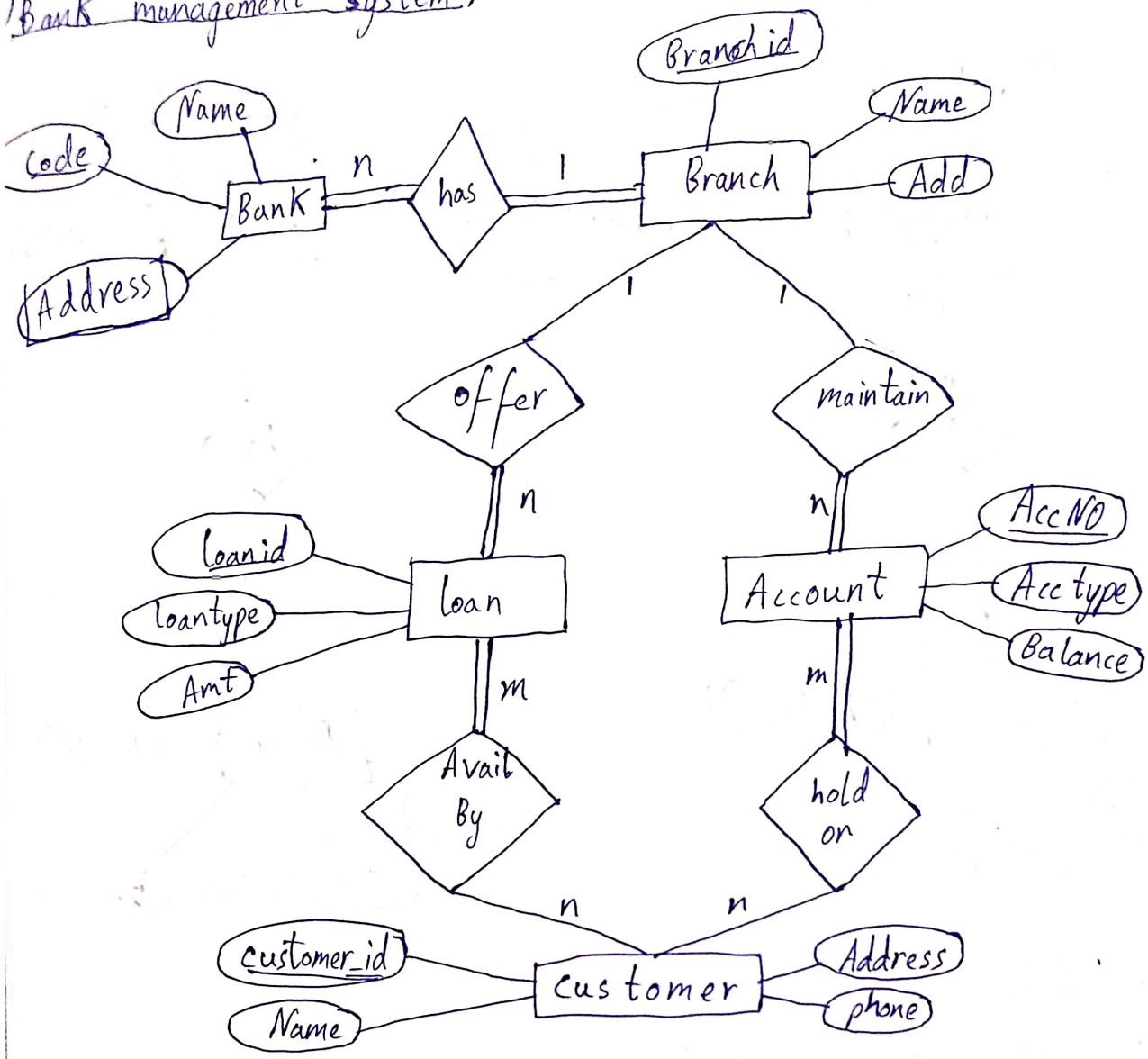
ER Diagrams

1) Bank management system :-



Explanation :-

This system stores bank details, branches, customers, accounts & loans. It shows how customers interact with their bank accounts and loans through their respective branches. It has relationships like Avail by and Hold on that helps the customer interact with the loan and account details and also has other relationships like offer, maintain and has for bank to interact with the respective data.

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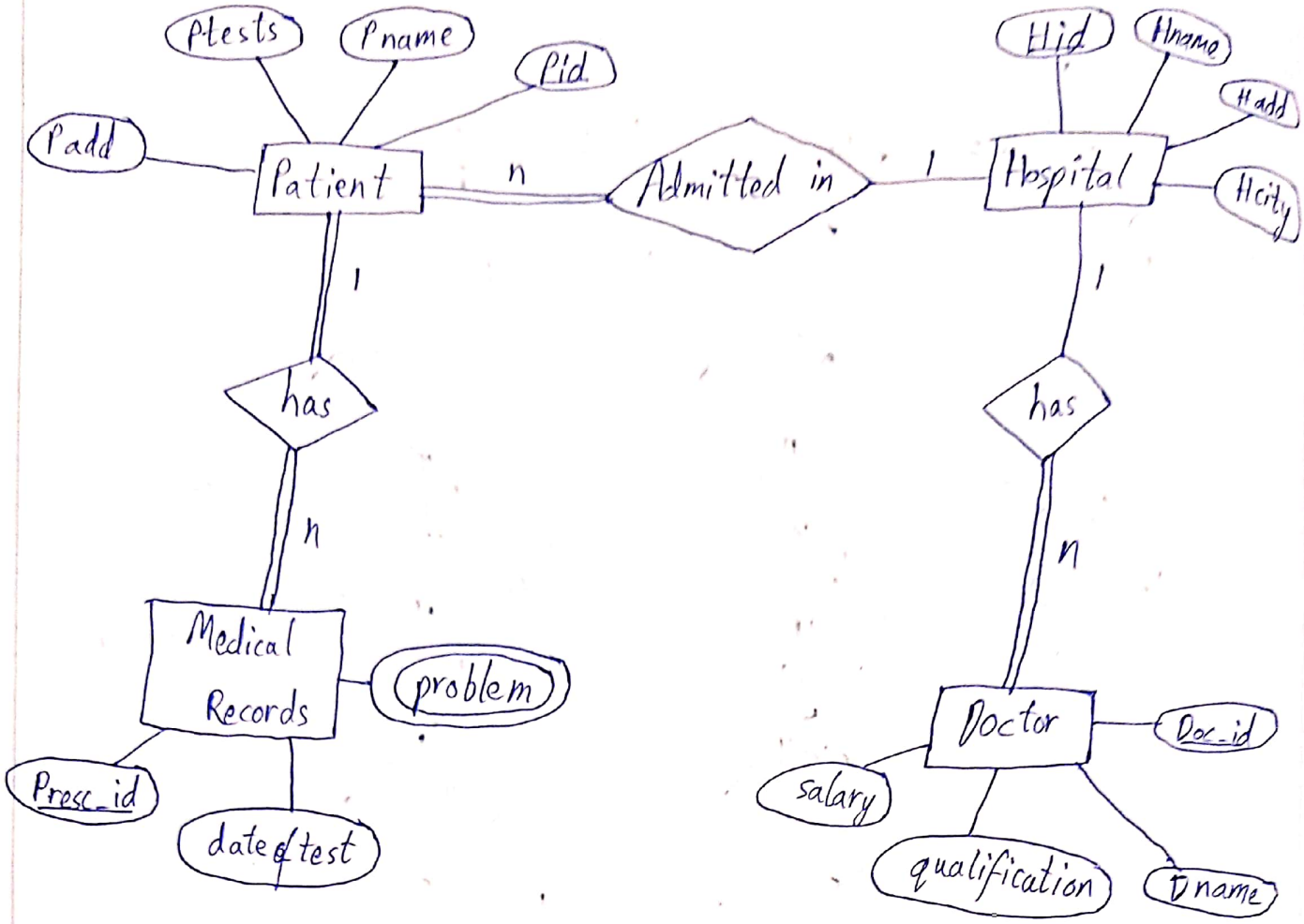
2) Hospital Management System :-



Explanation :-

This system stores patient details, doctors and medical records of the patients. It shows how patients are admitted and treated in hospitals. It has ~~three~~ four entities Patient, Hospital, Medical Records and Doctor. The system also has three relationships has, between Patient and medical records, has between Doctor and Hospital, Admitted in between patient and Hospital. The medical records has a multivalued attribute 'problem' as a patient might be diagnosed with multiple issues.

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Relational Algebra

1) Selection (σ) :-

It is used to select rows that satisfy a condition.

Ex:-

```
SELECT * FROM student WHERE age > 20;
```

$\sigma_{age>20}(Student)$

2) Projection (π) :-

It is used to select specific columns of a table.

Ex:-

```
SELECT name, age FROM student;
```

$\pi_{name,age}(student)$;

3) Union ($\cup$) :-

It is used to combine rows from two tables excluding duplicates.

Ex:-

```
SELECT * FROM student
UNION
SELECT * FROM Courses;
```

Student $\cup$ Courses

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4) Intersection (∩) :-

It is used to return common rows in both tables.

Ex :-

```
SELECT * FROM Student
INTERSECT
SELECT * FROM Courses;
```

Student ∩ Courses.

5) Difference :-

It is used to return rows in first table but not second.

Ex :-

```
SELECT * FROM student;
EXCEPT
SELECT * FROM Courses;
```

Student − Courses.

6) Cartesian Product (x) :-

It is used to combine all rows of two tables.

Ex :-

```
SELECT * FROM Student, Courses;
```

Student X Courses.

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10) Rename :- (ρ)

It is used to change the table name and attribute names.

Ex:-

$$\rho_{staff(staffID, staffName, salary)}(Employee)$$

- Table name only,

Ex:-

$$\rho_{staff}(Employee)$$

- Attribute names only,

Ex:-

$$\rho_{(sid, sName, salary)}(Employee)$$

11) Division (/) :-

It finds values related to all values in another table.

Ex:-

$$\rho(Temp\ sids, (\pi_{sid, bid} \cdot Reserves)) / (\pi_{bid} Boats)$$

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7) Join ($\bowtie$) :-

It is used to combine related rows from two tables.

Ex:- SELECT * FROM Student

Joins

SELECT * FROM Courses;

Student $\bowtie$ Courses.

8) Inner joins :-

i) Theta join $\bowtie_\theta$ — Ex:- Student $\bowtie_{name != 'Gowrish'}$ Marks.

ii) Equi join $\bowtie_=$ — Ex:- Student $\bowtie_{student.rollno = Marks.rollno}$ Marks

iii) Natural join $\bowtie$ — Ex:- Student $\bowtie$ Marks

9) Outer joins :-

i) Left outer join ⟕ — Ex :- Student ⟕ Marks.

ii) Right outer join ⟖ — Ex :- Student ⟖ Marks.

iii) Full outer join ⟗ — Ex:- Student ⟗ Marks.

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