Indian Institute of Technology, Kharagpur

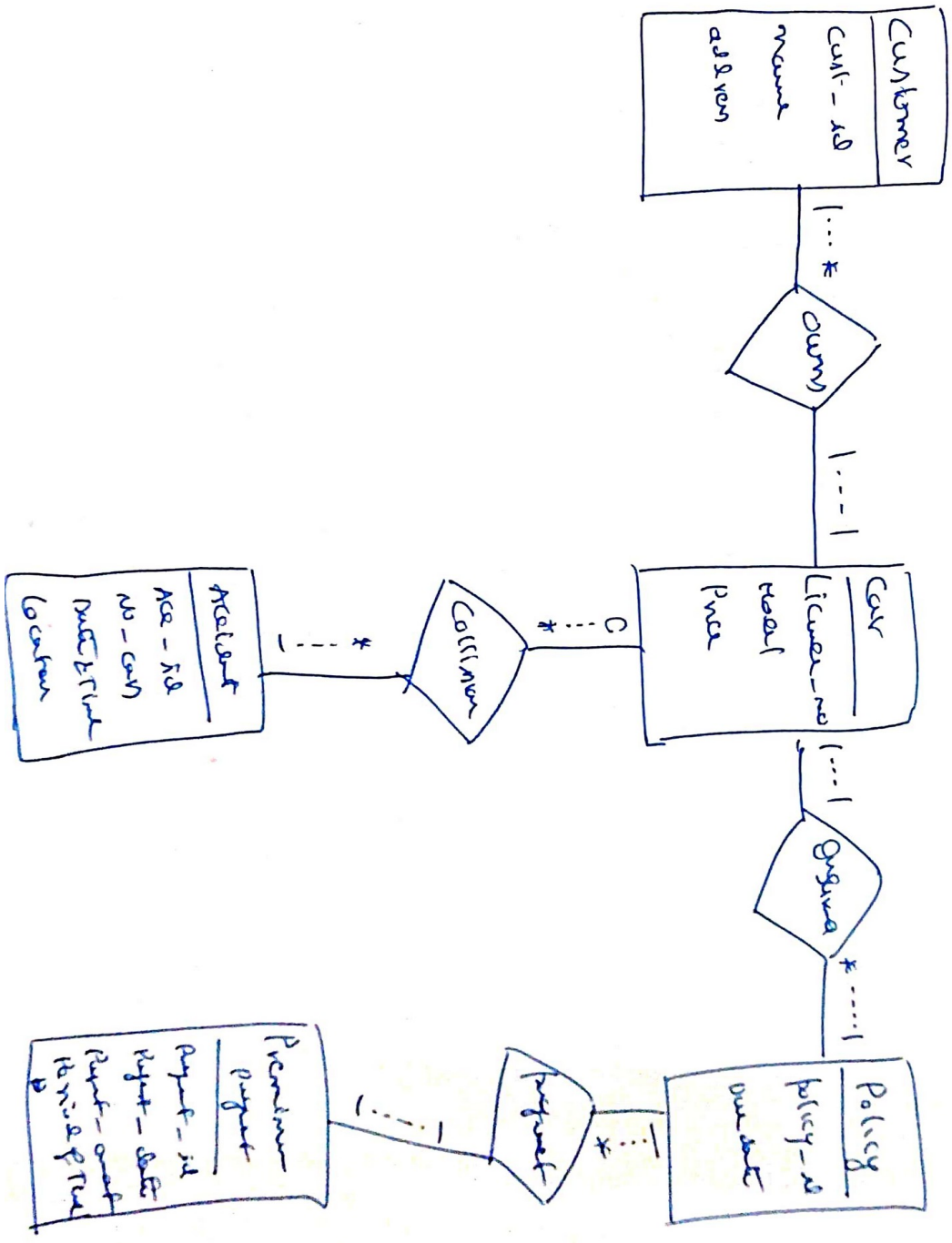
Department of Computer Science and Engineering

CS30202 : Database Management Systems (DBMS)

Class Test - 1 (Solution)

1. Construct an E-R diagram for a car insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents. Each insurance policy covers one or more cars and has one or more premium payments associated with it. Each payment is for a particular period of time, and has an associated due date, and the date when the payment was received. (8 Marks)

Answer



2. Consider the employee database shown below. Give an expression in the relational algebra to express each of the following queries: (4 Marks)

Employee Database
employee (id, name, street, city)
works (id, company name, salary)
company (company name, city)

(i) Find the ID and name of each employee who works for “BigBank”.

Answer

$$\Pi_{ID,person\_name} (employee \bowtie_{employee.ID=works.ID} (\sigma_{company\_name=”BigBank”} (works)))$$

(ii) Find the ID and name of each employee in this database who lives in the same city as the company for which she or he works.

Answer

$$\Pi_{ID,person\_name}(employee \bowtie_{employee.ID=works.ID} works \bowtie_{works.company\_name=company.company\_name \wedge employee.city=company.city} company)$$

3. Consider the library database shown below. Write the following queries in SQL. (8 Marks)

Library Database
member(memb_no, name)
book(isbn, title, authors, publisher)
borrowed(memb_no, isbn, date)

(i) Find the member number and name of each member who has borrowed at least one book published by “McGraw-Hill”.

Answer

```
SELECT
        memb_no, name
FROM
        member AS m
WHERE EXISTS (
```

```
    SELECT *
    FROM
        book
    INNER JOIN
        borrowed
    ON
        book.isbn = borrowed.isbn
    WHERE
        book.publisher = 'McGraw-Hill' AND borrowed.memb_no = m.memb_no
    )
```

(ii) For each publisher, find the member number and name of each member who has borrowed more than five books.

Answer

```
WITH
    member_borrowed_book(memb_no, memb_name,isbn,title,authors,publisher,date)
AS (
    SELECT
        member.memb_no, name, book.isbn, title, authors, publisher, date
    FROM
        member INNER JOIN borrowed ON member.memb_no = borrowed.memb_no
    INNER JOIN
        book
    ON
        borrowed.isbn = book.isbn
)
SELECT
    memb_no, memb_name, publisher, COUNT(isbn)
FROM
    member_borrowed_book
GROUP BY
    memb_no, memb_name, publisher
HAVING COUNT(isbn) > 5;
```