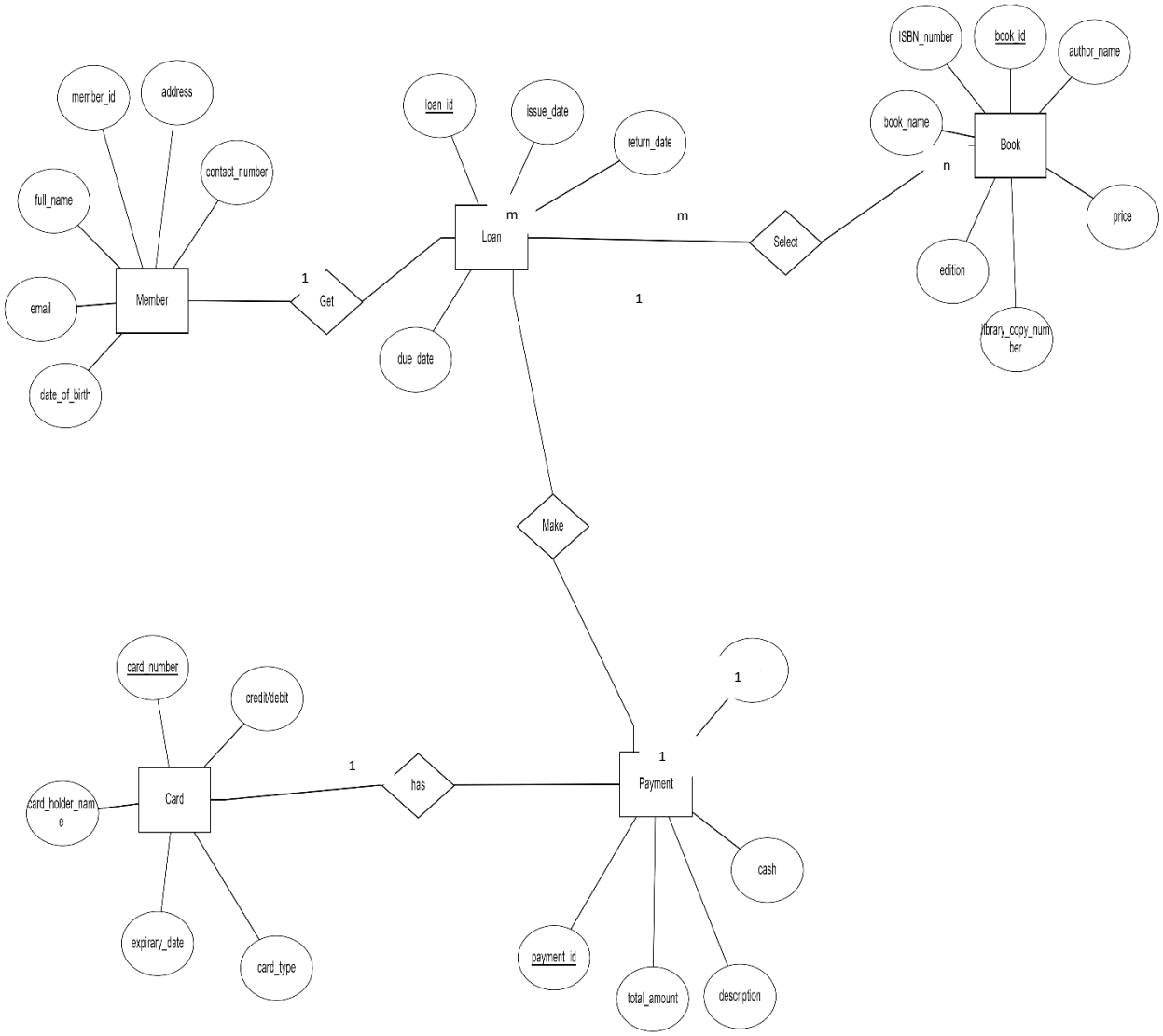
DATABASE DESIGN

QUESTION 01

Draw an Entity Relationship (ER) diagram for the Ceylon City Library case study. Clearly show the following –

- **Entities in your diagram**
- **Attributes of each entity. Underline the Key attribute.**
- **Relationships between entities.**

ER DIAGRAM



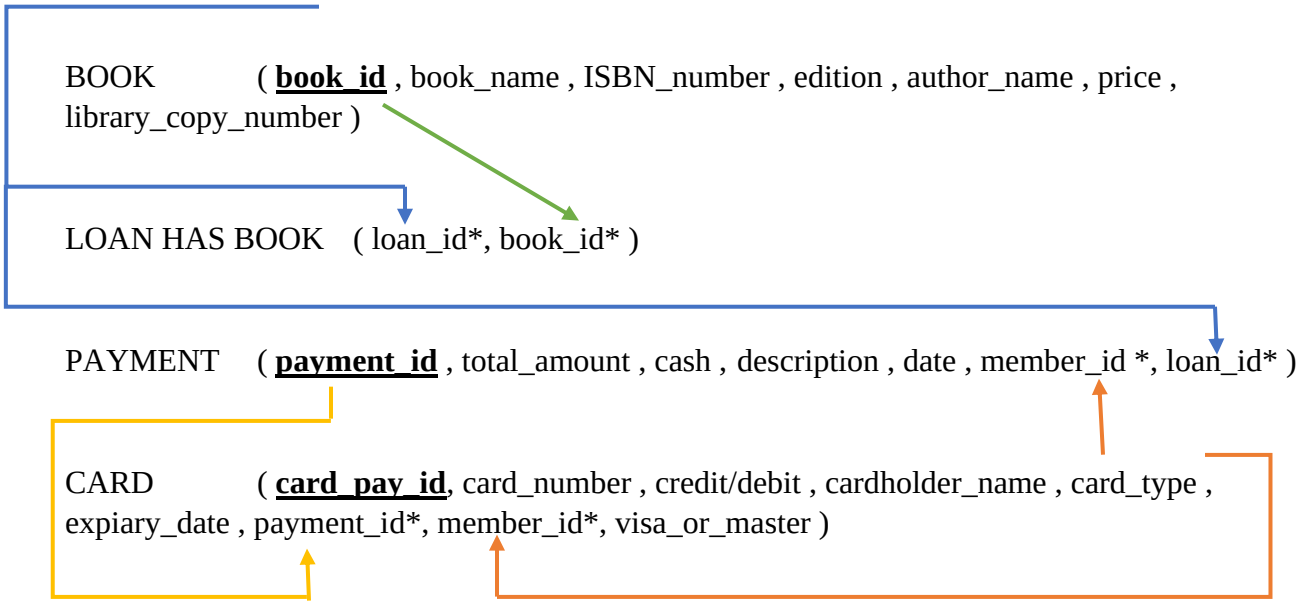
QUESTION 02

Map the Entity Relationship diagram in QUESTION 01 into a Logical Database Model.

- **Map the entities, attributes, and relationships (where necessary) to relational database tables and their attributes.**
- **Show primary keys, foreign keys, and link related primary and foreign key using arrows.**

MEMBER (**member_id** , member_name , address , contact_number , DOB , email)

LOAN (**loan_id** , issue_date , return_date , due_date , member_id *)



QUESTION 03

a) **Briefly provide the definitions of data normalization forms 1NF, 2NF, 3NF.**

b) **Check if each table you identified in QUESTION 02 are in 3NF. If a table is not in 3NF then normalize it up to 3NF. (Only normalize a table if it is not in 3NF. Do not force normalization)**

c) **Show the new tables with their attributes in your Logical Model after normalization to 3NF.**

a)

Definitions:

1NF

A relation in a relational database has the first normal form as one of its properties. Only when there are no attribute domains with relations as elements can a relation exist in first normal form. Or, to put it more casually, that no column in a table can contain tables as values.

- Each cell to be single valued.
- Entries in a column are same type.
- Rows uniquely identified.

2NF

The idea of full functional reliance serves as the foundation of second normal form. Relations with composite keys, or relations with a main key made up of two or more qualities, fall under the second normal form. A relation with a primary key that only has one attribute is automatically in second normal form.

- Each cell to be single valued.
- Entries in a column are same type.
- Rows uniquely identified.
- All attributes depend on the key.

3NF

A relational database design method called third normal form employs normalizing principles to decrease data duplication, prevent data anomalies, guarantee referential integrity, and streamline data administration.

- Each cell to be single valued.
- Entries in a column are same type.
- Rows uniquely identified.
- All attributes depend on the key.
- All attributes determined only by the key

b) and c)

Seems no any data redundancy of above tables. There are no Insertation, Deletion or Updation anomalies,

And seems no Functional Transitive Multivalued and Partial dependencies in above tables.

QUESTION 04

a) Develop the database system using your Logical Model by writing SQL statements. Clearly show the following –

- **Use of SQL statements to create the tables including table attributes and PRIMARY KEYS**
- **Use of SQL statements to create FOREIGN KEY constraints for the relevant tables**

b) Create 5 CHECK constraints using SQL to implement validations to suitable table fields.

a)

```
CREATE DATABASE Library_DB;

CREATE TABLE Member (

member_id     varchar(30)          PRIMARY KEY,
member_name   varchar(45)   NOT NULL,
member_address              varchar(45)   NOT NULL,
contact_number       numeric(11)   NOT NULL,
date_of_birth date NOT NULL,
email         varchar(45) NOT NULL,
);

CREATE TABLE Loan (
loan_id              varchar(30)          PRIMARY KEY,
issue_date    date   NOT NULL,
return_date   date   NOT NULL,
due_date      date   NOT NULL,
member_id     varchar(30),
);
ALTER TABLE Loan ADD FOREIGN KEY (member_id) REFERENCES Member (member_id);

CREATE TABLE Book (
book_id              varchar(30)          PRIMARY KEY,
book_name     varchar(45)   NOT NULL,
ISBN_no              numeric(20)   NOT NULL,
edition              varchar(45)   NOT NULL,
author_name   varchar(45)   NOT NULL,
price         numeric       NOT NULL,
library_copy_no      varchar(45)   NOT NULL,
);

CREATE TABLE Loan_Has_Book(
loan_id              varchar(30)   NOT NULL,
book_id              varchar(30)   NOT NULL,
PRIMARY KEY (loan_id, book_id),
FOREIGN KEY (loan_id) REFERENCES Loan (loan_id),
```

```
FOREIGN KEY (book_id) REFERENCES Book (book_id),
);
CREATE TABLE Payment (
payment_id    varchar(30)          PRIMARY KEY,
total_amount  int    NOT NULL,
cash          char(10)      NOT NULL,
description   varchar(45)   NOT NULL,
date_of_pay          date   NOT NULL,
member_id     varchar(30)   NOT NULL,
loan_id              varchar(30)   NULL,
);
ALTER TABLE Payment ADD FOREIGN KEY (member_id) REFERENCES Member (member_id);
ALTER TABLE Payment ADD FOREIGN KEY (loan_id) REFERENCES Loan (loan_id);

CREATE TABLE Card_Pay (
card_pay_id   varchar(30)          PRIMARY KEY,
card_no              numeric(16)          NOT NULL,
cardholder_name      varchar(45)   NOT NULL,
card_type     varchar(45)   NOT NULL,
expiary_date  date   NOT NULL,
payment_id    varchar(30)   NOT NULL,
member_id     varchar(30)   NOT NULL,
visa_or_master       char(6)       NOT NULL,
);

ALTER TABLE Card_Pay ADD FOREIGN KEY (payment_id) REFERENCES Payment (payment_id);
ALTER TABLE Card_Pay ADD FOREIGN KEY (member_id) REFERENCES Member (member_id);
```

b)

```
ALTER TABLE Member ADD CONSTRAINT chk_number CHECK (contact_number like '[9][4][0-9][0-
9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]');
ALTER TABLE Loan ADD CONSTRAINT chk_due_date CHECK (due_date < '2030-01-01');
ALTER TABLE Payment ADD CONSTRAINT chk_desciption CHECK (description IN ('Book Loan'
,'Membership' ,'Delayed Book Fee'));
ALTER TABLE Card_Pay ADD CONSTRAINT chk_card_type CHECK (card_type IN ('credit',
'debit'));
ALTER TABLE Payment ADD CONSTRAINT chk_total_amount CHECK (total_amount>=500 AND
total_amount<=50000);
ALTER TABLE Card_Pay ADD CONSTRAINT chk_isa_or_master CHECK (visa_or_master IN ('VISA' ,
'MASTER'));
ALTER TABLE Book ADD CONSTRAINT chk_ISBN_no CHECK (ISBN_no like '[0-9][0-9][0-9][0-9][0-
9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]');
ALTER TABLE Payment ADD CONSTRAINT chk_cash CHECK (cash IN ('YES', 'NO'));
```

QUESTION 05

a) Populate each database table with at least 10 records using SQL. (You can populate more records)

```
INSERT INTO Member VALUES ('TD0198' , 'Tashika Dilshan' , '275/A, Delgahawaththa,
Meepawala' , '94777249716' , '1998-10-16', 'tashikadilshan1998@gmail.com');
INSERT INTO Member VALUES ('YA100' , 'Yasith Anjana' , '76/C,Hirimbura,Galle' ,
'94712463589' , '2000-01-23', 'yashithAnaja@yahoo.com');
INSERT INTO Member VALUES ('KR196' , 'Kusum Renu' , '55/3,Palliya Para,Karapitiya' ,
'94765452204' , '1996-11-06', 'renu.Kusum96@gmail.com');
INSERT INTO Member VALUES ('HR603' , 'Hansini Rajapaksha' , 'Kithulampitiya Para,Galle' ,
'94756890872' , '2003-06-30', 'rajapaksha.Hansi003@gmail.com');
INSERT INTO Member VALUES ('KM402' , 'Kalum Munasinghe' , 'Mahawaththa,Kalegana,Galle' ,
'94781463893' , '2002-04-12', 'munasinghe020@gmail.com');
INSERT INTO Member VALUES ('AD704' , 'Asitha Diwlapitiya' , '443/A,Mahaweediya
Road,Galle' , '94712403887' , '2004-07-20', 'asithalucky7@gmail.com');
INSERT INTO Member VALUES ('PW895' , 'Prashani Wikramasinghe' , '77A,Bossa,Galle' ,
'94770990374' , '1995-08-15', 'pawickckrama95@gmail.com');
INSERT INTO Member VALUES ('IK1198' , 'Inura Kavishka' , '11/6,Beligaha junction,Galle' ,
'94771380066' , '1998-11-23', 'kavishkawikramanayake@gmail.com');
INSERT INTO Member VALUES ('NYB306' , 'Nadee Yapa Bandara' , 'Cross rd 01,Kalahe' ,
'94712106630' , '2006-03-23', 'nadeeBanda06@gmail.com');
INSERT INTO Member VALUES ('NT396' , 'Natasha Tamico' , 'Julgaha junction,Galle' ,
'94756630743' , '1996-03-27', 'tamicoNat96@gmail.com');
INSERT INTO Member VALUES ('CW1292' , 'Chamila Weebaduarachchi' , '118/A,Poddala,Galle' ,
'94766410186' , '1992-12-13', 'weebaduCH92@gmail.com');

INSERT INTO Loan VALUES ('LN01TD0198', '2022-05-17','2023-01-17', '2023-05-17',
'TD0198');
INSERT INTO Loan VALUES ('LN02YA100', '2022-07-29','2023-03-29', '2023-07-29', 'YA100');
INSERT INTO Loan VALUES ('LN03KR196', '2021-12-18','2022-06-18', '2022-12-18', 'KR196');
INSERT INTO Loan VALUES ('LN04HR603', '2020-03-13','2020-08-13', '2021-03-13', 'HR603');
INSERT INTO Loan VALUES ('LN05KM402', '2021-06-06','2022-01-06', '2022-06-06', 'KM402');
INSERT INTO Loan VALUES ('LN06AD704', '2022-10-16','2023-03-16', '2023-10-16', 'AD704');
INSERT INTO Loan VALUES ('LN07PW895', '2022-01-11','2022-07-11', '2023-01-11', 'PW895');
INSERT INTO Loan VALUES ('LN08IK1198', '2021-09-25','2022-02-25', '2022-09-25',
'IK1198');
INSERT INTO Loan VALUES ('LN09NYB306', '2019-08-18','2020-08-18', '2021-08-18',
'NYB306');
INSERT INTO Loan VALUES ('LN10NT396', '2021-05-30','2021-11-30', '2022-05-30', 'NT396');
INSERT INTO Loan VALUES ('LN11IK1198', '2020-07-17','2021-02-17', '2022-02-17',
'IK1198');
INSERT INTO Loan VALUES ('LN12AD704', '2022-10-02','2023-03-02', '2023-10-02', 'AD704');

INSERT INTO Book VALUES ('IEWU01', 'IT ENDS WITH US', 28719283704839372638, '1st',
'Colleen Hoover', 5500, '2');
INSERT INTO Book VALUES ('VR10', 'VERITY', 62738499870277725619, '2nd', 'Colleen Hoover',
7250, '1');
INSERT INTO Book VALUES ('IGMD22', 'I AM GLAD MY MOM DIED', 27772638903847672129, '1st',
'Jenette McCurdy', 6000, '4');
INSERT INTO Book VALUES ('FT22', 'FAIRY TALE', 89877700363872918273, '1st', 'Stephen
King', 10000, '2');
INSERT INTO Book VALUES ('LOR54', 'LORD OF THE RINGS', 11980565444728375649, '1st', 'J R
R Tolkien', 8500, '6');
INSERT INTO Book VALUES ('TSP19', 'THE SILENT PATIENT', 99833948571109822175, '2nd',
'Alex Michalides', 7550, '10');
INSERT INTO Book VALUES ('UL14', 'UGLY LOVE', 47787987846473827109, '1st', 'Colleen
Hoover', 10250, '4');
INSERT INTO Book VALUES ('TGL20', 'THE GUEST LIST', 67383846409192738477, '2nd', 'Lucy
Foley', 11550, '1');
```

```
INSERT INTO Book VALUES ('BR20', 'BEACH READ', 66252736455479026643, '2nd', 'Emily
Henry', 2500, '2');
INSERT INTO Book VALUES ('TPP21', 'THE PAPER PALACE', 22728399373847565572, '3rd',
'Miranda Cowley Heller', 1750, '3');

INSERT INTO Loan_Has_Book VALUES ('LN01TD0198', 'IGMD22');
INSERT INTO Loan_Has_Book VALUES ('LN02YA100', 'UL14');
INSERT INTO Loan_Has_Book VALUES ('LN03KR196', 'TSP19');
INSERT INTO Loan_Has_Book VALUES ('LN04HR603', 'FT22');
INSERT INTO Loan_Has_Book VALUES ('LN05KM402', 'TPP21');
INSERT INTO Loan_Has_Book VALUES ('LN06AD704', 'IEWU01');
INSERT INTO Loan_Has_Book VALUES ('LN07PW895', 'BR20');
INSERT INTO Loan_Has_Book VALUES ('LN08IK1198', 'VR10');
INSERT INTO Loan_Has_Book VALUES ('LN09NYB306', 'IGMD22');
INSERT INTO Loan_Has_Book VALUES ('LN10NT396', 'LOR54');
INSERT INTO Loan_Has_Book VALUES ('LN11IK1198', 'TGL20');
INSERT INTO Loan_Has_Book VALUES ('LN12AD704', 'TPP21');

INSERT INTO Payment VALUES ('PYLN01', 6000, 'NO', 'Book Loan', '2023-05-17', 'TD0198',
'LN01TD0198');
INSERT INTO Payment VALUES ('PYLN02', 10250, 'YES', 'Book Loan', '2023-07-29', 'YA100',
'LN02YA100');
INSERT INTO Payment VALUES ('PYLN03', 7550, 'YES', 'Book Loan', '2022-12-18', 'KR196',
'LN03KR196');
INSERT INTO Payment VALUES ('PYLN04', 10000, 'NO', 'Book Loan', '2021-03-13', 'HR603',
'LN04HR603');
INSERT INTO Payment VALUES ('PYLN05', 1750, 'YES', 'Book Loan', '2022-06-06', 'KM402',
'LN05KM402');
INSERT INTO Payment VALUES ('PYLN06', 5500, 'NO', 'Book Loan', '2023-10-16', 'AD704',
'LN06AD704');
INSERT INTO Payment VALUES ('PYLN07', 2500, 'NO', 'Book Loan', '2023-01-11', 'PW895',
'LN07PW895');
INSERT INTO Payment VALUES ('PYLN08', 7250, 'YES', 'Book Loan', '2022-09-25', 'IK1198',
'LN08IK1198');
INSERT INTO Payment VALUES ('PYLN09', 6000, 'YES', 'Book Loan', '2021-08-18', 'NYB306',
'LN09NYB306');
INSERT INTO Payment VALUES ('PYLN10', 8500, 'NO', 'Book Loan', '2022-05-30', 'NT396',
'LN10NT396');
INSERT INTO Payment VALUES ('PYLN11', 11550, 'YES', 'Book Loan', '2022-02-17', 'IK1198',
'LN11IK1198');
INSERT INTO Payment VALUES ('PYLN12', 1750, 'NO', 'Book Loan', '2023-10-02', 'AD704',
'LN12AD704');
INSERT INTO Payment VALUES ('PYMBR01', 2500, 'YES', 'Membership', '2022-10-02', 'IK1198',
NULL);
INSERT INTO Payment VALUES ('PYMBR02', 5000, 'NO', 'Membership', '2023-04-19', 'PW895',
NULL);
INSERT INTO Payment VALUES ('PYMBR03', 2500, 'YES', 'Membership', '2022-12-25', 'HR603',
NULL);
INSERT INTO Payment VALUES ('PYLN13', 4000, 'YES', 'Delayed Book Fee', '2021-02-23',
'KM402', NULL);
INSERT INTO Payment VALUES ('PYLN14', 4000, 'NO', 'Delayed Book Fee', '2022-04-12',
'TD0198', NULL);


INSERT INTO Card_Pay VALUES ('PAYCRD01', 2263001988272276, 'TASHIKA DILSHAN', 'CREDIT',
'2024-06-01', 'PYLN01', 'TD0198', 'VISA');
INSERT INTO Card_Pay VALUES ('PAYCRD02', 2677736488048576,'HANSINI RAJAPAKSHA', 'CREDIT',
'2026-10-01', 'PYLN04', 'HR603', 'VISA');
```

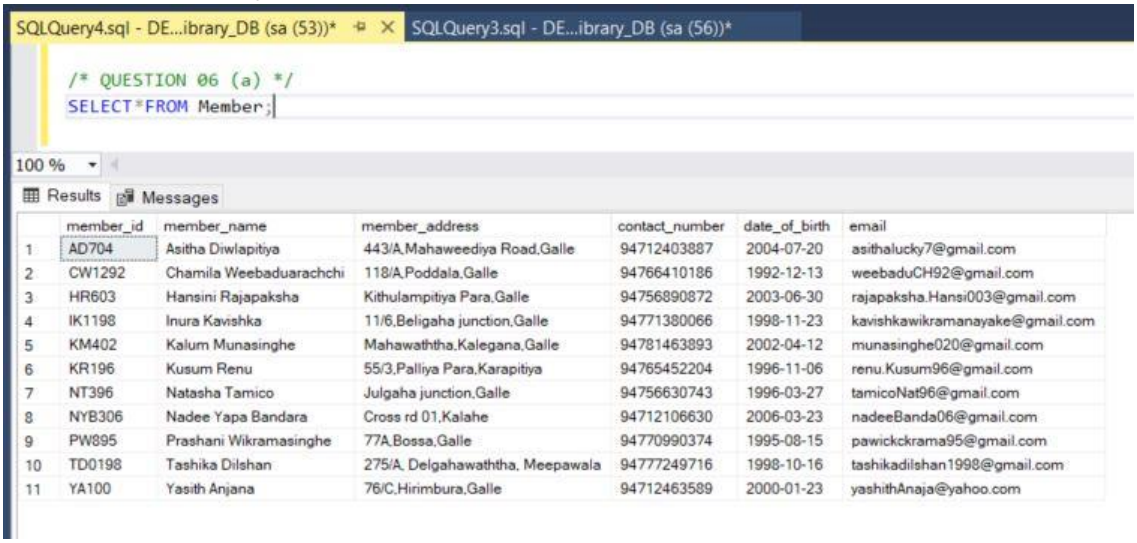
```
INSERT INTO Card_Pay VALUES ('PAYCRD03', 5574839288047263,'ASITHA DIWLAPITIYA', 'DEBIT',
'2025-03-01', 'PYLN06', 'AD704', 'VISA');
INSERT INTO Card_Pay VALUES ('PAYCRD04', 9983049658559008,'PRASHANI WICKRAMASINGHE',
'CREDIT', '2023-08-01', 'PYLN07', 'PW895', 'MASTER');
INSERT INTO Card_Pay VALUES ('PAYCRD05', 0018275568475678,'NATASHA TAMICO', 'DEBIT',
'2022-11-01', 'PYLN10', 'NT396', 'MASTER');
INSERT INTO Card_Pay VALUES ('PAYCRD06', 5574839288047263,'ASITHA DIWLAPITIYA', 'DEBIT',
'2025-03-01', 'PYLN12', 'AD704', 'VISA');
INSERT INTO Card_Pay VALUES ('PAYCRD07', 9983049658559008,'PRASHANI WIKRAMASINGHE',
'CREDIT', '2023-08-01', 'PYMBR02', 'PW895', 'MASTER');
INSERT INTO Card_Pay VALUES ('PAYCRD08', 2263001988272276, 'TASHIKA DILSHAN', 'CREDIT',
'2024-06-01', 'PYLN14', 'TD0198', 'VISA');
```

QUESTION 06

Write SQL statements to generate the information below. Each SQL statement you use must be written in your answer. Screenshot of output from each SQL statement should be shown under the written SQL statement.

a) Display all library members (show all fields of the members table with data)

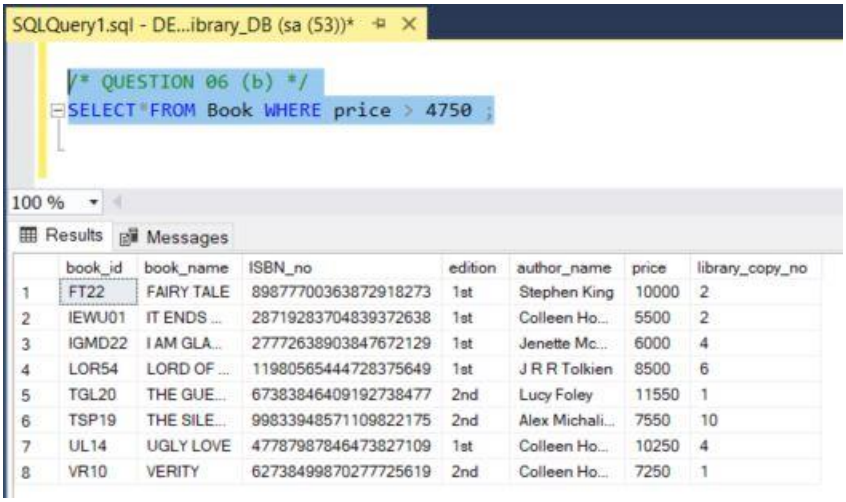
```
/* QUESTION 06 (a) */
SELECT*FROM Member;
```



	member_id	member_name	member_address	contact_number	date_of_birth	email
1	AD704	Asitha Diwlapitiya	443/A,Mahaweediya Road,Galle	94712403887	2004-07-20	asithalucky7@gmail.com
2	CW1292	Chamila Weebaduarachchi	118/A,Poddala,Galle	94766410186	1992-12-13	weebaduCH92@gmail.com
3	HR603	Hansini Rajapaksha	Kithulampitiya Para,Galle	94756890872	2003-06-30	rajapaksha.Hansi003@gmail.com
4	IK1198	Inura Kavishka	11/6,Beligaha junction,Galle	94771380066	1998-11-23	kavishkawikramanayake@gmail.com
5	KM402	Kalum Munasinghe	Mahawaththa,Kalegana,Galle	94781463893	2002-04-12	munasinghe020@gmail.com
6	KR196	Kusum Renu	55/3,Palliya Para,Karapitiya	94765452204	1996-11-06	renu.Kusum96@gmail.com
7	NT396	Natasha Tamico	Julgaha junction,Galle	94756630743	1996-03-27	tamicoNat96@gmail.com
8	NYB306	Nadee Yapa Bandara	Cross rd 01,Kalahe	94712106630	2006-03-23	nadeeBanda06@gmail.com
9	PW895	Prashani Wikramasinghe	77A,Bossa,Galle	94770990374	1995-08-15	pawickckrama95@gmail.com
10	TD0198	Tashika Dilshan	275/A, Delgahawaththa, Meepawala	94777249716	1998-10-16	tashikadilshan1998@gmail.com
11	YA100	Yasith Anjana	76/C,Hirimbura,Galle	94712463589	2000-01-23	yashithAnaja@yahoo.com

b) Display all books which are larger than a particular price. (show all the fields of books table with requested data).

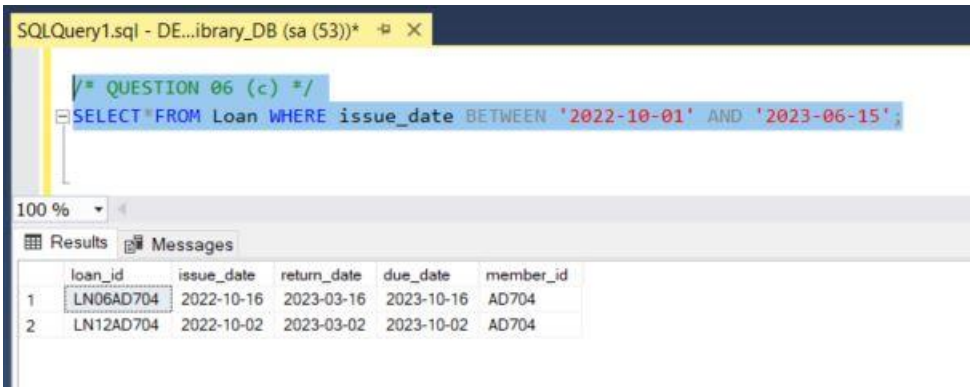
```
/* QUESTION 06 (b) */
SELECT*FROM Book WHERE price > 4750 ;
```



	book_id	book_name	ISBN_no	edition	author_name	price	library_copy_no
1	FT22	FAIRY TALE	89877700363872918273	1st	Stephen King	10000	2
2	IEWU01	IT ENDS ...	28719283704839372638	1st	Colleen Ho...	5500	2
3	IGMD22	I AM GLA...	27772638903847672129	1st	Jenette Mc...	6000	4
4	LOR54	LORD OF ...	11980565444728375649	1st	J R R Tolkien	8500	6
5	TGL20	THE GUE...	67383846409192738477	2nd	Lucy Foley	11550	1
6	TSP19	THE SILE...	99833948571109822175	2nd	Alex Michali...	7550	10
7	UL14	UGLY LOVE	47787987846473827109	1st	Colleen Ho...	10250	4
8	VR10	VERITY	62738499870277725619	2nd	Colleen Ho...	7250	1

c) Display details of all book loans issued between 2 dates (loan_id, issue_date, due_date, return_date)

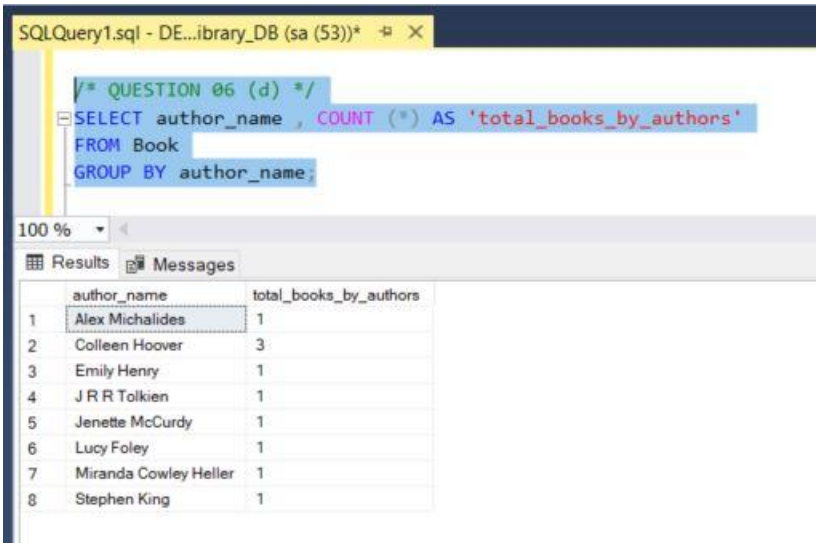
```
/* QUESTION 06 (c) */
SELECT*FROM Loan WHERE issue_date BETWEEN '2022-10-01' AND '2023-06-15';
```



	loan_id	issue_date	return_date	due_date	member_id
1	LN06AD704	2022-10-16	2023-03-16	2023-10-16	AD704
2	LN12AD704	2022-10-02	2023-03-02	2023-10-02	AD704

d) A query to COUNT books by each author (Display number of books in front of author name).

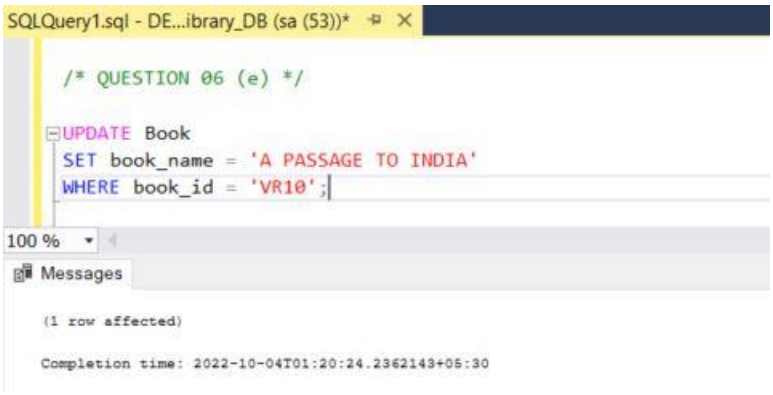
```
/* QUESTION 06 (d) */
SELECT author_name , COUNT (*) AS 'total_books_by_authors'
FROM Book
GROUP BY author_name;
```



	author_name	total_books_by_authors
1	Alex Michalides	1
2	Colleen Hoover	3
3	Emily Henry	1
4	J R R Tolkien	1
5	Jenette McCurdy	1
6	Lucy Foley	1
7	Miranda Cowley Heller	1
8	Stephen King	1

e) Write a query to update the book name of any 1 particular book in your library.

```
/* QUESTION 06 (e) */
UPDATE Book
SET book_name = 'A PASSAGE TO INDIA'
WHERE book_id = 'VR10';
```



SQLQuery1.sql - DE...ibrary_DB (sa (53))*

```
/* QUESTION 06 (e) */

UPDATE Book
SET book_name = 'A PASSAGE TO INDIA'
WHERE book_id = 'VR10';

SELECT*FROM Book
```

100 %

Results | Messages

	book_id	book_name	ISBN_no	edition	author_name	price	library_copy_no
1	BR20	BEACH READ	66252736455479026643	2nd	Emily Henry	2500	2
2	FT22	FAIRY TALE	89877700363872918273	1st	Stephen King	10000	2
3	IEWU01	IT ENDS WITH US	28719283704839372638	1st	Colleen Hoover	5500	2
4	IGMD22	I AM GLAD MY MOM DIED	27772638903847672129	1st	Jenette McCurdy	6000	4
5	LOR54	LORD OF THE RINGS	11980565444728375649	1st	J R R Tolkien	8500	6
6	TGL20	THE GUEST LIST	67383846409192738477	2nd	Lucy Foley	11550	1
7	TPP21	THE PAPER PALACE	22728399373847565572	3rd	Miranda Cowley Heller	1750	3
8	TSP19	THE SILENT PATIENT	99833948571109822175	2nd	Alex Michalides	7550	10
9	UL14	UGLY LOVE	47787987846473827109	1st	Colleen Hoover	10250	4
10	VR10	A PASSAGE TO INDIA	62738499870277725619	2nd	Colleen Hoover	7250	1

f) Display all members who have had more than 2 book loans. (The numbers of loans taken must appear before each full_name of the member)

In this Database, there are not any member Having more than two book loans. So, I'm Assuming that more than two as more than one.

```
/* QUESTION 06 (f) */
SELECT Member.member_name, COUNT(Loan.member_id) AS 'Numbers_Of_Loans'
FROM Loan JOIN Member ON Member.member_id = Loan.member_id
GROUP BY Member.member_name
HAVING COUNT(*)>1;
```

SQLQuery1.sql - DES...SS.library (sa (52))* | Library_DB.sql - DES...SS.library (sa (66))*

```
/* QUESTION 06 (f) */
SELECT Member.member_name, COUNT(Loan.member_id) AS 'Numbers_Of_Loans'
FROM Loan JOIN Member ON Member.member_id = Loan.member_id
GROUP BY Member.member_name
HAVING COUNT(*)>1;
```

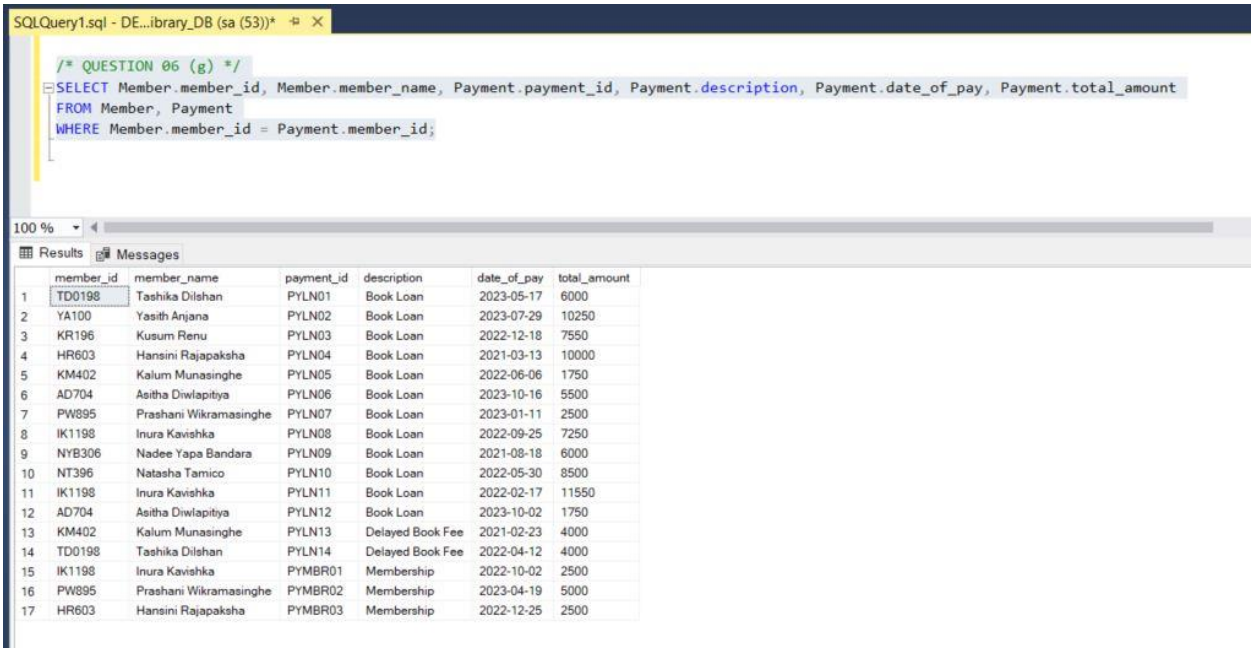
100 %

Results | Messages

	member_name	Numbers_Of_Loans
1	Asitha Diwlapitiya	2
2	Inura Kavishka	2

g) Display membership id, full_name, payment id, payment date, payment_description and payment amount. (Each Payment detail with member details) – HINT: Use a JOIN query

```sql
/* QUESTION 06 (g) */
SELECT Member.member_id, Member.member_name, Payment.payment_id,
Payment.description, Payment.date_of_pay, Payment.total_amount
FROM Member, Payment
WHERE Member.member_id = Payment.member_id;
```



SQLQuery1.sql - DE...ibrary_DB (sa (53))*

```sql
/* QUESTION 06 (g) */
SELECT Member.member_id, Member.member_name, Payment.payment_id, Payment.description, Payment.date_of_pay, Payment.total_amount
FROM Member, Payment
WHERE Member.member_id = Payment.member_id;
```

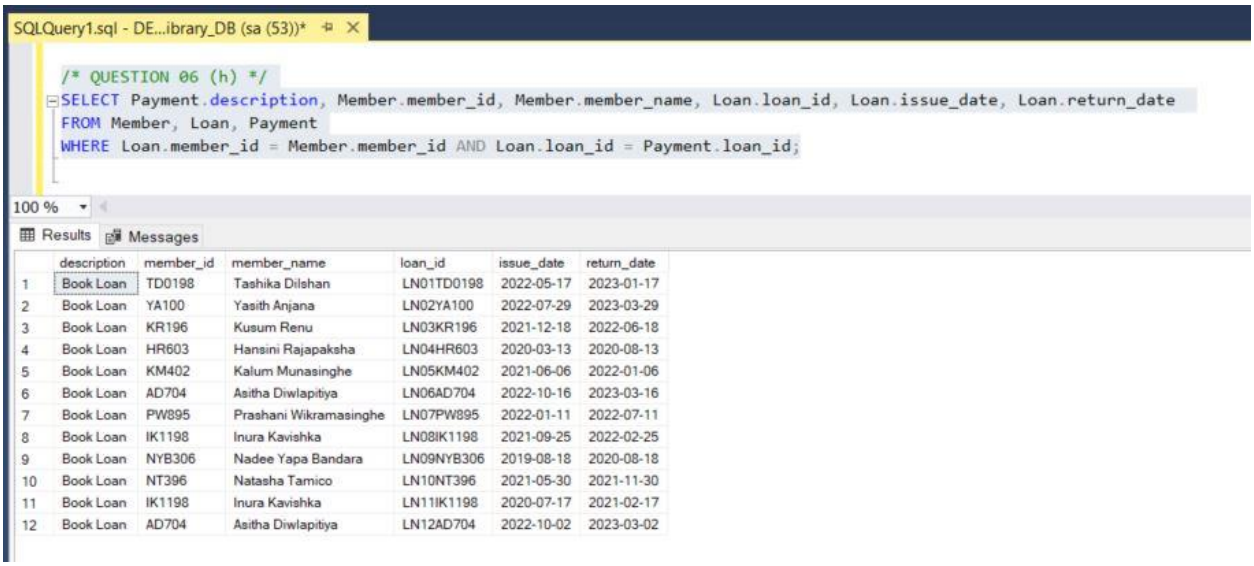
100 %

Results | Messages

	member_id	member_name	payment_id	description	date_of_pay	total_amount
1	TD0198	Tashika Dilshan	PYLN01	Book Loan	2023-05-17	6000
2	YA100	Yasith Anjana	PYLN02	Book Loan	2023-07-29	10250
3	KR196	Kusum Renu	PYLN03	Book Loan	2022-12-18	7550
4	HR603	Hansini Rajapaksha	PYLN04	Book Loan	2021-03-13	10000
5	KM402	Kalum Munasinghe	PYLN05	Book Loan	2022-06-06	1750
6	AD704	Asitha Diwlapitiya	PYLN06	Book Loan	2023-10-16	5500
7	PW895	Prashani Wikramasinghe	PYLN07	Book Loan	2023-01-11	2500
8	IK1198	Inura Kavishka	PYLN08	Book Loan	2022-09-25	7250
9	NYB306	Nadee Yapa Bandara	PYLN09	Book Loan	2021-08-18	6000
10	NT396	Natasha Tamico	PYLN10	Book Loan	2022-05-30	8500
11	IK1198	Inura Kavishka	PYLN11	Book Loan	2022-02-17	11550
12	AD704	Asitha Diwlapitiya	PYLN12	Book Loan	2023-10-02	1750
13	KM402	Kalum Munasinghe	PYLN13	Delayed Book Fee	2021-02-23	4000
14	TD0198	Tashika Dilshan	PYLN14	Delayed Book Fee	2022-04-12	4000
15	IK1198	Inura Kavishka	PYMBR01	Membership	2022-10-02	2500
16	PW895	Prashani Wikramasinghe	PYMBR02	Membership	2023-04-19	5000
17	HR603	Hansini Rajapaksha	PYMBR03	Membership	2022-12-25	2500

h) Displays details of all book loans with details of members (For each book loan, which member took the loan - loan_id, issue_date, return_date, member_id, full_name must be visible) HINT: Use a JOIN query

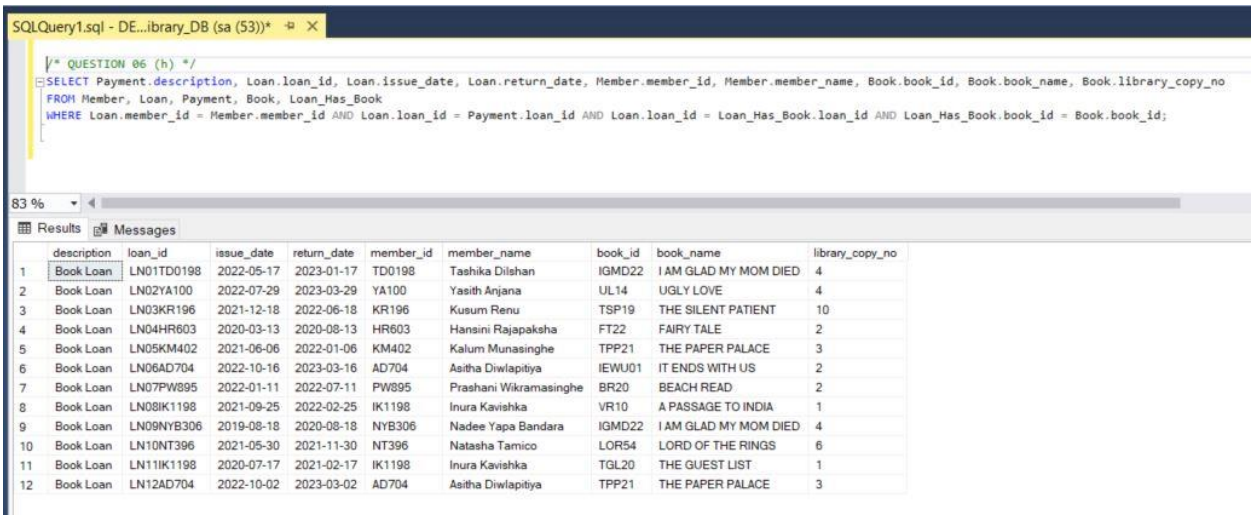
```sql
/* QUESTION 06 (h) */
SELECT Payment.description, Member.member_id, Member.member_name, Loan.loan_id,
Loan.issue_date, Loan.return_date
FROM Member, Loan, Payment
WHERE Loan.member_id = Member.member_id AND Loan.loan_id = Payment.loan_id;
```



	description	member_id	member_name	loan_id	issue_date	return_date
1	Book Loan	TD0198	Tashika Dilshan	LN01TD0198	2022-05-17	2023-01-17
2	Book Loan	YA100	Yasith Anjana	LN02YA100	2022-07-29	2023-03-29
3	Book Loan	KR196	Kusum Renu	LN03KR196	2021-12-18	2022-06-18
4	Book Loan	HR603	Hansini Rajapaksha	LN04HR603	2020-03-13	2020-08-13
5	Book Loan	KM402	Kalum Munasinghe	LN05KM402	2021-06-06	2022-01-06
6	Book Loan	AD704	Asitha Diwlapitiya	LN06AD704	2022-10-16	2023-03-16
7	Book Loan	PW895	Prashani Wikramasinghe	LN07PW895	2022-01-11	2022-07-11
8	Book Loan	IK1198	Inura Kavishka	LN08IK1198	2021-09-25	2022-02-25
9	Book Loan	NYB306	Nadee Yapa Bandara	LN09NYB306	2019-08-18	2020-08-18
10	Book Loan	NT396	Natasha Tamico	LN10NT396	2021-05-30	2021-11-30
11	Book Loan	IK1198	Inura Kavishka	LN11IK1198	2020-07-17	2021-02-17
12	Book Loan	AD704	Asitha Diwlapitiya	LN12AD704	2022-10-02	2023-03-02

i) Displays details of all loans with details of members and books (For each book loan, which member took the book loan and which book was taken) (loan_id, issue_date, return_date, member_id, full_name, book_id, book_name, copy_no must be visible) HINT: Use a JOIN query

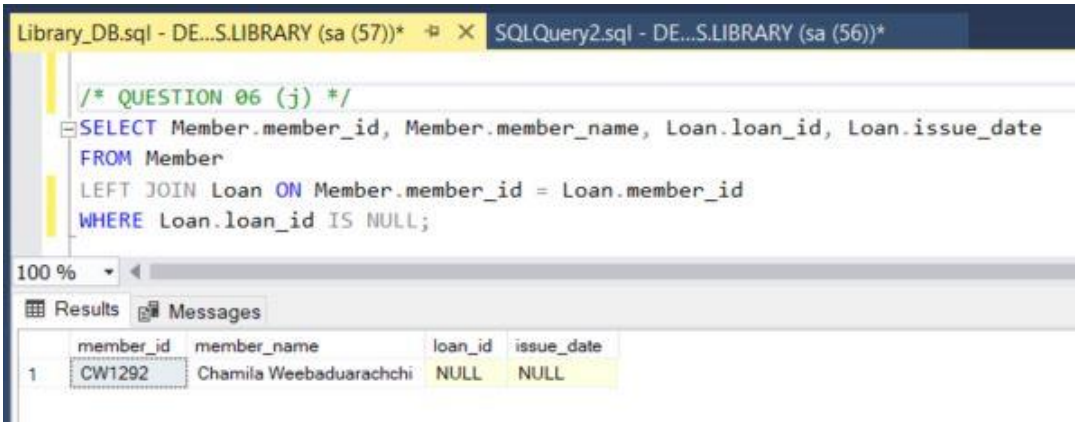
```
/* QUESTION 06 (i) */
SELECT Payment.description, Loan.loan_id, Loan.issue_date, Loan.return_date,
Member.member_id, Member.member_name, Book.book_id, Book.book_name,
Book.library_copy_no
FROM Member, Loan, Payment, Book, Loan_Has_Book
WHERE Loan.member_id = Member.member_id AND Loan.loan_id = Payment.loan_id AND
Loan.loan_id = Loan_Has_Book.loan_id AND Loan_Has_Book.book_id = Book.book_id;
```



	description	loan_id	issue_date	return_date	member_id	member_name	book_id	book_name	library_copy_no
1	Book Loan	LN01TD0198	2022-05-17	2023-01-17	TD0198	Tashika Dilshan	IGMD22	I AM GLAD MY MOM DIED	4
2	Book Loan	LN02YA100	2022-07-29	2023-03-29	YA100	Yasith Anjana	UL14	UGLY LOVE	4
3	Book Loan	LN03KR196	2021-12-18	2022-06-18	KR196	Kusum Renu	TSP19	THE SILENT PATIENT	10
4	Book Loan	LN04HR603	2020-03-13	2020-08-13	HR603	Hansini Rajapaksha	FT22	FAIRY TALE	2
5	Book Loan	LN05KM402	2021-06-06	2022-01-06	KM402	Kalum Munasinghe	TPP21	THE PAPER PALACE	3
6	Book Loan	LN06AD704	2022-10-16	2023-03-16	AD704	Asitha Diwlapitiya	IEWU01	IT ENDS WITH US	2
7	Book Loan	LN07PW895	2022-01-11	2022-07-11	PW895	Prashani Wikramasinghe	BR20	BEACH READ	2
8	Book Loan	LN08IK1198	2021-09-25	2022-02-25	IK1198	Inura Kavishka	VR10	A PASSAGE TO INDIA	1
9	Book Loan	LN09NYB306	2019-08-18	2020-08-18	NYB306	Nadee Yapa Bandara	IGMD22	I AM GLAD MY MOM DIED	4
10	Book Loan	LN10NT396	2021-05-30	2021-11-30	NT396	Natasha Tamico	LOR54	LORD OF THE RINGS	6
11	Book Loan	LN11IK1198	2020-07-17	2021-02-17	IK1198	Inura Kavishka	TGL20	THE GUEST LIST	1
12	Book Loan	LN12AD704	2022-10-02	2023-03-02	AD704	Asitha Diwlapitiya	TPP21	THE PAPER PALACE	3

j) Write a LEFT JOIN to display members who have not had any book loans. (You may not have results to display but nevertheless write the query).

```
/* QUESTION 06 (j) */
SELECT Member.member_id, Member.member_name, Loan.loan_id, Loan.issue_date
FROM Member
LEFT JOIN Loan ON Member.member_id = Loan.member_id
WHERE Loan.loan_id IS NULL;
```



APPENDIX

CREATE TABLE Member (

member_id varchar(30) PRIMARY KEY,
member_name varchar(45) NOT NULL,
member_address varchar(45) NOT NULL,
contact_number numeric(11) NOT NULL,
date_of_birth date NOT NULL,
email varchar(45) NOT NULL,
);

CREATE TABLE Loan (
loan_id varchar(30) PRIMARY KEY,
issue_date date NOT NULL,
return_date date NOT NULL,

```
due_date        date    NOT NULL,
member_id       varchar(30),
);
ALTER TABLE Loan ADD FOREIGN KEY (member_id) REFERENCES Member
(member_id);

CREATE TABLE Book (
book_id                 varchar(30)             PRIMARY KEY,
book_name       varchar(45)     NOT NULL,
ISBN_no                 numeric(20)     NOT NULL,
edition         varchar(45)     NOT NULL,
author_name     varchar(45)     NOT NULL,
price           numeric         NOT NULL,
library_copy_no         varchar(45)     NOT NULL,
);

CREATE TABLE Loan_Has_Book(
loan_id         varchar(30)     NOT NULL,
book_id                 varchar(30)     NOT NULL,
PRIMARY KEY (loan_id, book_id),
FOREIGN KEY (loan_id) REFERENCES Loan (loan_id),
FOREIGN KEY (book_id) REFERENCES Book (book_id),
);
CREATE TABLE Payment (
payment_id      varchar(30)             PRIMARY KEY,
total_amount    int     NOT NULL,
cash            char(10)        NOT NULL,
description     varchar(45)     NOT NULL,
date_of_pay             date    NOT NULL,
member_id       varchar(30)     NOT NULL,
loan_id         varchar(30)     NULL,
);
ALTER TABLE Payment ADD FOREIGN KEY (member_id) REFERENCES Member
(member_id);
ALTER TABLE Payment ADD FOREIGN KEY (loan_id) REFERENCES Loan
(loan_id);

CREATE TABLE Card_Pay (
card_pay_id     varchar(30)             PRIMARY KEY,
card_no                 numeric(16)             NOT NULL,
cardholder_name         varchar(45)     NOT NULL,
card_type       varchar(45)     NOT NULL,
expiary_date    date    NOT NULL,
```

```
payment_id     varchar(30)     NOT NULL,
member_id      varchar(30)     NOT NULL,
visa_or_master          char(6) NOT NULL,
);

ALTER TABLE Card_Pay ADD FOREIGN KEY (payment_id) REFERENCES
Payment (payment_id);
ALTER TABLE Card_Pay ADD FOREIGN KEY (member_id) REFERENCES Member
(member_id);

ALTER TABLE Member ADD CONSTRAINT chk_number CHECK (contact_number
like '[9][4][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9]');
ALTER TABLE Loan ADD CONSTRAINT chk_due_date CHECK (due_date < '2030-
01-01');
ALTER TABLE Payment ADD CONSTRAINT chk_desciption CHECK (description IN
('Book Loan' ,'Membership' ,'Delayed Book Fee'));
ALTER TABLE Card_Pay ADD CONSTRAINT chk_card_type CHECK (card_type IN
('credit', 'debit'));
ALTER TABLE Payment ADD CONSTRAINT chk_total_amount CHECK
(total_amount>=500 AND total_amount<=50000);
ALTER TABLE Card_Pay ADD CONSTRAINT chk_isa_or_master CHECK
(visa_or_master IN ('VISA' , 'MASTER'));
ALTER TABLE Book ADD CONSTRAINT chk_ISBN_no CHECK (ISBN_no like '[0-
9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-9][0-
9][0-9]');
ALTER TABLE Payment ADD CONSTRAINT chk_cash CHECK (cash IN ('YES',
'NO'));


INSERT INTO Member VALUES ('TD0198' , 'Tashika Dilshan' , '275/A,
Delgahawaththa, Meepawala' , '94777249716' , '1998-10-16',
'tashikadilshan1998@gmail.com');
INSERT INTO Member VALUES ('YA100' , 'Yasith Anjana' , '76/C,Hirimbura,Galle' ,
'94712463589' , '2000-01-23', 'yashithAnaja@yahoo.com');
INSERT INTO Member VALUES ('KR196' , 'Kusum Renu' , '55/3,Palliya
Para,Karapitiya' , '94765452204' , '1996-11-06', 'renu.Kusum96@gmail.com');
INSERT INTO Member VALUES ('HR603' , 'Hansini Rajapaksha' , 'Kithulampitiya
Para,Galle' , '94756890872' , '2003-06-30', 'rajapaksha.Hansi003@gmail.com');
INSERT INTO Member VALUES ('KM402' , 'Kalum Munasinghe' ,
'Mahawaththa,Kalegana,Galle' , '94781463893' , '2002-04-12',
'munasinghe020@gmail.com');
INSERT INTO Member VALUES ('AD704' , 'Asitha Diwlapitiya' , '443/A,Mahaweediya
Road,Galle' , '94712403887' , '2004-07-20', 'asithalucky7@gmail.com');
```

```
INSERT INTO Member VALUES ('PW895' , 'Prashani Wikramasinghe' ,
'77A,Bossa,Galle' , '94770990374' , '1995-08-15', 'pawickckrama95@gmail.com');
INSERT INTO Member VALUES ('IK1198' , 'Inura Kavishka' , '11/6,Beligaha
junction,Galle' , '94771380066' , '1998-11-23', 'kavishkawikramanayake@gmail.com');
INSERT INTO Member VALUES ('NYB306' , 'Nadee Yapa Bandara' , 'Cross rd
01,Kalahe' , '94712106630' , '2006-03-23', 'nadeeBanda06@gmail.com');
INSERT INTO Member VALUES ('NT396' , 'Natasha Tamico' , 'Julgaha junction,Galle' ,
'94756630743' , '1996-03-27', 'tamicoNat96@gmail.com');
INSERT INTO Member VALUES ('CW1292' , 'Chamila Weebaduarachchi' ,
'118/A,Poddala,Galle' , '94766410186' , '1992-12-13', 'weebaduCH92@gmail.com');

INSERT INTO Loan VALUES ('LN01TD0198', '2022-05-17','2023-01-17', '2023-05-17',
'TD0198');
INSERT INTO Loan VALUES ('LN02YA100', '2022-07-29','2023-03-29', '2023-07-29',
'YA100');
INSERT INTO Loan VALUES ('LN03KR196', '2021-12-18','2022-06-18', '2022-12-18',
'KR196');
INSERT INTO Loan VALUES ('LN04HR603', '2020-03-13','2020-08-13', '2021-03-13',
'HR603');
INSERT INTO Loan VALUES ('LN05KM402', '2021-06-06','2022-01-06', '2022-06-06',
'KM402');
INSERT INTO Loan VALUES ('LN06AD704', '2022-10-16','2023-03-16', '2023-10-16',
'AD704');
INSERT INTO Loan VALUES ('LN07PW895', '2022-01-11','2022-07-11', '2023-01-11',
'PW895');
INSERT INTO Loan VALUES ('LN08IK1198', '2021-09-25','2022-02-25', '2022-09-25',
'IK1198');
INSERT INTO Loan VALUES ('LN09NYB306', '2019-08-18','2020-08-18', '2021-08-
18', 'NYB306');
INSERT INTO Loan VALUES ('LN10NT396', '2021-05-30','2021-11-30', '2022-05-30',
'NT396');
INSERT INTO Loan VALUES ('LN11IK1198', '2020-07-17','2021-02-17', '2022-02-17',
'IK1198');
INSERT INTO Loan VALUES ('LN12AD704', '2022-10-02','2023-03-02', '2023-10-02',
'AD704');

INSERT INTO Book VALUES ('IEWU01', 'IT ENDS WITH US',
28719283704839372638, '1st', 'Colleen Hoover', 5500, '2');
INSERT INTO Book VALUES ('VR10', 'VERITY', 62738499870277725619, '2nd',
'Colleen Hoover', 7250, '1');
INSERT INTO Book VALUES ('IGMD22', 'I AM GLAD MY MOM DIED',
27772638903847672129, '1st', 'Jenette McCurdy', 6000, '4');
```

```
INSERT INTO Book VALUES ('FT22', 'FAIRY TALE', 89877700363872918273, '1st',
'Stephen King', 10000, '2');
INSERT INTO Book VALUES ('LOR54', 'LORD OF THE RINGS',
11980565444728375649, '1st', 'J R R Tolkien', 8500, '6');
INSERT INTO Book VALUES ('TSP19', 'THE SILENT PATIENT',
99833948571109822175, '2nd', 'Alex Michalides', 7550, '10');
INSERT INTO Book VALUES ('UL14', 'UGLY LOVE', 47787987846473827109, '1st',
'Colleen Hoover', 10250, '4');
INSERT INTO Book VALUES ('TGL20', 'THE GUEST LIST',
67383846409192738477, '2nd', 'Lucy Foley', 11550, '1');
INSERT INTO Book VALUES ('BR20', 'BEACH READ', 66252736455479026643,
'2nd', 'Emily Henry', 2500, '2');
INSERT INTO Book VALUES ('TPP21', 'THE PAPER PALACE',
22728399373847565572, '3rd', 'Miranda Cowley Heller', 1750, '3');

INSERT INTO Loan_Has_Book VALUES ('LN01TD0198', 'IGMD22');
INSERT INTO Loan_Has_Book VALUES ('LN02YA100', 'UL14');
INSERT INTO Loan_Has_Book VALUES ('LN03KR196', 'TSP19');
INSERT INTO Loan_Has_Book VALUES ('LN04HR603', 'FT22');
INSERT INTO Loan_Has_Book VALUES ('LN05KM402', 'TPP21');
INSERT INTO Loan_Has_Book VALUES ('LN06AD704', 'IEWU01');
INSERT INTO Loan_Has_Book VALUES ('LN07PW895', 'BR20');
INSERT INTO Loan_Has_Book VALUES ('LN08IK1198', 'VR10');
INSERT INTO Loan_Has_Book VALUES ('LN09NYB306', 'IGMD22');
INSERT INTO Loan_Has_Book VALUES ('LN10NT396', 'LOR54');
INSERT INTO Loan_Has_Book VALUES ('LN11IK1198', 'TGL20');
INSERT INTO Loan_Has_Book VALUES ('LN12AD704', 'TPP21');

INSERT INTO Payment VALUES ('PYLN01', 6000, 'NO', 'Book Loan', '2023-05-17',
'TD0198', 'LN01TD0198');
INSERT INTO Payment VALUES ('PYLN02', 10250, 'YES', 'Book Loan', '2023-07-29',
'YA100', 'LN02YA100');
INSERT INTO Payment VALUES ('PYLN03', 7550, 'YES', 'Book Loan', '2022-12-18',
'KR196', 'LN03KR196');
INSERT INTO Payment VALUES ('PYLN04', 10000, 'NO', 'Book Loan', '2021-03-13',
'HR603', 'LN04HR603');
INSERT INTO Payment VALUES ('PYLN05', 1750, 'YES', 'Book Loan', '2022-06-06',
'KM402', 'LN05KM402');
INSERT INTO Payment VALUES ('PYLN06', 5500, 'NO', 'Book Loan', '2023-10-16',
'AD704', 'LN06AD704');
INSERT INTO Payment VALUES ('PYLN07', 2500, 'NO', 'Book Loan', '2023-01-11',
'PW895', 'LN07PW895');
```

```
INSERT INTO Payment VALUES ('PYLN08', 7250, 'YES', 'Book Loan', '2022-09-25',
'IK1198', 'LN08IK1198');
INSERT INTO Payment VALUES ('PYLN09', 6000, 'YES', 'Book Loan', '2021-08-18',
'NYB306', 'LN09NYB306');
INSERT INTO Payment VALUES ('PYLN10', 8500, 'NO', 'Book Loan', '2022-05-30',
'NT396', 'LN10NT396');
INSERT INTO Payment VALUES ('PYLN11', 11550, 'YES', 'Book Loan', '2022-02-17',
'IK1198', 'LN11IK1198');
INSERT INTO Payment VALUES ('PYLN12', 1750, 'NO', 'Book Loan', '2023-10-02',
'AD704', 'LN12AD704');
INSERT INTO Payment VALUES ('PYMBR01', 2500, 'YES', 'Membership', '2022-10-
02', 'IK1198', NULL);
INSERT INTO Payment VALUES ('PYMBR02', 5000, 'NO', 'Membership', '2023-04-
19', 'PW895', NULL);
INSERT INTO Payment VALUES ('PYMBR03', 2500, 'YES', 'Membership', '2022-12-
25', 'HR603', NULL);
INSERT INTO Payment VALUES ('PYLN13', 4000, 'YES', 'Delayed Book Fee', '2021-
02-23', 'KM402', NULL);
INSERT INTO Payment VALUES ('PYLN14', 4000, 'NO', 'Delayed Book Fee', '2022-
04-12', 'TD0198', NULL);


INSERT INTO Card_Pay VALUES ('PAYCRD01', 2263001988272276, 'TASHIKA
DILSHAN', 'CREDIT', '2024-06-01', 'PYLN01', 'TD0198', 'VISA');
INSERT INTO Card_Pay VALUES ('PAYCRD02', 2677736488048576,'HANSINI
RAJAPAKSHA', 'CREDIT', '2026-10-01', 'PYLN04', 'HR603', 'VISA');
INSERT INTO Card_Pay VALUES ('PAYCRD03', 5574839288047263,'ASITHA
DIWLAPITIYA', 'DEBIT', '2025-03-01', 'PYLN06', 'AD704', 'VISA');
INSERT INTO Card_Pay VALUES ('PAYCRD04', 9983049658559008,'PRASHANI
WICKRAMASINGHE', 'CREDIT', '2023-08-01', 'PYLN07', 'PW895', 'MASTER');
INSERT INTO Card_Pay VALUES ('PAYCRD05', 0018275568475678,'NATASHA
TAMICO', 'DEBIT', '2022-11-01', 'PYLN10', 'NT396', 'MASTER');
INSERT INTO Card_Pay VALUES ('PAYCRD06', 5574839288047263,'ASITHA
DIWLAPITIYA', 'DEBIT', '2025-03-01', 'PYLN12', 'AD704', 'VISA');
INSERT INTO Card_Pay VALUES ('PAYCRD07', 9983049658559008,'PRASHANI
WIKRAMASINGHE', 'CREDIT', '2023-08-01', 'PYMBR02', 'PW895', 'MASTER');
INSERT INTO Card_Pay VALUES ('PAYCRD08', 2263001988272276, 'TASHIKA
DILSHAN', 'CREDIT', '2024-06-01', 'PYLN14', 'TD0198', 'VISA');

SELECT*FROM Member
SELECT*FROM Loan
SELECT*FROM Book
SELECT*FROM Loan_Has_Book
```

```
SELECT*FROM Payment
SELECT*FROM Card_Pay

/* QUESTION 06 (a) */
SELECT*FROM Member;

/* QUESTION 06 (b) */
SELECT*FROM Book WHERE price > 4750;

/* QUESTION 06 (c) */
SELECT*FROM Loan WHERE issue_date BETWEEN '2022-10-01' AND '2023-06-15';

/* QUESTION 06 (d) */
SELECT author_name , COUNT (*) AS 'total_books_by_authors'
FROM Book
GROUP BY author_name;

/* QUESTION 06 (e) */
UPDATE Book
SET book_name = 'A PASSAGE TO INDIA'
WHERE book_id = 'VR10';

/* QUESTION 06 (f) */
SELECT Member.member_name, COUNT(Loan.member_id) AS 'Numbers_Of_Loans'
FROM Loan JOIN Member ON Member.member_id = Loan.member_id
GROUP BY Member.member_name
HAVING COUNT(*)>1;


/* QUESTION 06 (g) */
SELECT Member.member_id, Member.member_name, Payment.payment_id,
Payment.description, Payment.date_of_pay, Payment.total_amount
FROM Member, Payment
WHERE Member.member_id = Payment.member_id;

/* QUESTION 06 (h) */
SELECT Payment.description, Member.member_id, Member.member_name,
Loan.loan_id, Loan.issue_date, Loan.return_date
FROM Member, Loan, Payment
WHERE Loan.member_id = Member.member_id AND Loan.loan_id = Payment.loan_id;

/* QUESTION 06 (i) */
```

```
SELECT Payment.description, Loan.loan_id, Loan.issue_date, Loan.return_date,
Member.member_id, Member.member_name, Book.book_id, Book.book_name,
Book.library_copy_no
FROM Member, Loan, Payment, Book, Loan_Has_Book
WHERE Loan.member_id = Member.member_id AND Loan.loan_id = Payment.loan_id
AND Loan.loan_id = Loan_Has_Book.loan_id AND Loan_Has_Book.book_id =
Book.book_id;
```

```
/* QUESTION 06 (j) */
SELECT Member.member_id, Member.member_name, Loan.loan_id, Loan.issue_date
FROM Member
LEFT JOIN Loan ON Member.member_id = Loan.member_id
WHERE Loan.loan_id IS NULL;
```