

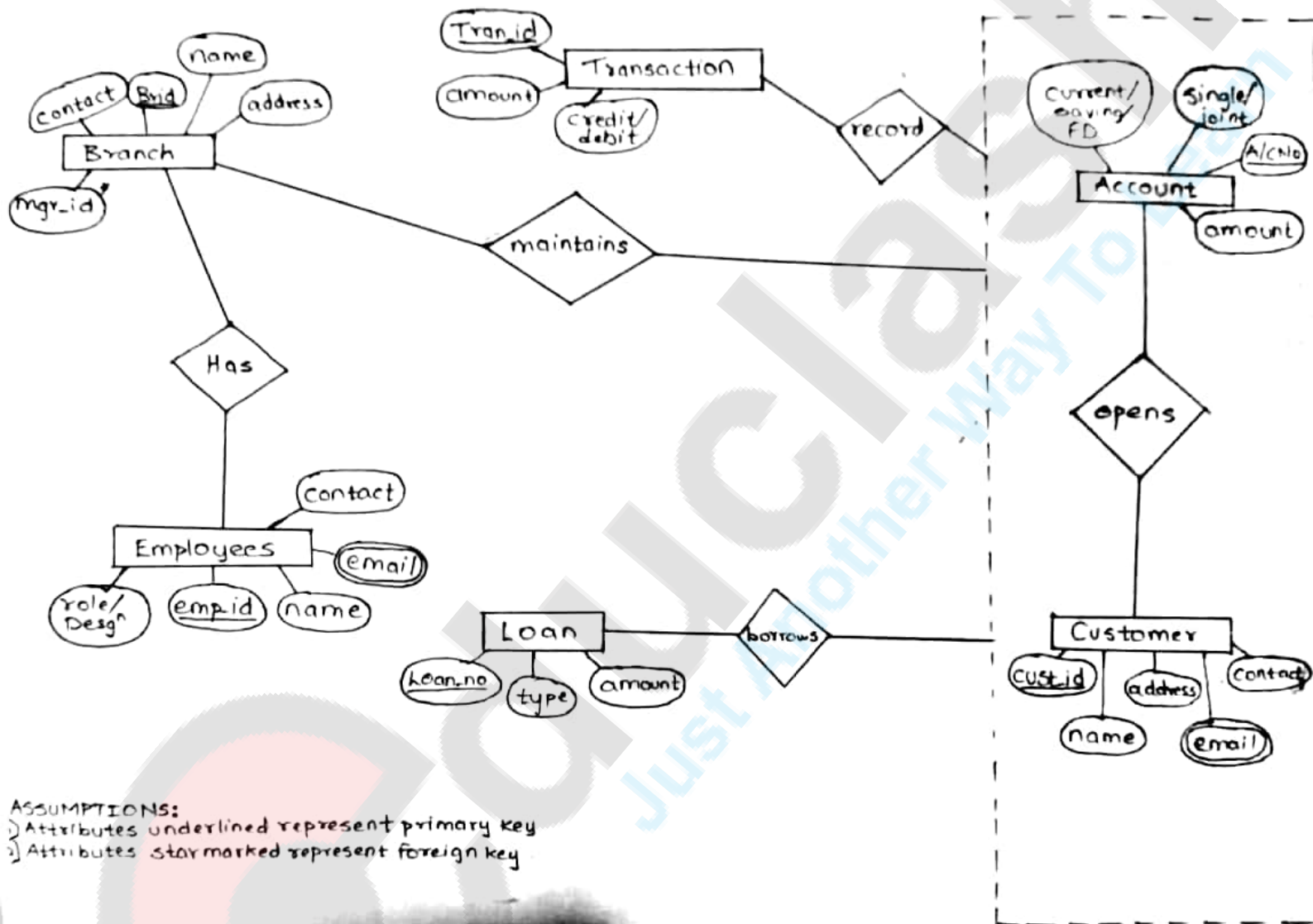
- 2.2 (a) A large bank has several branches at different places.
- i) Each branch is managed by a manager
 - ii) Each branch maintains the account details of the customer.
 - iii) The customer may open the saving current and FD accounts as single and joint operations.
 - iv) The bank also provides the loan for various purposes.
 - v) Bank keeps record of each transaction by the customer to his account.
 - vi) All the branches have employees for different operations.

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Construct an ER diagram for the above system. Document all assumptions that you make for designing.

- (b) Explain the architecture of database system and also explain how it is different from conventional file system.

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TABLES

Branch { br_id, Br.name, Br.add, contact }

Branch.Emp { Br_id, emp_id }

Employees { emp_id, ename, contact, ~~name~~ role }

Emp.Email { emp_id, email_id }

Branch.Cust.A/c { Br_id, A/cNo, Cust_id }

Customer { Cust_id, C.name, C.add, contact }

Cust.Email { Cust_id, Email }

Account { A/cNo, amount, type, operation }

Cust.A/c { Cust_id, A/cNo }

Loan { Loan.no, type, amount }

Loan.Cust { Loan.no, Cust_id, A/cNo }

Transaction { tran_id, amount, cr/dr }

Trans.Cust { tran_id, Cust_id, A/cNo }

NORMALIZATION

1) 1NF

There are no repeating groups and multivalued attributes in tables. Hence they are in 1NF.

2) 2NF

Tables are in 1NF

It has composite keys, but there is no partial dependencies (i.e. All non-key attributes are functionally dependent on the whole primary key). Hence they are in 2NF.

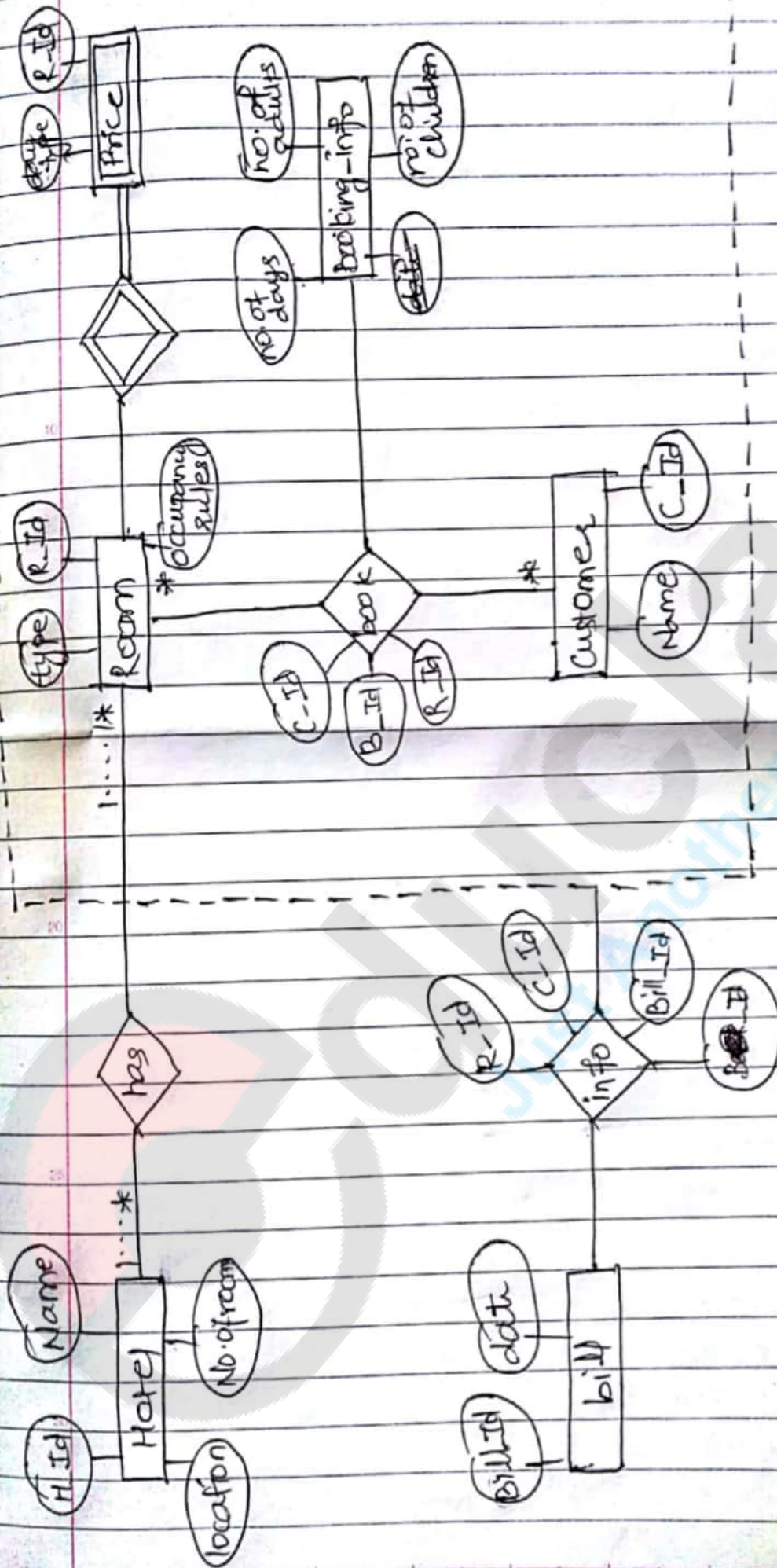
3) 3NF

Tables are in 2NF

There is no transitive dependency i.e. no non-key attribute is dependent on non-key attribute.

- Q.1 a. Consider a hotel management system. This is a number of hotels across the country with following assumptions:-
- i. Each hotel has a possibly different number of rooms.
 - ii. Rooms can be classified in a number of ways (for example, 2 double beds, a suite, one king, etc.)
 - iii. Rooms have a different prices based on the day of the week and time of year. If there is a festival then rooms are generally priced higher, and Thursday, Friday, Saturday night rooms are more expensive.
 - iv. Guests or customers are given a bill for each stay (a stay is one or more nights in a row) and notation is made of the date of payment.
 - v. Customers check into a particular room in a particular hotel on a date, check out is assumed to be the date of the bill.
 - vi. Generally, there is no need to have all the names of people staying in a room, but a count of the number of adults and children is necessary as rooms and each hotel have maximum occupancy rules.

Draw an ER diagram that represents this. Note all of the entities and relationships, cardinality, indicate key attributes on diagram.



Hotel Management System - ER

⇒ Already in 1NF :-

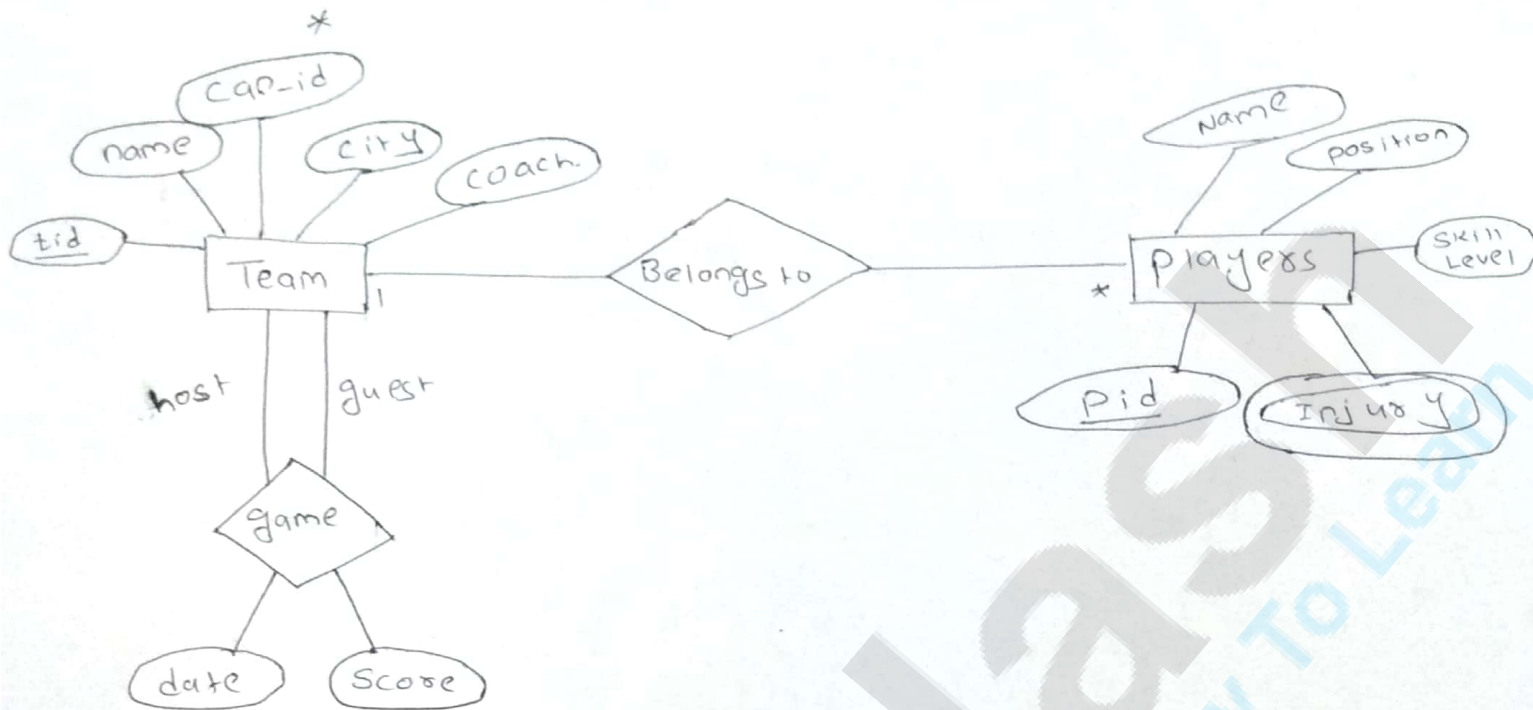
(*) 2NF

- ① Hotel [H-Id, Name, location, No. of rooms]
- ② Room [R-Id, type, occupancy rule]
- ③ Price [day-type, R-Id^{*}]
- ④ book [B-Id, C-Id^{*}, R-Id^{*}]
- ⑤ Customer [C-Id, Name]
- ⑥ Booking-info [No. of days, No. of adults, No. of children]
- ⑦ info [Bidd-Id^{*}, B-Id, C-Id^{*}, R-Id^{*}]
- ⑧ Bill [Bill-Id, date]

(*) 3NF

- (2)
- a) Suppose you are given the following requirements for a simple database for the National Hockey League (NHL):
- i) The NHL has many teams,
 - ii) Each team has a name, a city, a coach, a captain, and a set of players;
 - iii) Each player belongs to only one team.
 - iv) Each player has a name, a position (such as left wing or goalie), a skill level, and a set of injury records,
 - v) A team captain is also a player.
 - vi) A game is played between two teams (referred to as host team and guest team) and has a date (such as May 11th, 2016) and a score (such as 4 to 2).
- Construct a clear and concise ER diagram for the NHL database.

⇒ ER Diagram:-



⇒ Assumptions:-

- 1) tid is assumed to be the primary key of Team
- 2) pid is assumed to be the primary key of players

⇒ Tables:-

team (tid, name, city, coach, car_id)
 players (pid, name, position, skill level)
 Injury (pid, injury)
 belongs (tid, pid)
 game (host, guest, date, score)

⇒ Normalization:-

- 1NF:- All the tables do not have any multivalued attribute, & all are primitive.
- 2NF:- In any table there is no partial dependencies. Hence it is already in 2NF form.
- 3NF:- There is no transitivity.

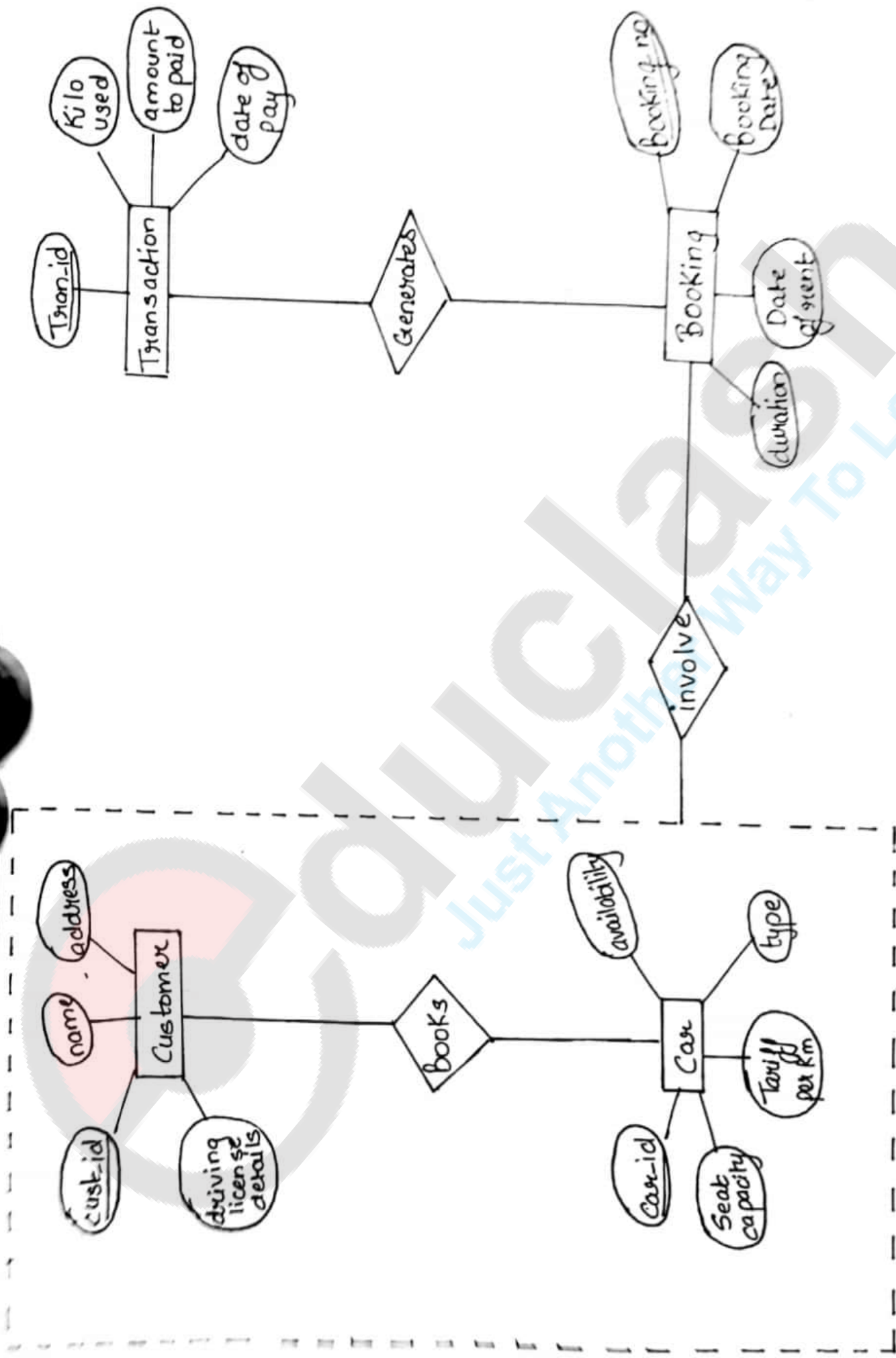
Q1: (a) Draw an E R Diagram for the following,

(4)

"Saboo car rental services" is a car rental showroom, who want to automate their business.

1. They offer different types of cars on rent as small car, SUV, MUV
2. Each types of car has the maximum seating available and the tariff per kilometer.
3. The management wants the system to show availability of the number of cars of each type for serving the inquiry.
4. The system should have a provision for booking the car. Before the booking is made, the customer needs to provide personal information and driving license details.
5. Booking is typically stored as booking date, date of rent, duration in hours and type of vehicle.
6. Once the booking is done a unique booking number is provided to the customer for their reference which they need to produce at the time they come to collect the car.
7. A new transaction record is created for each booking after the car is returned, specifying the kilometers used and the amount to be paid, date of payment.

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⇒ Assumptions :

1. Availability could be found using program through booking details.

⇒ Tables :

customer (customer-id, name, address, driving license details)

transaction (Txan-id, Kilo used, amount to paid, date of pay)

customer-transaction (customer-id, txan-id)

cars (car-id, availability, tollaffie per km, type, seat capacity)

customer-car (car-id, customer-id)

booking (booking-no., booking date, date of rent, duration)

cust-car-booking (customer-id, car-id, booking-id)

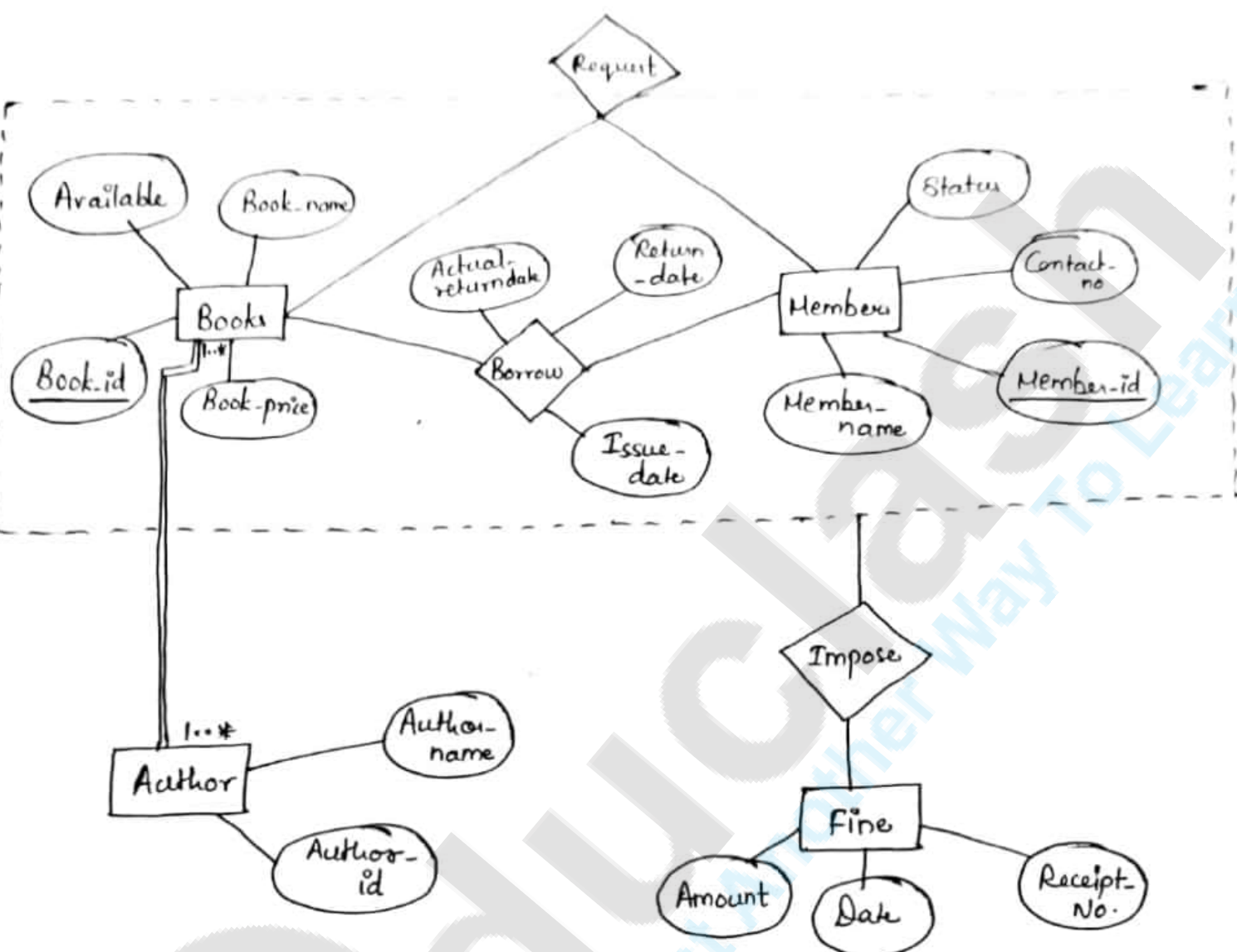
⇒ Normalization :

1NF - All the tables do not have any multivalued attribute & all are primitive.

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Hence it is already in 2NF form.

3NF - There is no transitivity.

- 11 a) A General Hospital consists of a number of specialized wards (such as Maternity, Pediatrics, Oncology, etc). Each ward hosts a number of patients, who were admitted on the recommendation of their own GP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. (10)
- Construct an ER Diagram for the above example. Document all assumptions made about mapping constraints.



Assumptions:-

Primary key is denoted by —

Foreign key is denoted by *

Relations:-

- 1) Books { Book-id, Available, book-name, book-price }
- 2) Members { Member-id, member-name, contact-no, status, book-id* }
- 3) Request { member-id, Book-id }
- 4) Borrow { book-id, member-id, issue-date, return-date, actual-return-date }
- 5) Author { author-id, author-name, book-id* }
- 6) writtenBy { book-id, author-id }
- 7) fine { receipt-no, amount, date; Book-id, member-id }
- 8) Impose { Book-id, member-id, receipt-no }

Normalization:-

1) 1NF:

- a) There are no repeating groups and multivalued attributes in the tables.
Hence, the tables are in 1NF.

2) 2NF:

- a) The tables are in 1NF.
- b) It has composite keys, but there is no partial dependencies (i.e. all non-key attributes are functionally dependent on the whole primary key (composite key)). Hence they are in 2NF.

3) 3NF:

- a) The tables are in 2NF.
- b) There is no transitive dependency i.e. no non-key attribute is dependent on any other non-key attribute. Hence, the tables are in 3NF.