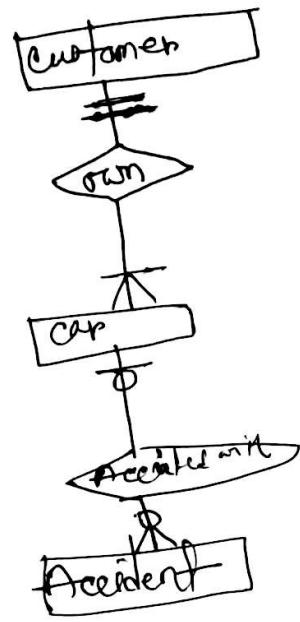
(5)



cardinality Constraints

- one to one
- one to many
- many to many

—	—	mandatory	one	• 0 or 1
—	—	optional	one	• 0 or 1
—	—	mandatory	many	• 0 or many
—	—	optional	many	• 0 or many



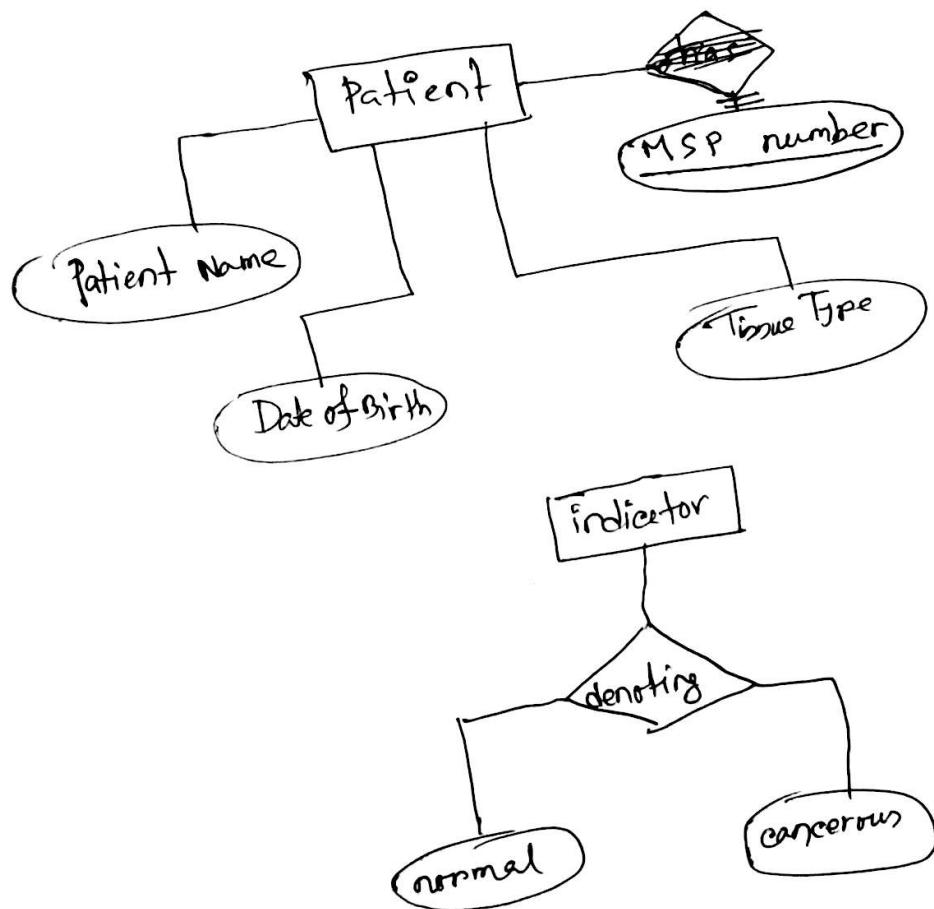
Date: 08-10-16

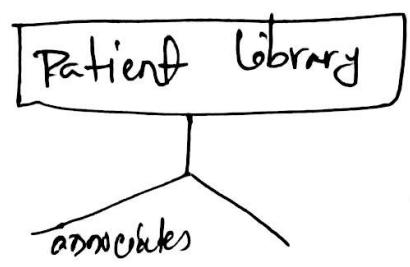
Database theory &

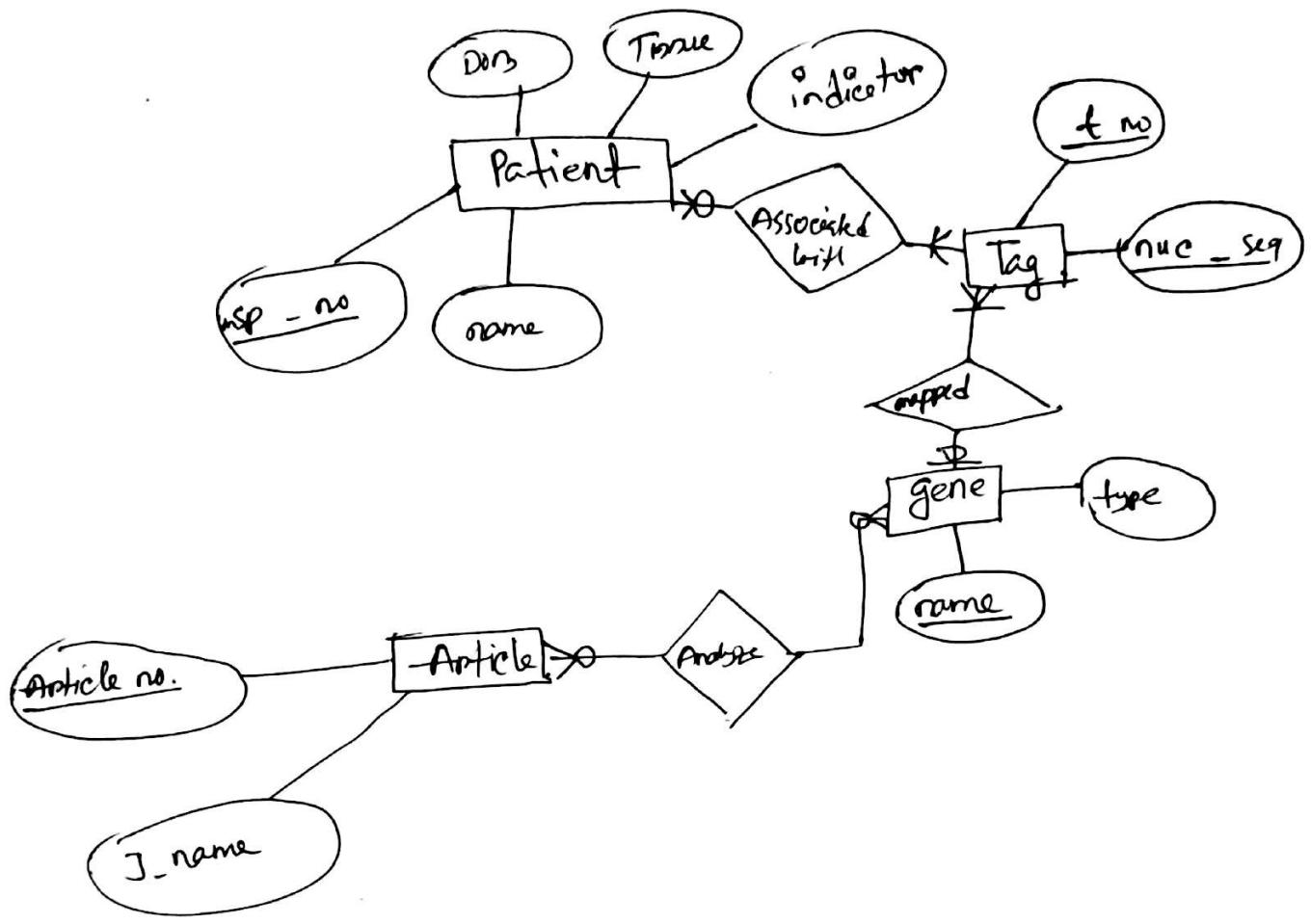
wrapping → key attribute.

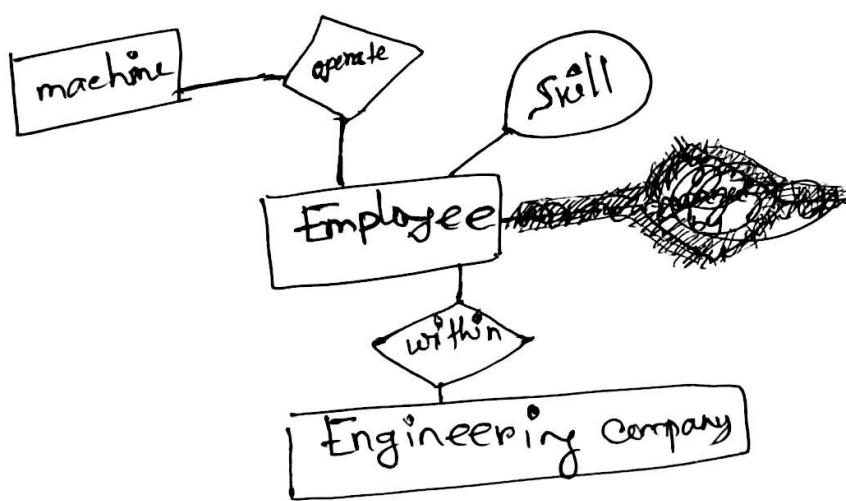
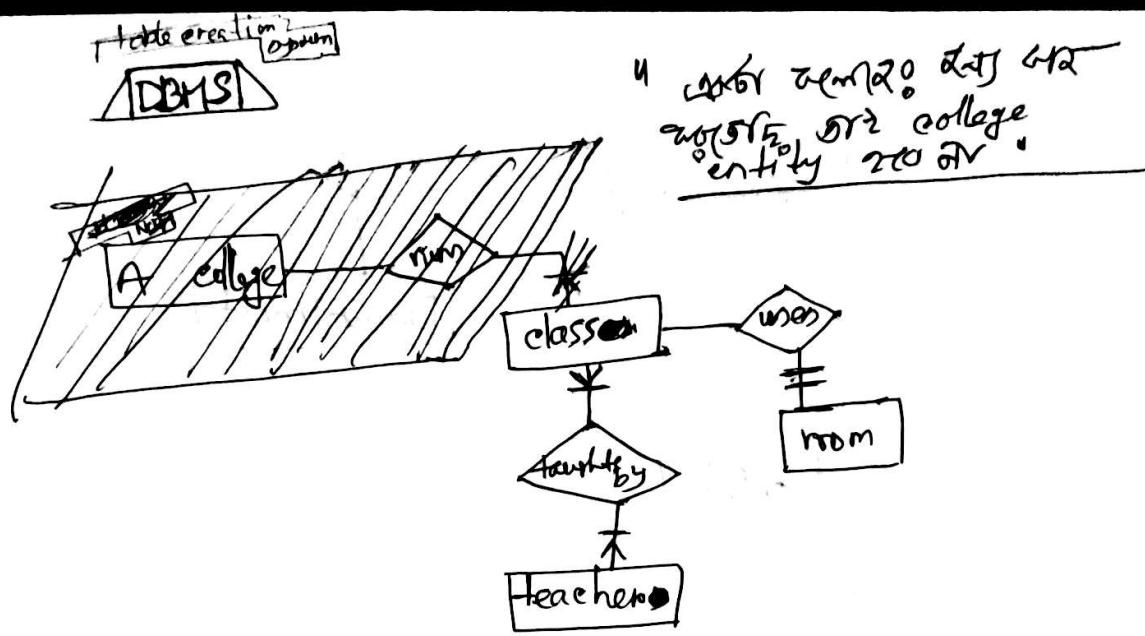
ER Diagram

3.

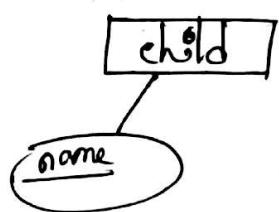
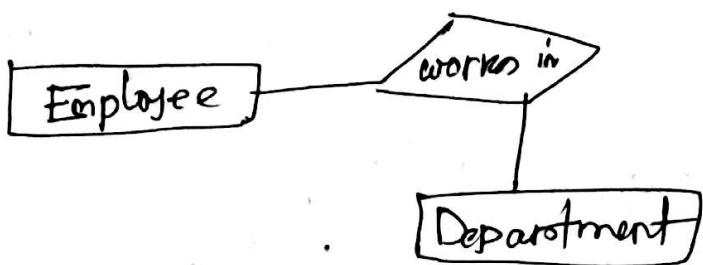


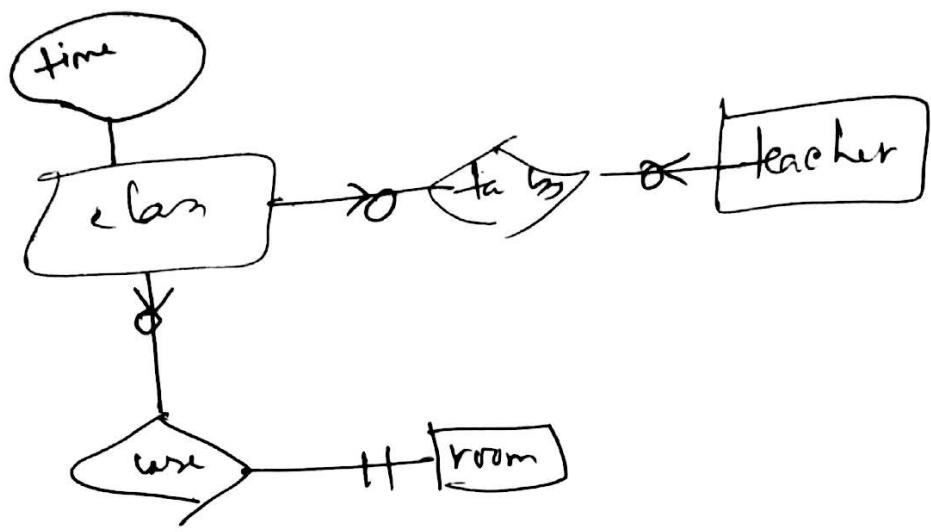






2 and 3





Database

17-10-16

table delete ddl

table
structure

WUJM

create table

VARIABLE = string

{
create
table
only
database
}

rule start or constraints

unique not null \Rightarrow primary key

frame products

cname pid - int - primary
pname - string - not null and unique
price - double - not null and must
be greater than or equal to
quantity - int - not null
must be ≥ 0

brand - string
~~not null~~ > 0

bprice - double - not null ~~not null~~ > 0 bprice

gprice - int - not null > 0 bprice

"Database" "19/01/16"

identifying on entity net

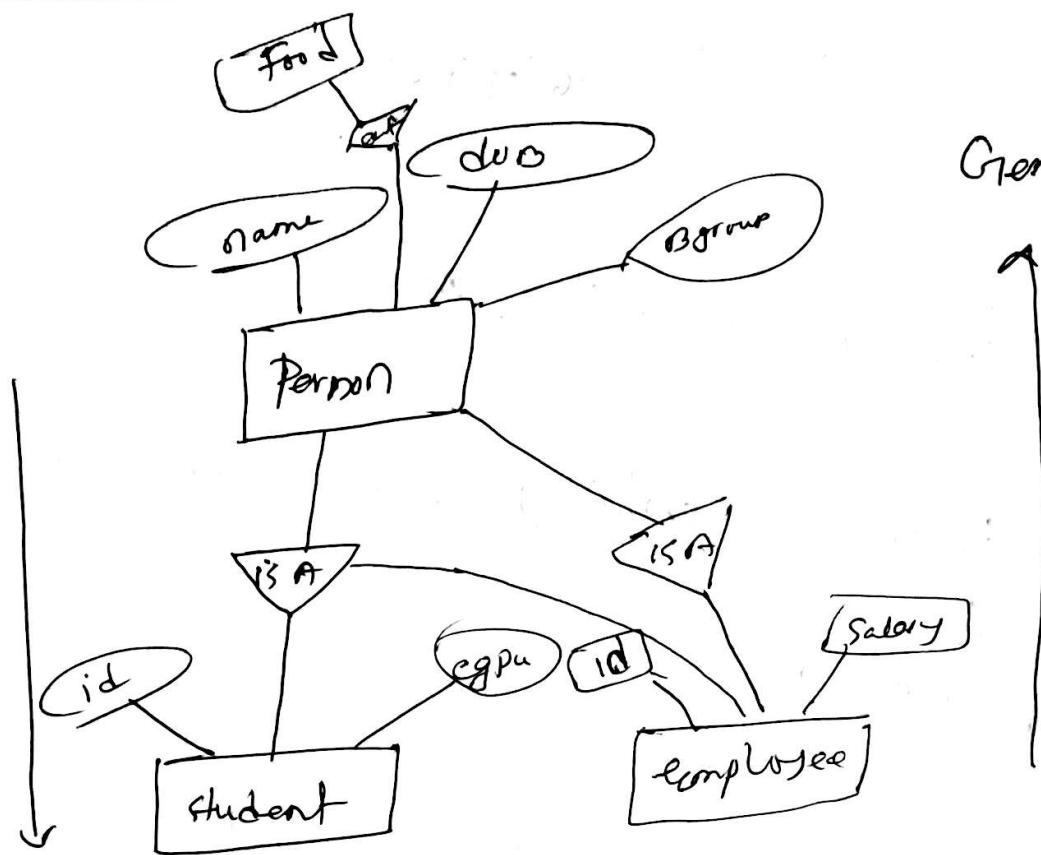
= denormal entity → weak entity

↓
primary key

identifying relationship net

— partial participation.

==

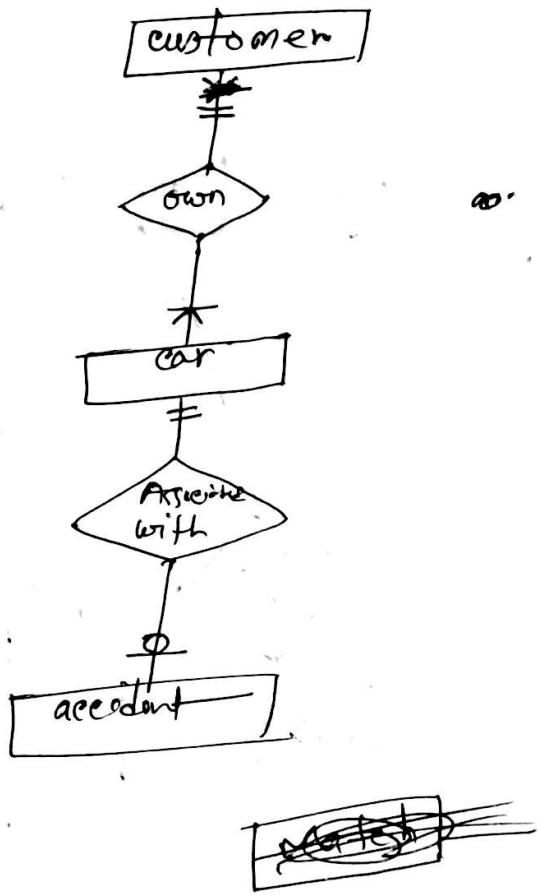


Generalization

Specialization

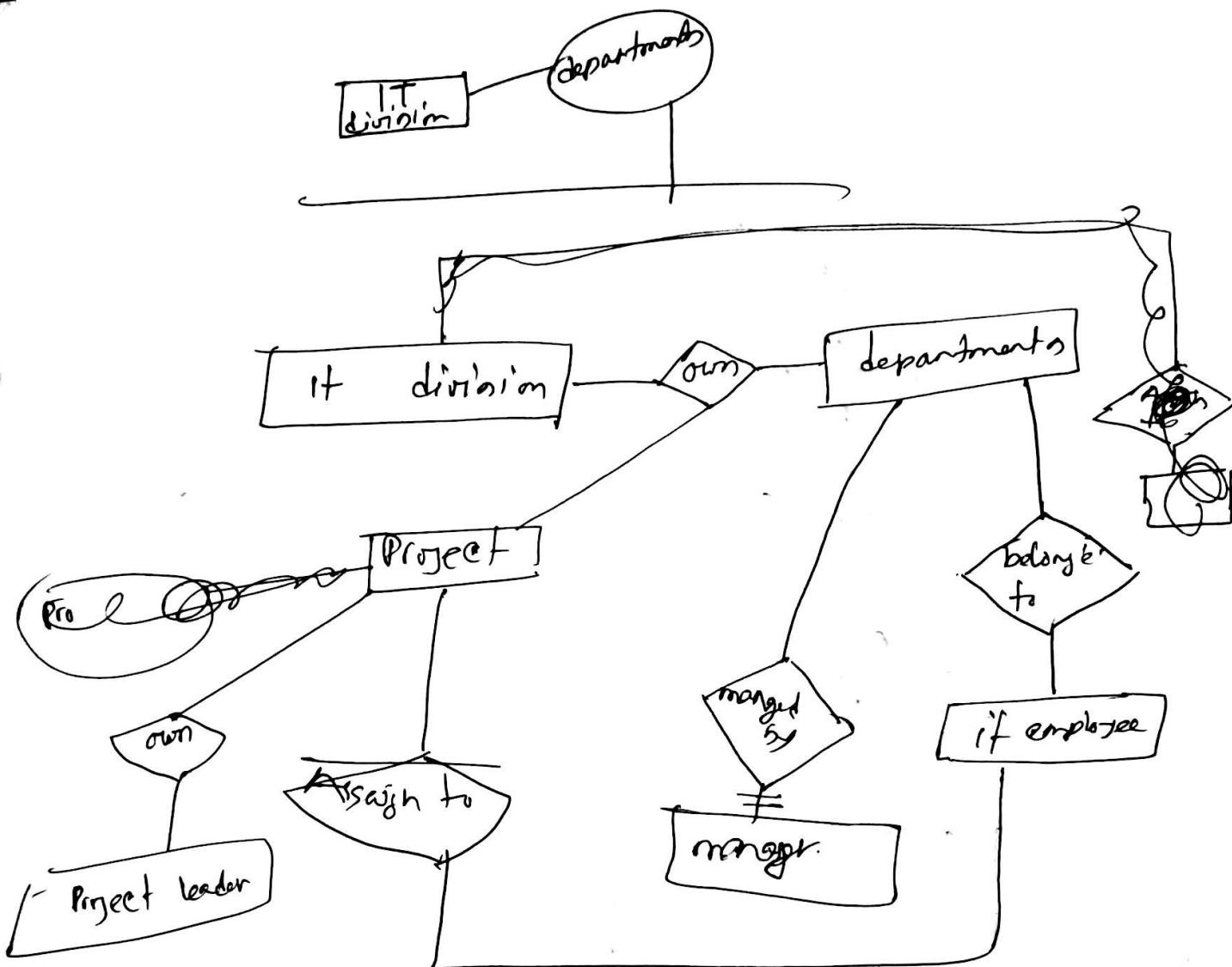
ER diagram

(1)



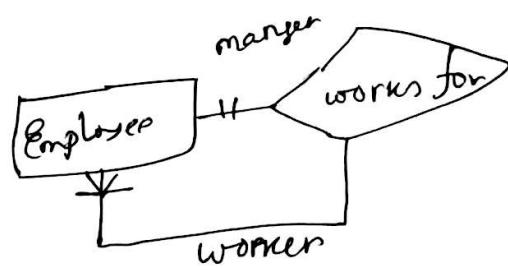
(2)

Summ.



team

match



(14)

check

constraint constraint_name

~~set_name~~ check(
col_name condition)

" Foreign key "

constraint cons_name Foreign key references
ref_table (ref_col)

DML

insert
update
delete

300% error

insert into table_name values (....)

Update
update table_name set col_name = value;
= value (where condition).

update department set budget = budget + 300

delete

Delete from table-name ;

where condition ;

~~total~~

" Group Function "

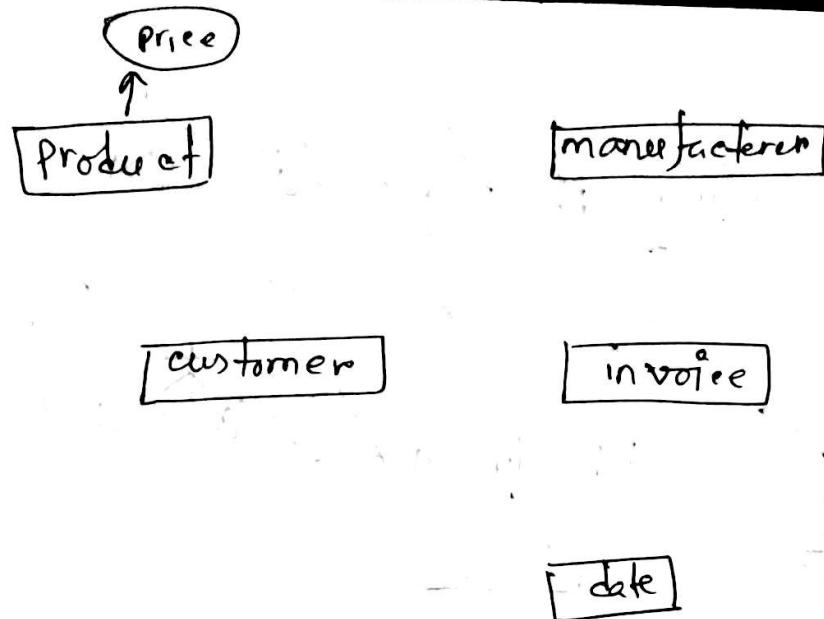
AVG COUNT MAX MEAN SUM

" order by "

" group by "

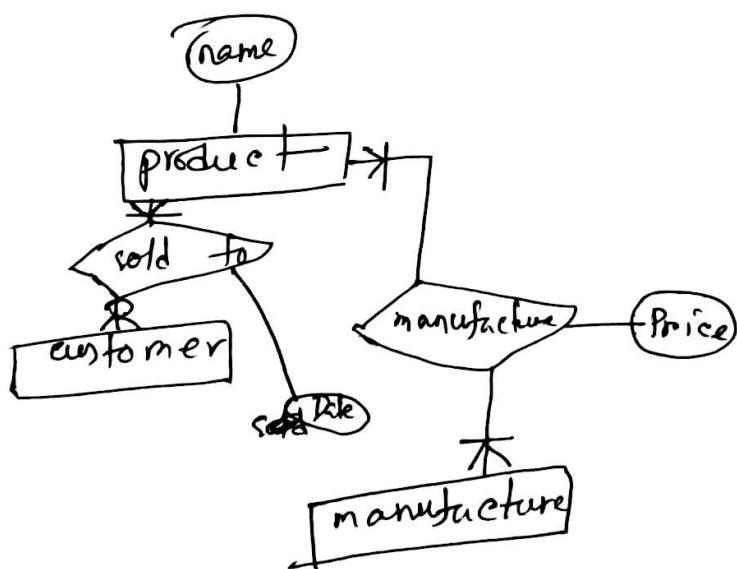
COUNT *

problem 04°

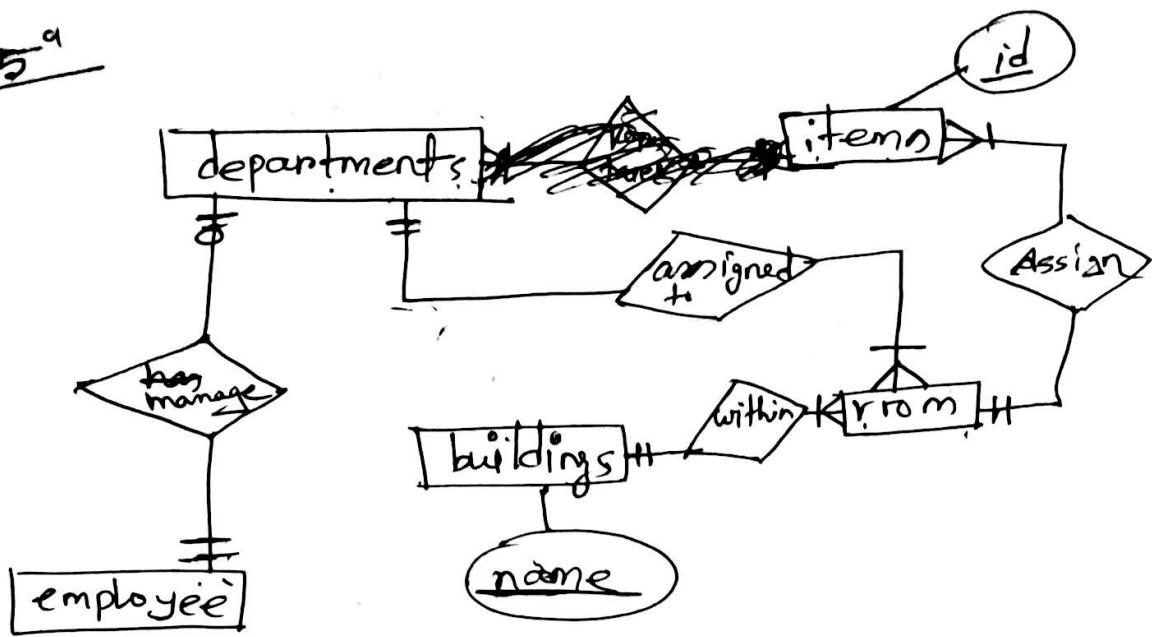


Problem 04† invoice bill report 22 or 23 output

entity should be an object



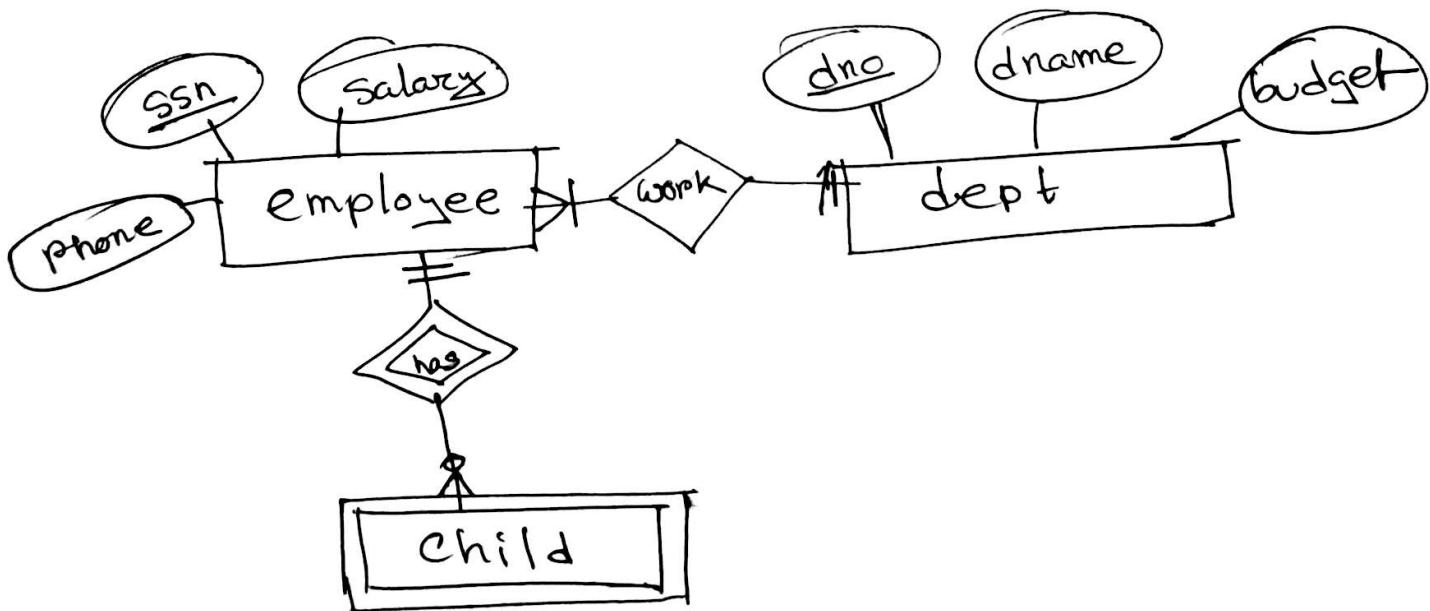
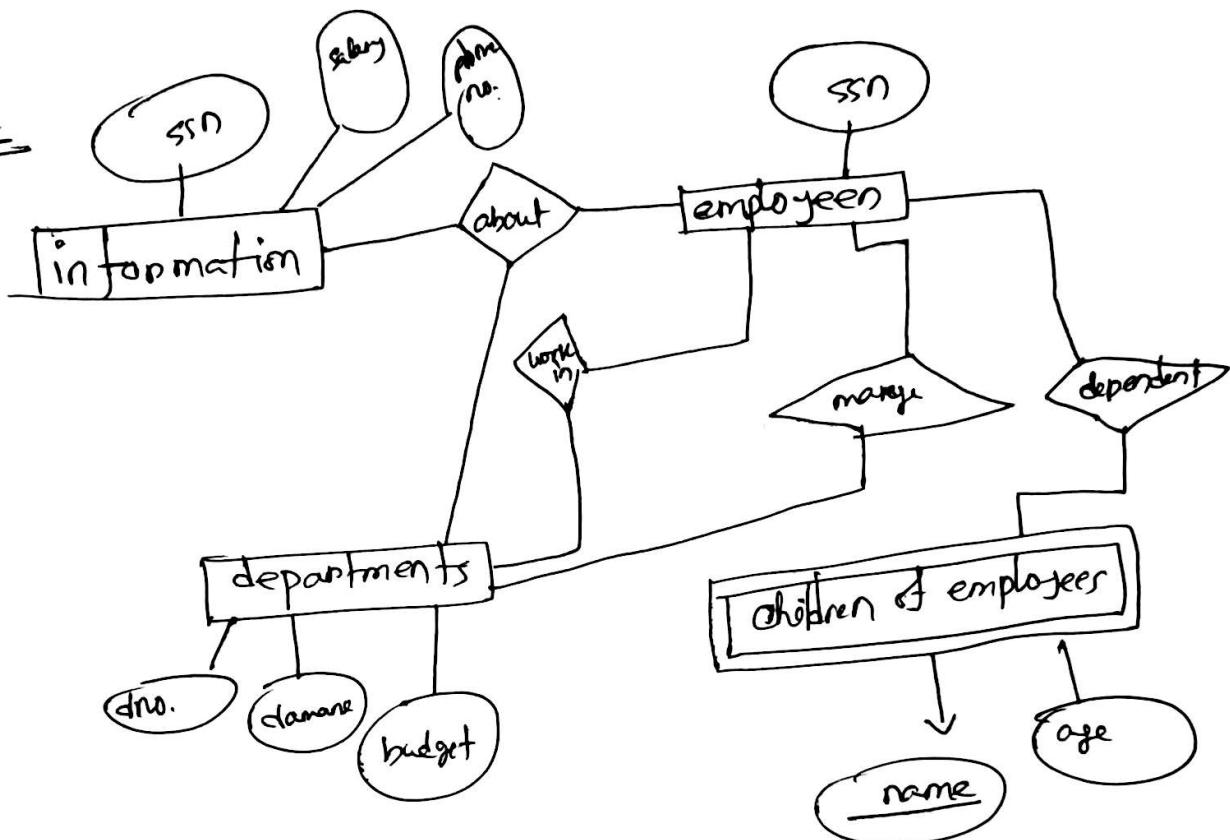
a P-5^a



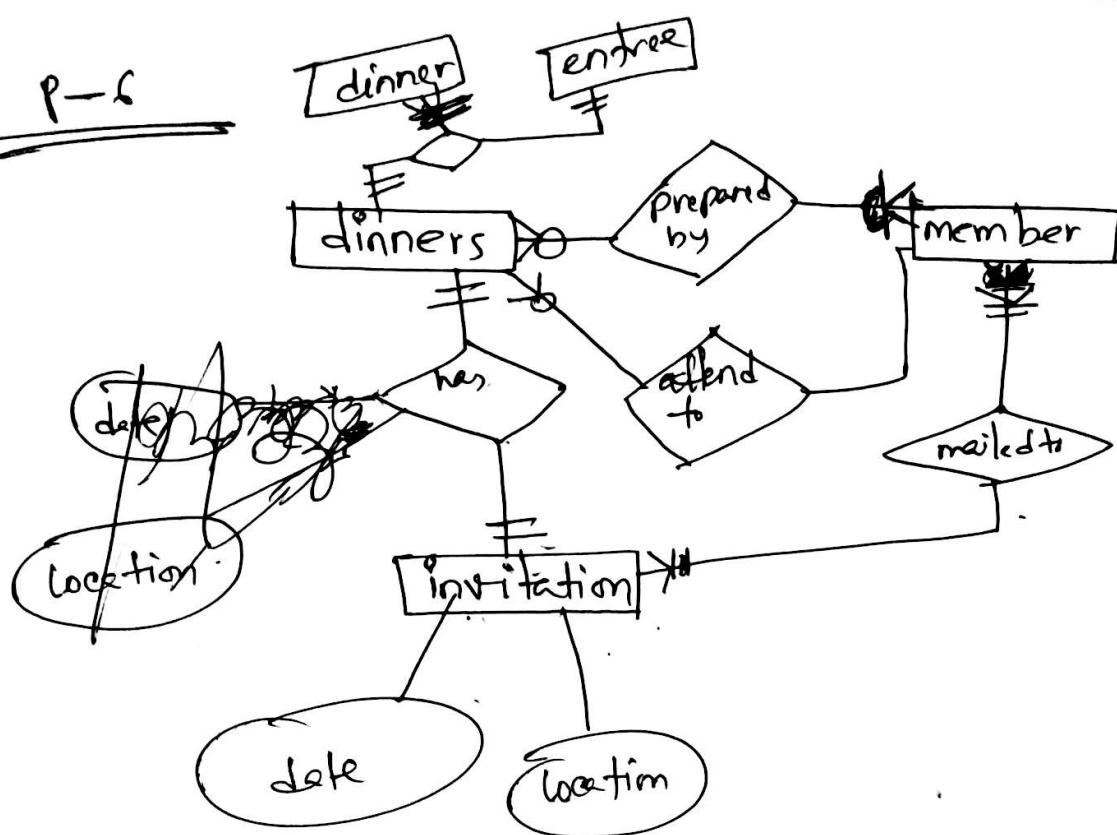
item assigned to a room
and assigned to a building

P2

P2



P-6



desert

entree

database in our 3 entity 2027

President = user

2027 0722 share acco

acc entry

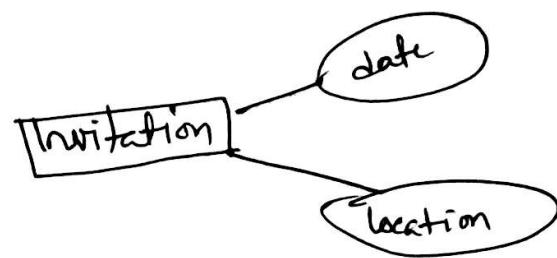
share acco acc

or 2nd
attribute
20

P-6

Member

Dinner



desent

Ques. Mark Distribution

Duplicate row
Distinct

$$M \times Q \Rightarrow 15 \times 1 = 15$$

$$T/F \Rightarrow 10 \times 1.5 = 15 \quad \boxed{\text{True false}}$$

$$\text{operator finding} \Rightarrow 5 \times 12 = 10$$

$$\text{Query} \Rightarrow 25$$

short question S/Q $\Rightarrow \frac{3 \text{ out of } 5}{3 \times 5} = 15 \Rightarrow \boxed{\text{on diagram}}$

$$\text{ERD} \Rightarrow \frac{2 \text{ out of } 3}{10 \times 2} = \frac{20}{100}$$

DDL, DML

teen tag patient

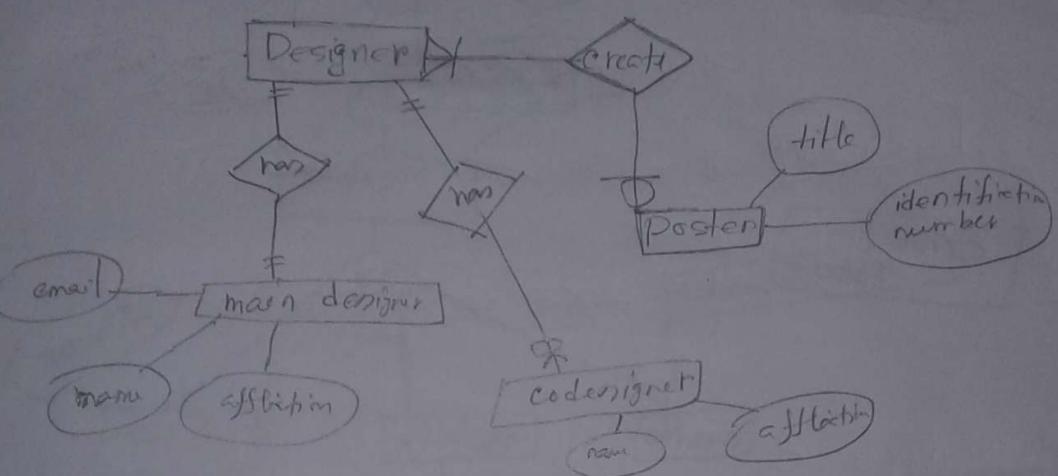
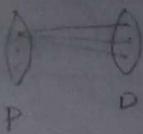
chapter 1 \rightarrow bei theke.
reading

CL9
3 - 4.50
421

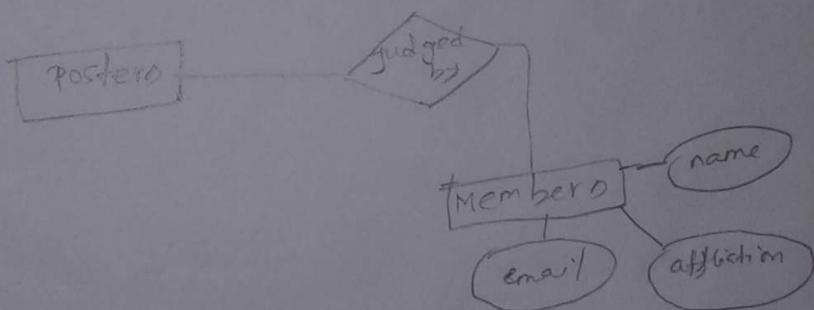
218.00 2N

submining phase

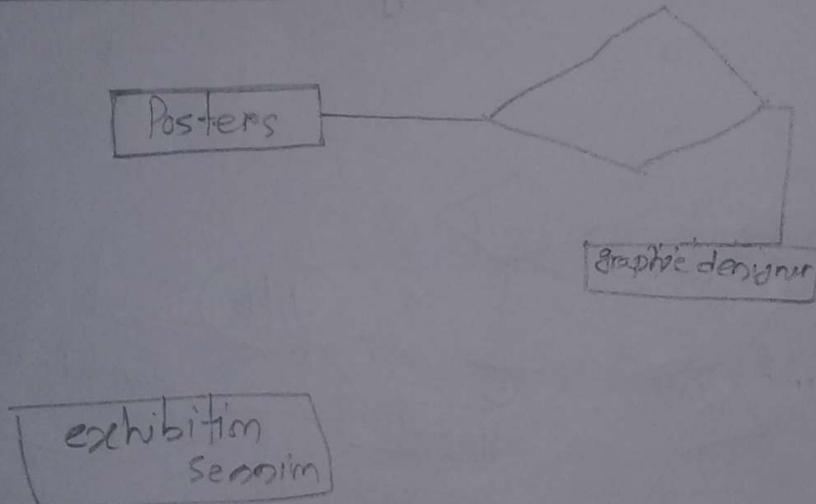
Database "09-11-16"
Theory

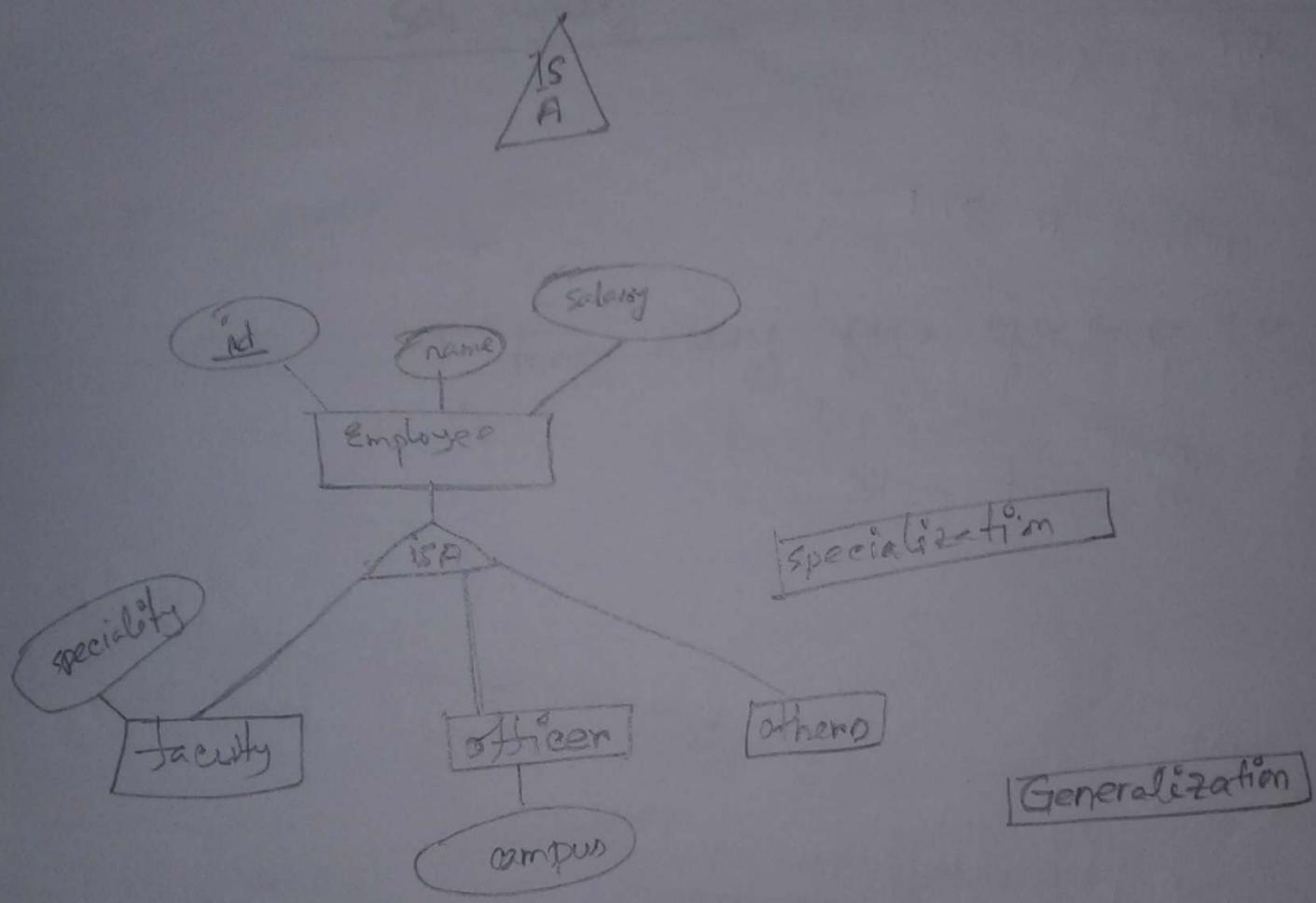


Selecting phase



Presentation Phase:





Sub Query

Database Lab

19/11/16

inner query in a query 20

for
Admit 1

nothing in 1NF

dependency
 $\pi_{X^03} (MUV)$

\downarrow				\downarrow			
p_id	name	age		\xrightarrow{cid}	floor	ad date	redate
\uparrow				\uparrow			

2NF

p_id	name	age

relation \rightarrow attribute π_{X^03}
3rd table π_{X^03}

cid	floor

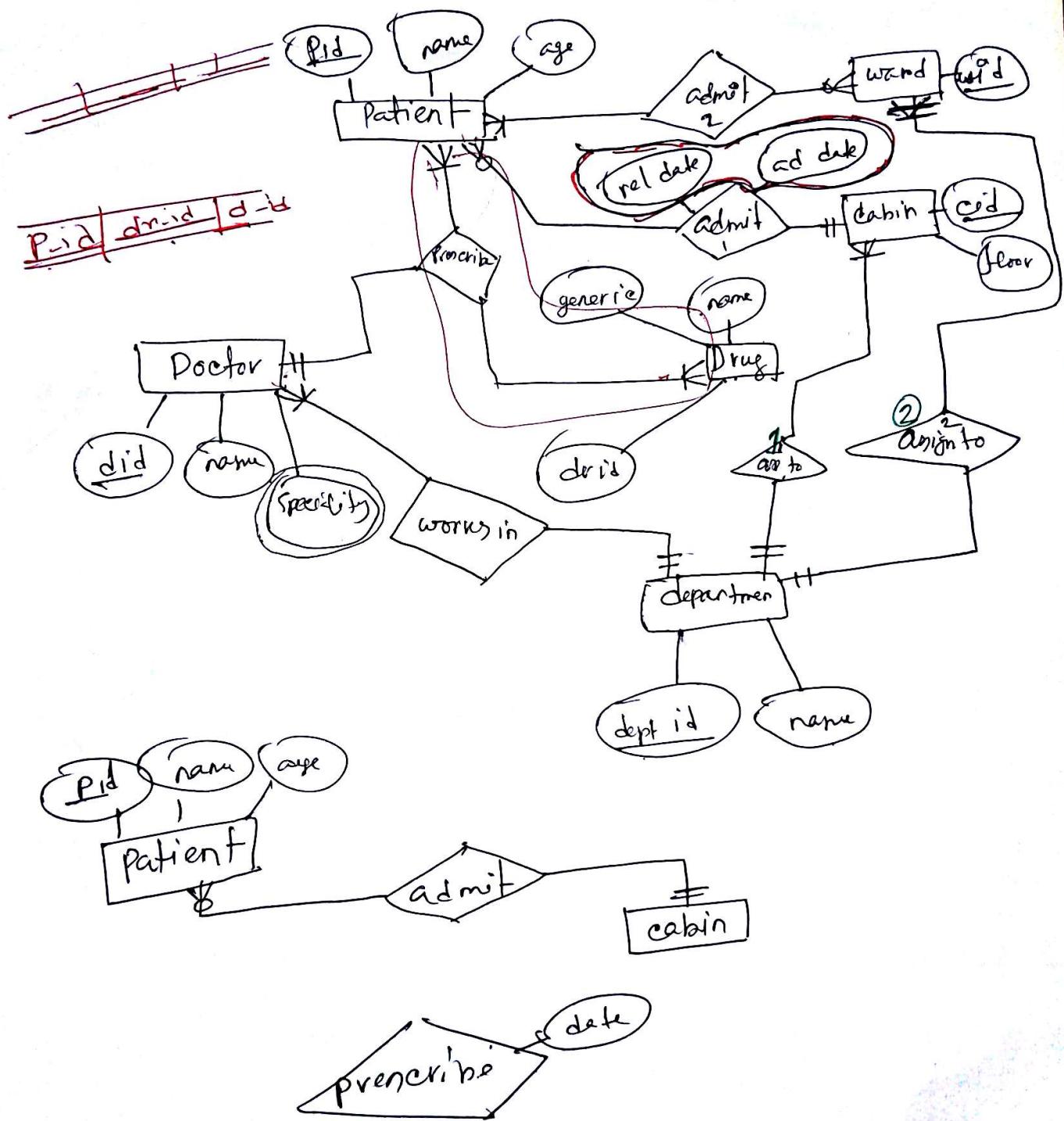
p_id	cid	ad date	re date

Principle

~~p_id name age~~

p_id name age generic name did

did name specificity



Normalization ^

admit 1

P-id	name	age	<u>c-id</u>	floor
------	------	-----	-------------	-------

admit 2

P-id	name	age	<u>w-id</u>	...
------	------	-----	-------------	-----

3 anomalies

1. Insert anomaly
2. update ^
3. delete ^

steps of normalization

✓	1 NF
✓	2 NF
✓	3 NF

introduction to Data base

BCNF (Boyden-code)

4NF

5NF

functional dependency

a column depends on another column.

student column p-key ↪ qro dependent are

independent column



P-id, Cid

dependent column

name, age, floor.

95/10
Ans 75
225

Partial Dependency

if table has
one column
as primary key
then no partial dependency

$$\begin{array}{l} p\text{-id} \rightarrow \text{name, age} \\ c\text{-id} \rightarrow \text{floor} \end{array}$$

work from 25

work in

d-id	name	speciality	dept-id	name
------	------	------------	---------	------

$$d\text{-id}, \xrightarrow{\text{dept-id}} \text{name, speciality, name}$$

$$d\text{-id} \rightarrow \text{name, speciality}$$

$$\text{dept-id} \rightarrow \text{name}$$

1 NF

1. No multivalued attribute / col^m
2. No duplicate colⁿ name
3. No duplicate row

works in

1 NF

1. No multivalued
2. No duplicate
3. No duplicate row = ?

attribute / col^m

col^m name

row = ?

d-id	d-name	dept id	dept name
1	doe	1	ENT
2		2	ENT
3		3	SKIN
3		3	CANCER



composite p-key

d-id	speciality
1	ENT
2	ENT
2	SKIN
3	ENT
3	CANCER

works in

2 NF

1. Must be in 1NF
2. no partial dependency

Doctor.

d-id	d-name	dept id
1	doe	1

Department

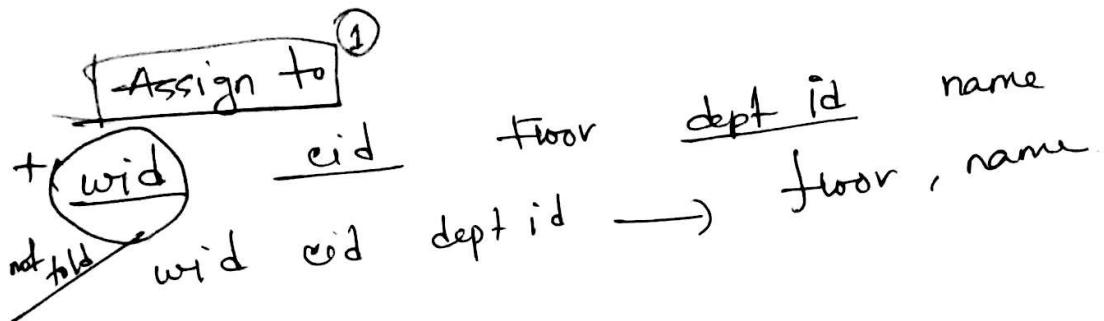
dept id	dept name
1	ENT

doe	spec o
1	ENT

one 20 and 20 a P-key

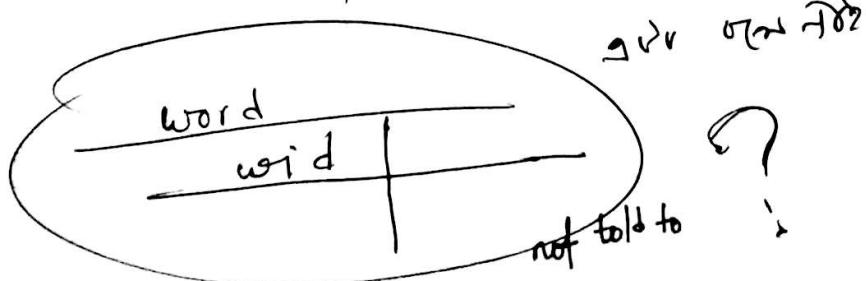
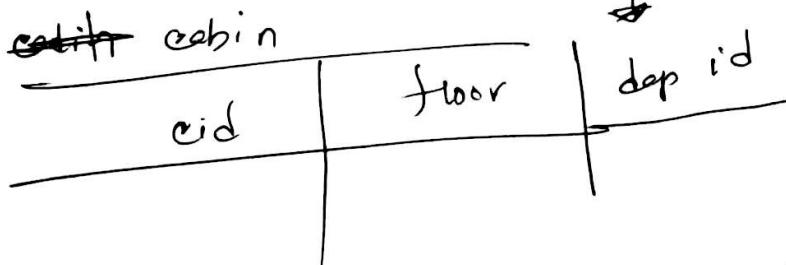
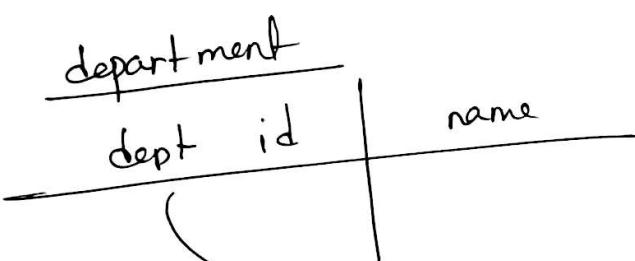
many 20 and 20

Foreign key for 2NF



1NF

- wid →
- cid → floor
- dept-id → name



Admit 2

1 NF

pid	name	age	wid

2 NF

Patient

pid	name	age

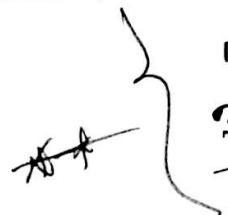
but what what
out or 2073
out or 200?

pid	wid

composite
p-key

word

wid



many to many relation in 3rd table
2073 200
to many to many relation

Principle relationship

"date at event"

many to
many
etc:

2RVR

one to many
OR 2M1

OR

p-id | dr-id | d-id

↓

OR2R dr 1-to-many
etc

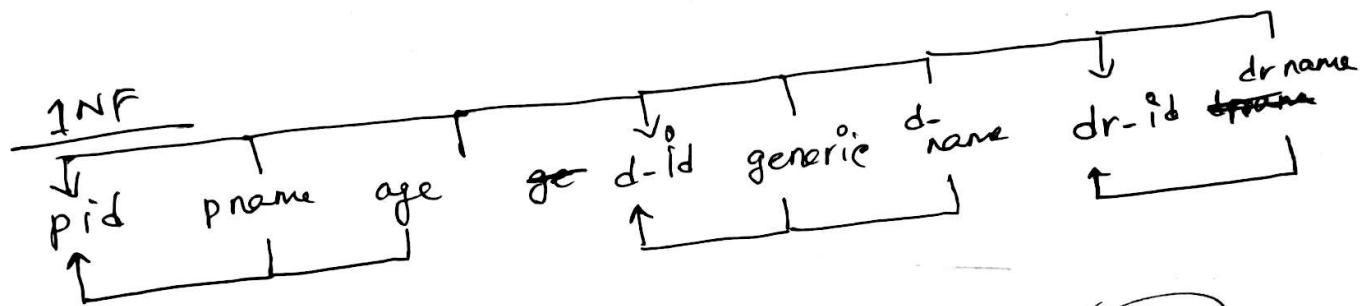
OR d-id
only

OR 2R
composite
221E

but 2R1 d-id
OR many OR relation
was 2R1
3R2 composite
220,

Prescribe

pid name age generic name did name date



Patient

pid | pname | age

Drug

d-id | generic | dr-name

Doctor

dr. id | dr-name | ph-id

~~date~~ date erratic

pid | d-id | dr-id | date

foreign key

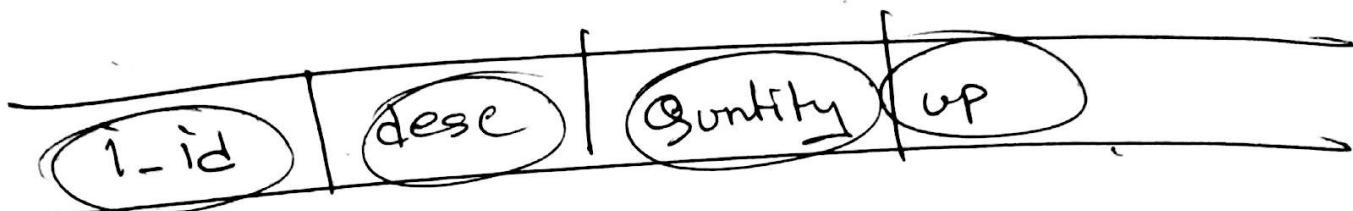
(PK) PK

composite PK?

joining to DB of 20°?

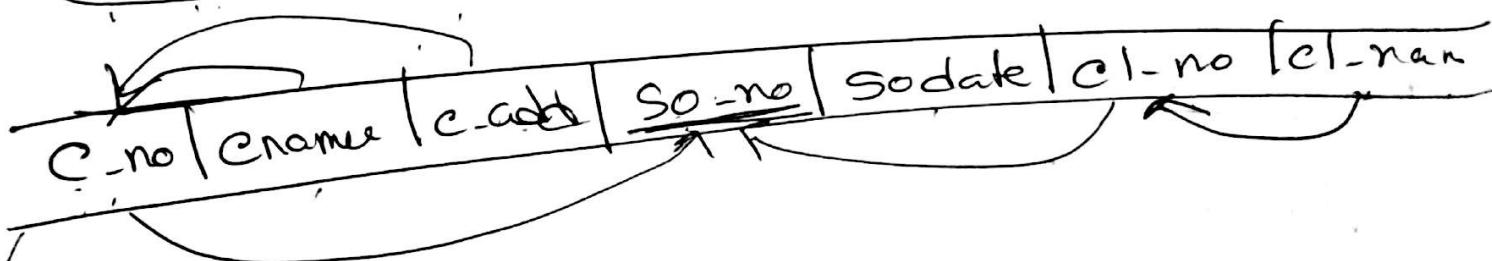
DB & automatic
PK?

C-no	C-name	C-add	<u>so-no</u>	so-date	cl-no	cl-name
------	--------	-------	--------------	---------	-------	---------



1NF

<u>So-no</u>	<u>i-id</u>	desc	[Q]	U-P
--------------	-------------	------	-----	-----



2NF

<u>i-id</u>	desc
-------------	------

<u>So-no</u>	Quantity	UP	<u>i-id</u>	<u>So-date</u>
--------------	----------	----	-------------	----------------

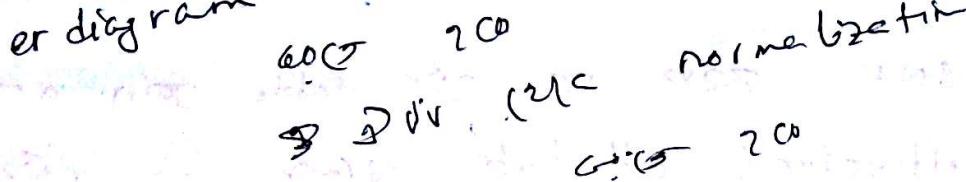
3NF

<u>C-no</u>	C-name	C-add
-------------	--------	-------

<u>cl-no</u>	cl-name
--------------	---------

<u>So-no</u>	so-date	C-no	cl-no
--------------	---------	------	-------

er diagram next wednesday (→ submit)



relationship don't have more than 9 people.

Ans: 3rd \rightarrow 2nd \rightarrow 1st one with pkey, many
relation & attribute \rightarrow 2nd \rightarrow 3rd

2nd \rightarrow one \rightarrow many cardinality

one to one or one to many
Ans: 2nd \rightarrow 3rd table \rightarrow 2nd ?
relationship \rightarrow 3rd table \rightarrow 2nd ?
relation one to many?

2nd Table \rightarrow 2nd \rightarrow Normalize \rightarrow 3rd

relationship \rightarrow 3rd table \rightarrow 2nd \rightarrow 3rd \rightarrow Normalize

2nd table \rightarrow 2nd \rightarrow relationship \rightarrow 3rd table \rightarrow 2nd \rightarrow 3rd

ISA table \rightarrow inherit \rightarrow 3rd

composite primary key \rightarrow syntax ✓

2nd relationship \rightarrow normalize

2nd \rightarrow yes

- # composite p-key of table & foreign key
 2nd ans 1) ~~one~~ (1) 2nd/3rd/n sv
 attribute ~~is~~ p-key ~~as~~ foreign key ~~as~~ 2nd
- # INF 2nd p 2nd table join ac
 multivalued attribute 2nd of 2nd
 table (2nd) for? ~~or~~ just 1st table to
 but sv relationship & multivalued? ~~or~~ dependent 1st table
 2nd 2nd table (2nd) p-key into 1st p-key ~~or~~
~~#~~ ~~or~~ of 2nd (2nd) 1st table ~~or~~?
- # Relationship to attribute & 1st cart
 p-key 2nd or? ~~or~~
- # EF Diagram
 a 2nd 1st 2nd 1st 2nd ? ~~or~~
- # 2nd Table to 2nd p-key or
 2nd 1st one to many relation 2nd or?
 1st 2nd p-key 1st 2nd

Data Manipulation Language DML statement

1. Insert
2. Update
3. Delete
4. Merge
5. Transactions

Data definition language

DDL statement

1. creating new table
 - a. Defining data type
 - b. Defining default value
 - c. Defining constraint
 - d. column level constraint
2. Drop existing table

~~not~~
ternary relation ~~bad~~ bad design
~~can't~~ ~~go~~ ~~to~~ ~~2~~ ~~1~~ ~~or~~ ~~2~~ ~~1~~ ~~2~~
relationship ~~2~~ ~~1~~ ~~table~~ ~~2~~
~~can't~~ connected ~~1~~ ~~2~~ ~~1~~ ~~2~~

Multi row sub query

In
Any
all

P-S (In)

```
select first_name, salary, dept_id
from employees where salary in (select
salary from employees where dept_id
= 20)
```

For

< Any	< All
> Any	> All

Constraint cons_name primary key (col1, col2)
foreign key (col1, col2) ref-
table (col1, col2)

P-9

select first_name, salary from emp where

select salary from employees where

dept_id = 50

> All	> max()
< All	< min()
> Any	> min()
< Any	< max()

CMD →

salary

→ hr → hr

ACDB

make up class
Thursday 2-5
lets @ L11

[campus 5
level 4/3]

COMMIT ;

or diagram

include supplier
commision attribute

122

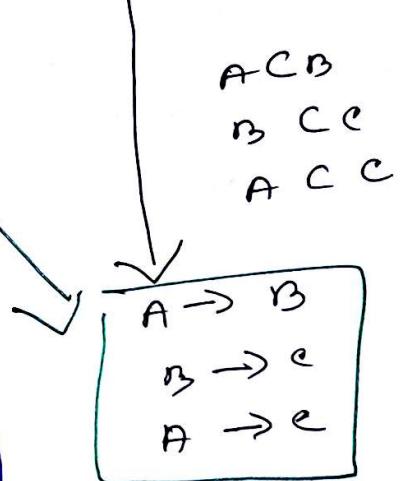
RAYAMEHZABIN

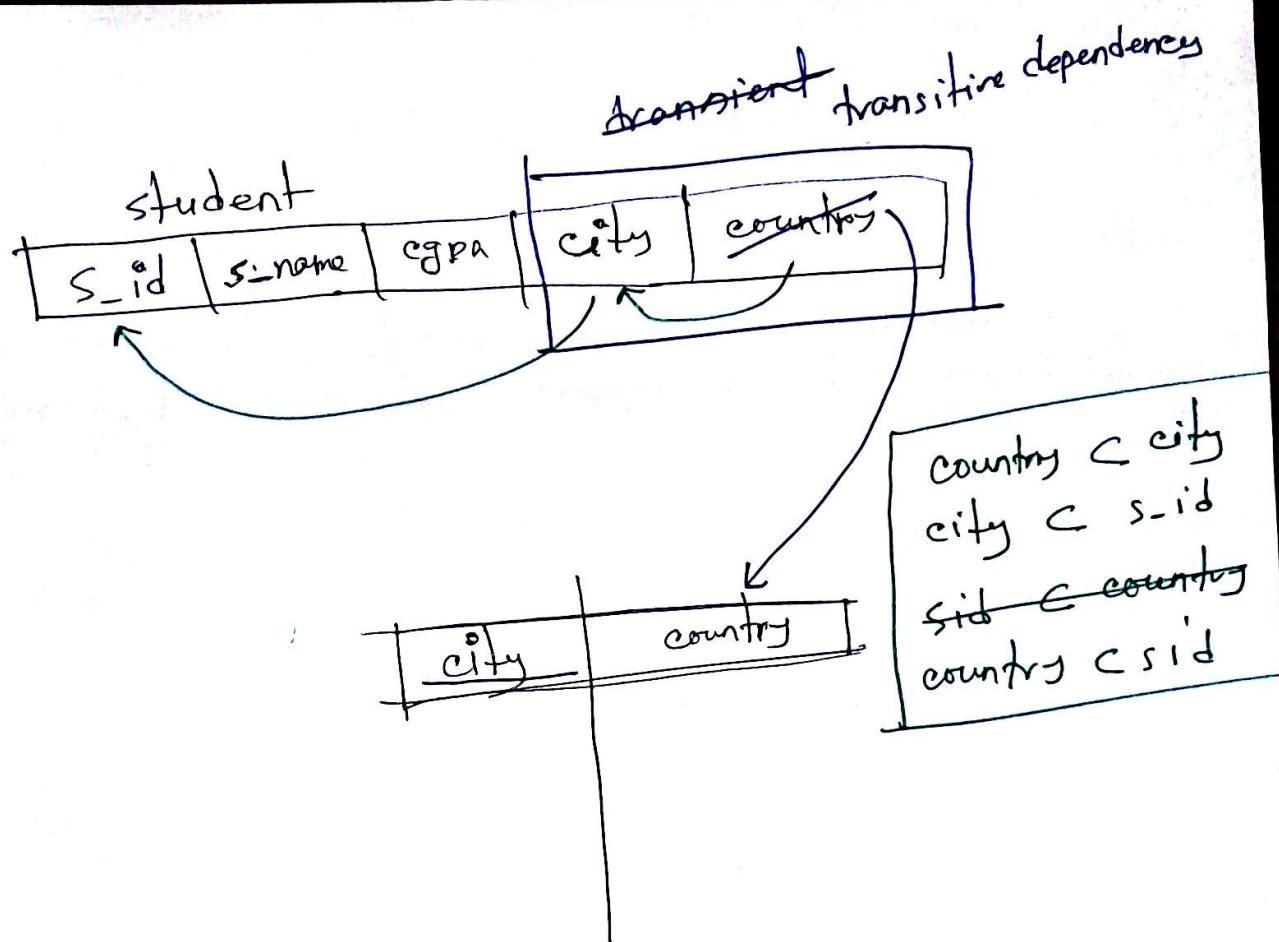
shaguftarahan@gmail.com

3NFNormalization

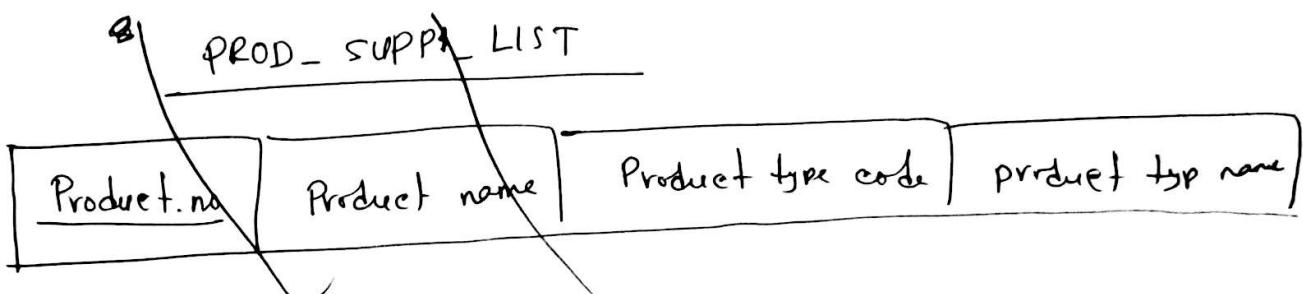
- 1) Must be in 2NF
- 3) No transitive dependency

Table 20 C4F
column 2nf
P-key 2nf
2nf col in 20
2nf dependent
2nf





1



2NF
① Product

Prod-supp-list

Description

Product no	product name	product type code	product typ.name	Supplier no.
------------	--------------	-------------------	------------------	--------------

Supplier table

Supplier no	supplier name	product pr.	description
-------------	---------------	-------------	-------------

3NF

product type code	product typ.name
-------------------	------------------

R 2

2NF

Sales Order No.	Date	Cus_no	Cus_name	Cus_addr	Clerk No
-----------------	------	--------	----------	----------	----------

Clerk Name	Item No	Description	Qty	Unit P
------------	---------	-------------	-----	--------

Sales

| Sales Ord No.

Relational Model

Projection π

↓

show col^m 's of
table All / specific

if no specific col^m
then not needed

Selection σ

↓

specific rows
condition

where clause
assume
select *
as a common

rename {

Syntax

$\sigma_{\text{Condition}}$ (table)

\wedge = and

\vee = or

\neg = not

Syntax

$\pi_{\text{col}^n \text{ name } \dots}$ (table)

$\Pi_{A,c}^n(T)$

$T \quad \boxed{\sigma_{A=B}(r)}$

works as a table

Union "merge"
arity Same number of colⁿ

and compatibility
no. of colⁿ $\boxed{\text{tab}} \cup \boxed{\text{tab}}$ only.
 \downarrow
order of column

$\text{branch}(\text{branch_n}, \text{b_city}, \text{assets})$

$\text{cust}(\text{c-na}, \text{cu-str}, \text{cus-ci})$

$\text{acc}(\text{acc-n}, \text{br-n}, \text{bal})$

$\text{loan}(\text{l-no}, \text{br-na}, \text{ammou})$

$\text{deposit}(\text{cus-name}, \text{acc-no.})$

$\text{borrow}(\text{cus-name}, \text{loan})$

{ set intersection, ~~union~~, set diff or ~~exists~~ arrt^s and compatibility
same ref 2C0

~~exists~~ $\Gamma_{\text{amount} > 1200}$ (loan)

$\Pi_{\text{loan no.}} (\Gamma_{\text{amount} > 1200})$ (loan)

~~exists~~ $\Gamma_{\text{c-name}}$ (depositor) -

$\Pi_{\text{c-name}} (\text{borrower})$

Find
Name of cust has Acc/loan or want Acc

$\Pi_{\text{cust_name}} (\text{depositor}) \cup \Pi$

Set difference

gator	coln	coza	enq	zabt
colm	fedor	zor		

Reshma

Joining

equal join \Rightarrow

not equal join

outer join

• self join

Select * from tab name, tab name ,

Cartesian product

m row r row
output $m \times n$ row

joining condition

where ^{ent.} dept no = dept. deptno. equi join

~~table alias~~

table name alias

multiple table joining "ACB C e"

A and B ~ common
 $\exists^1 \forall^1$ ent.

B and C ~ common
 $\exists^1 \forall^1$ ent.

Non Equijoing

where

between

outer join

right outer join



where $\text{tbl1-column}(t) = \text{tbl2.col}$

"full outer join"

Self join

row is called
tuple

full outer join

select column1, column2... from table1
full outer join table2 on conditions

Multiple joins

select colⁿ₁, colⁿ₂... from table 1

join table 2

on condition

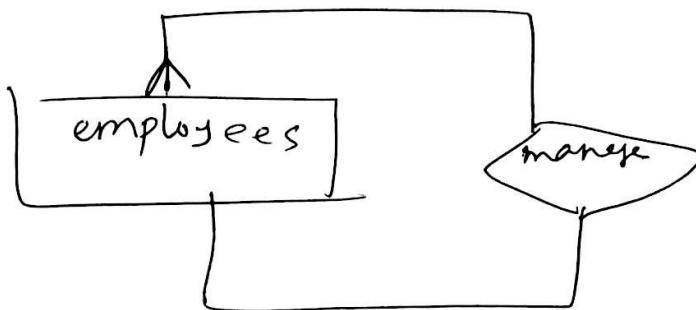
join table 3

on condition.

Lab

5/12/16

* 2025208 ^{in table} (n)
contion (n - 1)



emp

e₁

e-no.	ename	mgr-id

mgr.

e₂

emp_no.	ename	mgr-id

e₂.last-name .

e₁.last-name ,

e₁.mgr-id = e₂.~~mgr-id~~ emp-id

e₁

e_id	e_name	dept. no.

e₁. last name = 'king'

and e₁.dep_id = e₂.dept_id

e₂

eid	ename	dept-id

current month employees info

"acdb joining"

~~1NF~~
served by

cname	cid	addr	city	memsince	sname	sd	comm pc
-------	-----	------	------	----------	-------	----	------------

① customer

cid	address
-----	---------

2NF

cid → cname, city, memsince

sid → sname, ~~sd~~ commission pc

✓ customer ②

cid	sid	city	memsince
-----	-----	------	----------

✓ Sales Man ③

sid	sname	commission pc
-----	-------	---------------

Places 1NF

cid	cname	city	memsince	order no.	Date
-----	-------	------	----------	-----------	------

2NF

cid → cname, city, memsince

order no → date

✓ places ④

cid	order No.
-----	-----------

✓ order

order no	date
----------	------

1NF
contains

Product table 20 570 2(6) multivalued
270?

pid	su price	cost u price	Description	Quantity	Order No	Date
-----	----------	--------------	-------------	----------	----------	------

2NF

pid → su price, cost u price, quantity, Description

order no. → date

1	1	10
3	1	15
4	2	30
3	2	10

✓ contains ⑤

pid	order no	Quantity
-----	----------	----------

✓ Product ⑥

pid	scint	price	cost unit	price	Quantity	Description
-----	-------	-------	-----------	-------	----------	-------------

Issued from 1NF

order no.	date	bid	bname
-----------	------	-----	-------

2NF

order no. → date

bid

bid → bname

✓ order table updated ⑦

order no.	date	bid
-----------	------	-----

⑧ branch [bid] [bname]

Stocked in

"dia"

bid	bname	pid	Qnty	SUP	CUP	Desc
-----	-------	-----	------	-----	-----	------

INF

bid, pid → bname, Qnty, SUP, CUP, Desc.

2NF

bid → bname

pid → Qnty, sup, cup, desc

✓ branch

b name	bid
--------	-----

✓ stocked in (9)

pid	bid	Quantity
-----	-----	----------

X Purchases (10)

Pid	Bid	Date
-----	-----	------

Supplies

INF sid, pid → sname,

✓ supplies (10)

sid	pid	Date	Quantity
-----	-----	------	----------

Supplier (11)

sid	sname
-----	-------

7/12/16

Curtinian Product

$\nabla \text{customer name}$

$(l.ln = b.l.n)$ (loan x borrower)
 $\wedge l.\text{branch.name} = 'Perin..'$)

Set intersection

Natural Join

- ✓ or same name, common column.
- ✓ same data type, common column.
- ✓ same size

* MGR joining condition $l.\text{loan-no} = b.\text{loan-no}$

select * from loan, borrower b where $l.\text{loan-no} = b.\text{loan-no}$

natural join
select * from loan natural join borrower;

auto check no join so output 1%
common column & check 40%

join condition 25%,
output same.

Manual join

$\sigma_{loan.loan_no = borrower.loan_no}$

(loan \times borrower)

Natural join

loan \bowtie borrower

to, after selection
project
use avar no.

Division merge

~~π_{b.cust_name, b.amount}~~

(loan \bowtie borrower)

$\pi_{customer.name}$

($\sigma_{acc.branch_name = 'uptown'}$)

(account \bowtie depositors)

U

$\sigma_{acc.branch_name = 'Downtown'}$

(account \bowtie depositors)

or $\delta_{M23 \text{ and } M24}$

Generalized Projection

Select amount from loan

$\pi_{\text{amount}}(\text{loan})$

Select amount * 12 from loan.

$\pi_{\text{amount} * 12}(\text{loan})$

* 2nd arithmetic operation 270

Aggregated function

sum, avg, min, max, count

$\vartheta_{\text{func}(\text{col}) \dots}(\text{table})$

$\vartheta_{\max(\text{amount})}(\text{loan})$

$\vartheta_{\text{avg}(\text{balance})}(\text{account})$

$\vartheta_{\text{avg}(\text{balance}), \text{sum}(\text{balance})}(\text{acc})$

Group by

branch-name ↗ arg(balance), sum(balance) (acc)

$G_1, G_2, G_3 \quad \nabla F(A_1), F_2(A_2 \dots F_n(A_n)) (E)$

Select arg(balance), sum(balance) from
~~account~~ group by branch-name

outer join

left outer join

right u n

full u n

natural join

loan x borrower

NULL value

and → {
 priority ④ NULL value use ~~not~~
 ① False False
 ② NULL NULL
 ③ True NULL

or →

① True True
 ② NULL NULL
 ③ False NULL

not → opposite \Rightarrow

but $\text{not unknown} = \text{unknown}$.

- 1) Foreign key at p-key REFERENCES of $\text{S0}(5)$ mo?
- 2) value insert A00 M00 → ?
- 3) V0 or table S0 $\text{C1}(5)$ one cardinality S0 table
 S0 p-key at 3rd table \rightarrow Foreign
key REFERENCES enst?
- 4) after product S0 delete S0 or $\text{C1}(5)$ at 3rd
table S0 automatic change S0 ?
Foreign key p-key S0 .

27/12

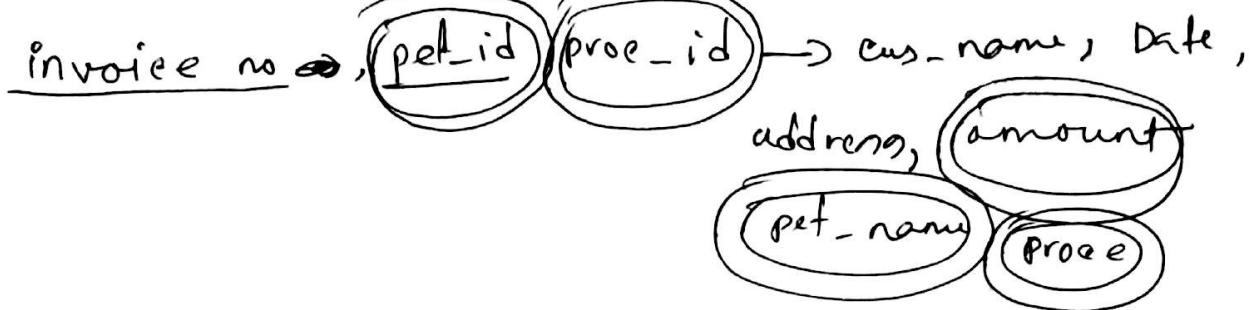
~~1200~~ 1168

lab quiz
project

viva.

relational algebra

1NF



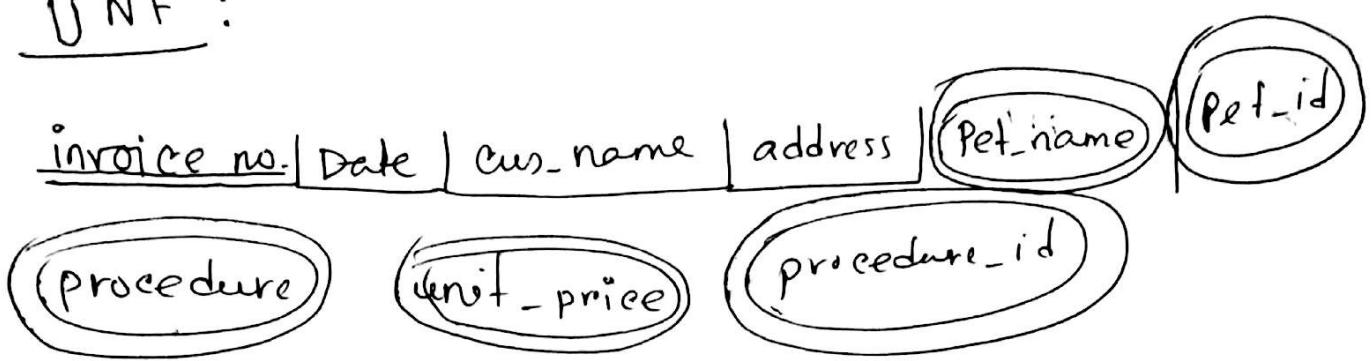
pet_id

<u>invoice_no</u>	<u>proc_id</u>	<u>pet_id</u>	<u>pet_name</u>	<u>proc</u>	<u>amount</u>
✓ invoice no	cus_name	Date	address		

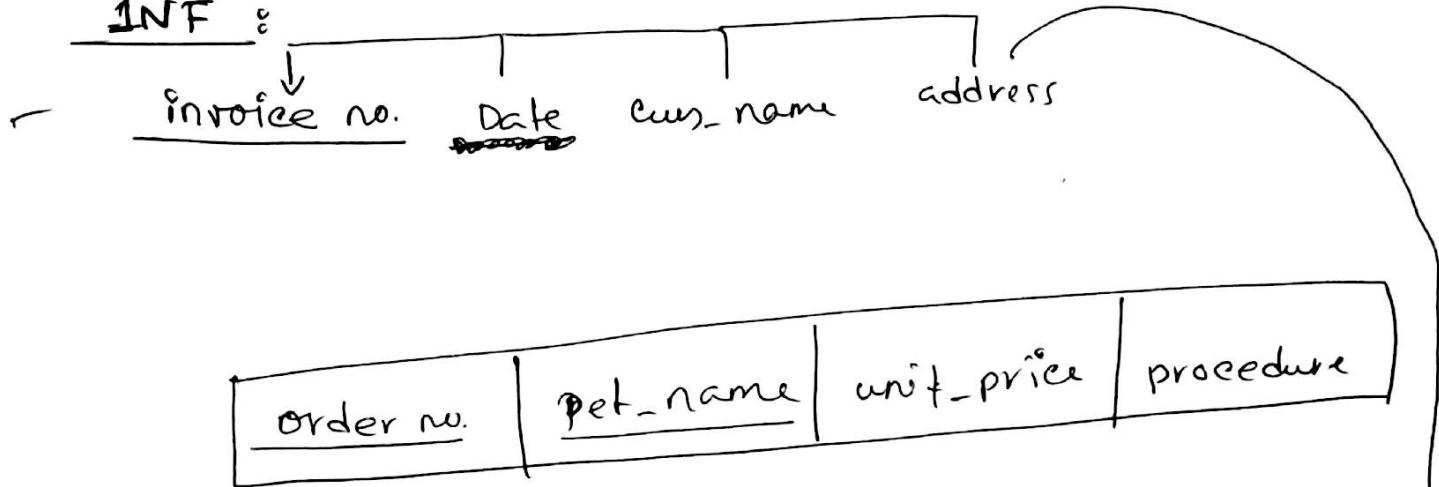
2NF

~~pet~~ pet_id | pet_name | amount

UNF :



1NF :



2NF :

order no.	pet_name	procedure
-----------	----------	-----------

pet_name	unit price
----------	------------

3NF

cus_name	address
----------	---------

✓
invoice#, cust-name, cust-add, inv-date, pet-name,
proc-name, amount

INF
✓
invoice#, pet-name, proc-name amount X
name pkey 2707V

✓ invoice#, pet-id, pet-name, proc-id proc-name, amount
✓ invoice#, pet-id, proc-id, pet-name, proc-name, amount
✓ invoice#, cust-name, cust-add, inv-date

Bangladesh

2NF
pet-id , pet name
proc-id , pro-name
✓ invoice#, pet-id , proc-id , amount

3NF
part of INF
✓ invoice#, cust-id , cust-name, cust-add, inv-date

3NF
✓ cust-id , cust-name , cust-add
✓ invoice#, cust-id , inv-date

Show employee, name, department name who
works in Seattle

subquery and joining

a view

select

joining.

multiple table (via value)

show avg()

query save as view

create or replace view \diamond view-name as
(subquery)

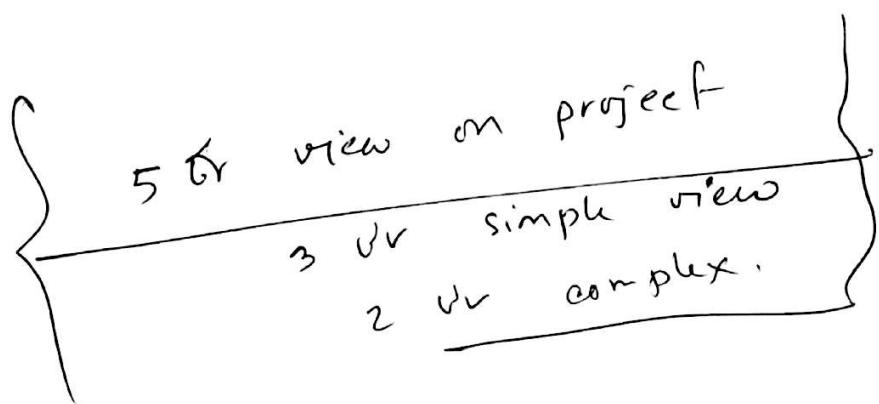
many to many 3 or table join
for ex 1 view as join w/
two or more

simple
where

complex
to group function,
subquery /
join

dml → complex view or user's blk

simple view → dml possible ~~and can't~~ ²⁸⁽⁵⁾

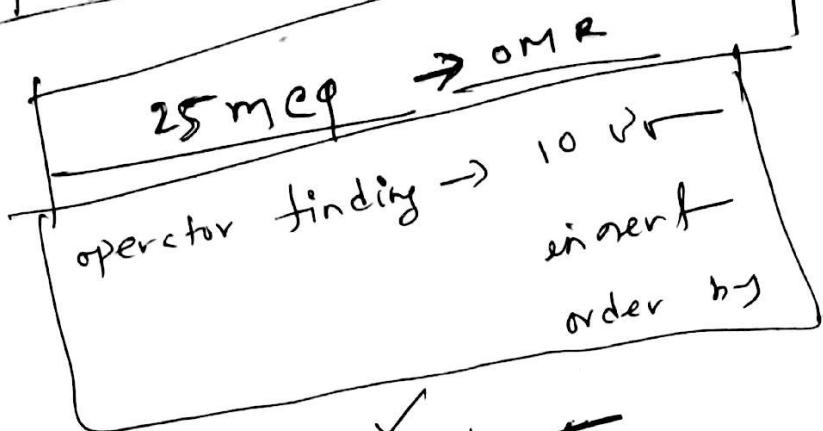


✓ bill generate $\text{avg } 210$
2nd

✓ date interval 10^{th} to 20^{th}
cart product
no 2nd null int

✓ 2nd employee average sell avg
cart product cart count

question pattern



(mid + final) → 591 → ✓ 20 / 25

relation alg → 20 (no theory)

normalization → 20 15

↳ theory - 5