Q1.

A.

```
mysql> CREATE TABLE Passenger_mc23bt029 (
    -> pid INT PRIMARY KEY,
    -> pname VARCHAR(255),
    -> age INT
    -> );
Query OK, 0 rows affected (0.02 sec)

mysql> DESCRIBE Passenger_mc23bt029;
+-------+--------------+------+-----+---------+-------+
| Field | Type         | Null | Key | Default | Extra |
+-------+--------------+------+-----+---------+-------+
| pid   | int          | NO   | PRI | NULL    |       |
| pname | varchar(255) | YES  |     | NULL    |       |
| age   | int          | YES  |     | NULL    |       |
+-------+--------------+------+-----+---------+-------+
3 rows in set (0.01 sec)

mysql> CREATE TABLE Reservation_mc23bt029 (
    -> pid INT,
    -> class VARCHAR(50),
    -> tid INT,
    -> PRIMARY KEY (pid, tid),
    -> FOREIGN KEY (pid) REFERENCES Passenger_mc23bt029(pid)

    -> );
Query OK, 0 rows affected (0.02 sec)

mysql> DESCRIBE Reservation_mc23bt029;
+-------+-------------+------+-----+---------+-------+
| Field | Type        | Null | Key | Default | Extra |
+-------+-------------+------+-----+---------+-------+
| pid   | int         | NO   | PRI | NULL    |       |
| class | varchar(50) | YES  |     | NULL    |       |
| tid   | int         | NO   | PRI | NULL    |       |
+-------+-------------+------+-----+---------+-------+
3 rows in set (0.00 sec)
```

```
mysql> INSERT INTO Passenger_mc23bt029 (pid, pname, age) VALUES
    -> (0, 'Sachin', 65),
    -> (1, 'Rahul', 66),
    -> (2, 'Sourav', 67),
    -> (3, 'Anil', 69);
Query OK, 4 rows affected (0.01 sec)
Records: 4  Duplicates: 0  Warnings: 0

mysql> INSERT INTO Reservation_mc23bt029 (pid, class, tid) VALUE
S
    -> (0, 'AC', 8200),
    -> (1, 'AC', 8201),
    -> (2, 'SC', 8201),
    -> (2, 'SC', 8204),
    -> (3, 'AC', 8202);
Query OK, 5 rows affected (0.01 sec)
Records: 5  Duplicates: 0  Warnings: 0
```

B. (I)

```
mysql> SELECT
    -> Passenger_mc23bt029.pname,Passenger_mc23bt029.age,Reservation_mc23bt029.class,Reservation_mc23bt029.tid
    -> FROM Passenger_mc23bt029
    -> LEFT JOIN Reservation_mc23bt029 ON Passenger_mc23bt029.pid = Reservation_mc23bt029.pid;
+--------+------+-------+------+
| pname  | age  | class | tid  |
+--------+------+-------+------+
| Sachin |   65 | AC    | 8200 |
| Rahul  |   66 | AC    | 8201 |
| Sourav |   67 | SC    | 8201 |
| Sourav |   67 | SC    | 8204 |
| Anil   |   69 | AC    | 8202 |
+--------+------+-------+------+
5 rows in set (0.00 sec)
```

B. (II)

```
mysql> SELECT class,COUNT(DISTINCT pid) AS total_passengers
    -> FROM Reservation_mc23bt029
    -> GROUP BY class;
+-------+------------------+
| class | total_passengers |
+-------+------------------+
| AC    |                3 |
| SC    |                1 |
+-------+------------------+
2 rows in set (0.01 sec)
```

B. (III)

```
mysql> SELECT Passenger_mc23bt029.pname,Passenger_mc23bt029.
age
    -> FROM Passenger_mc23bt029
    -> JOIN Reservation_mc23bt029 ON Passenger_mc23bt029.pid
 = Reservation_mc23bt029.pid
    -> WHERE Passenger_mc23bt029.age > 65 AND Reservation_mc
23bt029.class = 'AC';
+-------+------+
| pname | age  |
+-------+------+
| Rahul |   66 |
| Anil  |   69 |
+-------+------+
2 rows in set (0.00 sec)
```

B. (IV)

```
mysql> SELECT tid
    -> FROM Reservation_mc23bt029
    -> GROUP BY tid
    -> HAVING COUNT(DISTINCT pid) > 1;
+------+
| tid  |
+------+
| 8201 |
+------+
1 row in set (0.01 sec)
```

B. (V)

```
mysql> SELECT Reservation_mc23bt029.class,AVG(Passenger_mc23
bt029.age) AS average_age
    -> FROM Reservation_mc23bt029
    -> JOIN Passenger_mc23bt029 ON Reservation_mc23bt029.pid
 = Passenger_mc23bt029.pid
    -> GROUP BY Reservation_mc23bt029.class;
+-------+-------------+
| class | average_age |
+-------+-------------+
| AC    |     66.6667 |
| SC    |     67.0000 |
+-------+-------------+
2 rows in set (0.00 sec)
```

Q2.

A.
CREATION OF TABLES

```
mysql> CREATE TABLE Books_mc23bt029(
    -> book_id INT PRIMARY KEY,
    -> title VARCHAR(30),
    -> genre VARCHAR(30),
    -> year_published INT
    -> );
Query OK, 0 rows affected (0.04 sec)

mysql> DESCRIBE Books_mc23bt029;
+----------------+-------------+------+-----+---------+-------+
| Field          | Type        | Null | Key | Default | Extra |
+----------------+-------------+------+-----+---------+-------+
| book_id        | int         | NO   | PRI | NULL    |       |
| title          | varchar(30) | YES  |     | NULL    |       |
| genre          | varchar(30) | YES  |     | NULL    |       |
| year_published | int         | YES  |     | NULL    |       |
+----------------+-------------+------+-----+---------+-------+
4 rows in set (0.02 sec)
```

```
mysql> DESCRIBE Authors_mc23bt029;
+-------------+-------------+------+-----+---------+-------+
| Field       | Type        | Null | Key | Default | Extra |
+-------------+-------------+------+-----+---------+-------+
| author_id   | int         | NO   | PRI | NULL    |       |
| name        | varchar(30) | YES  |     | NULL    |       |
| nationality | varchar(30) | YES  |     | NULL    |       |
+-------------+-------------+------+-----+---------+-------+
3 rows in set (0.01 sec)
```

```
mysql> CREATE TABLE Members_mc23bt029(
    -> member_id INT PRIMARY KEY,
    -> name VARCHAR(100),
    -> membership_date DATE,
    -> membership_type VARCHAR(30)
    -> );
Query OK, 0 rows affected (0.04 sec)

mysql> DESCRIBE Members_mc23bt029;
```

Field	Type	Null	Key	Default	Extra
member_id	int	NO	PRI	NULL	
name	varchar(100)	YES		NULL	
membership_date	date	YES		NULL	
membership_type	varchar(30)	YES		NULL	

```
4 rows in set (0.01 sec)
```

```
mysql> CREATE TABLE Borrowing_mc23bt029(
    -> borrow_id INT PRIMARY KEY,
    -> member_id INT,
    -> book_id INT,
    -> borrow_date DATE,
    -> return_date DATE,
    -> FOREIGN KEY (member_id) REFERENCES Members_mc23bt029(memb
er_id),
    -> FOREIGN KEY (book_id) REFERENCES Books_mc23bt029(book_id)

    -> );
Query OK, 0 rows affected (0.06 sec)

mysql> DESCRIBE Borrowing_mc23bt029;
```

Field	Type	Null	Key	Default	Extra
borrow_id	int	NO	PRI	NULL	
member_id	int	YES	MUL	NULL	
book_id	int	YES	MUL	NULL	
borrow_date	date	YES		NULL	
return_date	date	YES		NULL	

```
5 rows in set (0.00 sec)
```

```
mysql> CREATE TABLE BookAuthors_mc23bt029 (
    -> book_id INT,
    -> author_id INT,
    -> PRIMARY KEY (book_id, author_id),
    -> FOREIGN KEY (book_id) REFERENCES Books_mc23bt029(book_id),
    -> FOREIGN KEY (author_id) REFERENCES Authors_mc23bt029(author_id)
    -> );
Query OK, 0 rows affected (0.07 sec)

mysql> DESCRIBE BookAuthors_mc23bt029;
+-----------+------+------+-----+---------+-------+
| Field     | Type | Null | Key | Default | Extra |
+-----------+------+------+-----+---------+-------+
| book_id   | int  | NO   | PRI | NULL    |       |
| author_id | int  | NO   | PRI | NULL    |       |
+-----------+------+------+-----+---------+-------+
2 rows in set (0.04 sec)
```

INSERTION OF DATA

```
mysql> INSERT INTO Books_mc23bt029 (book_id, title, genre, year_
published) VALUES
    -> (1, 'To Kill a Mockingbird', 'Fiction', 1960),
    -> (2, '1984', 'Dystopian', 1949),
    -> (3, 'Pride and Prejudice', 'Romance', 1813),
    -> (4, 'The Great Gatsby', 'Fiction', 1925),
    -> (5, 'Moby-Dick', 'Adventure', 1851),
    -> (6, 'War and Peace', 'Historical Fiction', 1869),
    -> (7, 'The Catcher in the Rye', 'Fiction', 1951);
Query OK, 7 rows affected (0.02 sec)
Records: 7  Duplicates: 0  Warnings: 0
```

```
mysql> INSERT INTO Authors_mc23bt029 (author_id, name, nationali
ty) VALUES
    -> (1, 'Harper Lee', 'American'),
    -> (2, 'George Orwell', 'British'),
    -> (3, 'Jane Austen', 'British'),
    -> (4, 'F. Scott Fitzgerald', 'American'),
    -> (5, 'Herman Melville', 'American'),
    -> (6, 'Leo Tolstoy', 'Russian'),
    -> (7, 'J.D. Salinger', 'American');
Query OK, 7 rows affected (0.01 sec)
Records: 7  Duplicates: 0  Warnings: 0
```

```
mysql> INSERT INTO Members_mc23bt029 (member_id, name, membershi
p_date, membership_type) VALUES
    -> (1, 'Alice Johnson', '2023-01-15', 'Regular'),
    -> (2, 'Bob Smith', '2023-02-10', 'Premium'),
    -> (3, 'Carol Williams', '2023-03-05', 'Regular'),
    -> (4, 'David Brown', '2023-04-20', 'Premium'),
    -> (5, 'Eve Davis', '2023-05-15', 'Regular');
Query OK, 5 rows affected (0.01 sec)
Records: 5  Duplicates: 0  Warnings: 0
```

```
mysql> INSERT INTO Borrowing_mc23bt029 (borrow_id, member_id, bo
ok_id, borrow_date, return_date) VALUES
    -> (1, 1, 1, '2023-07-01', '2023-07-15'),
    -> (2, 2, 2, '2023-07-05', '2023-07-20'),
    -> (3, 3, 3, '2023-07-10', '2023-07-24'),
    -> (4, 4, 1, '2023-07-12', '2023-07-26'),
    -> (5, 5, 2, '2023-07-15', '2023-07-29');
Query OK, 5 rows affected (0.01 sec)
Records: 5  Duplicates: 0  Warnings: 0
```

```
mysql> INSERT INTO BookAuthors_mc23bt029 (book_id, author_id) VA
LUES

    -> (1, 1),
    -> (2, 2),
    -> (3, 3),
    -> (4, 4),
    -> (5, 5),
    -> (6, 6);
Query OK, 6 rows affected (0.01 sec)
Records: 6  Duplicates: 0  Warnings: 0
```

B.

B.(I)

```
mysql> SELECT Books_mc23bt029.title,Books_mc23bt029.genre,Borrowing_mc2
3bt029.borrow_date,Borrowing_mc23bt029.return_date
    -> FROM Books_mc23bt029
    -> JOIN Borrowing_mc23bt029 ON Books_mc23bt029.book_id = Borrowing_
mc23bt029.book_id
    -> JOIN Members_mc23bt029 ON Borrowing_mc23bt029.member_id = Member
s_mc23bt029.member_id
    -> WHERE Members_mc23bt029.name = 'Alice Johnson';
+-----------------------+---------+-------------+-------------+
| title                 | genre   | borrow_date | return_date |
+-----------------------+---------+-------------+-------------+
| To Kill a Mockingbird | Fiction | 2023-07-01  | 2023-07-15  |
+-----------------------+---------+-------------+-------------+
1 row in set (0.00 sec)
```

B.(II)

```
mysql> SELECT
    -> Books_mc23bt029.title,
    -> Authors_mc23bt029.name AS author_name
    -> FROM Books_mc23bt029
    -> JOIN BookAuthors_mc23bt029 ON Books_mc23bt029.book_id = B
ookAuthors_mc23bt029.book_id
    -> JOIN Authors_mc23bt029 ON BookAuthors_mc23bt029.author_id
 = Authors_mc23bt029.author_id;
+-----------------------+-----------------------+
| title                 | author_name           |
+-----------------------+-----------------------+
| To Kill a Mockingbird | Harper Lee            |
| 1984                  | George Orwell         |
| Pride and Prejudice   | Jane Austen           |
| The Great Gatsby      | F. Scott Fitzgerald   |
| Moby-Dick             | Herman Melville       |
| War and Peace         | Leo Tolstoy           |
+-----------------------+-----------------------+
6 rows in set (0.00 sec)
```

B.(III)

```
mysql> SELECT Members_mc23bt029.name,COUNT(Borrowing_mc23bt029.book_id)
 AS books_borrowed
    -> FROM Members_mc23bt029
    -> LEFT JOIN Borrowing_mc23bt029 ON Members_mc23bt029.member_id = B
orrowing_mc23bt029.member_id
    -> GROUP BY Members_mc23bt029.name;
+-----------------+-----------------+
| name            | books_borrowed  |
+-----------------+-----------------+
| Alice Johnson   |               1 |
| Bob Smith       |               1 |
| Carol Williams  |               1 |
| David Brown     |               1 |
| Eve Davis       |               1 |
+-----------------+-----------------+
5 rows in set (0.01 sec)
```

B.(IV)

```
mysql> SELECT Books_mc23bt029.genre,COUNT(Borrowing_mc23bt029.
book_id) AS Borrow_Count
    -> FROM Books_mc23bt029
    -> JOIN Borrowing_mc23bt029 ON Books_mc23bt029.book_id=Bor
rowing_mc23bt029.book_id
    -> GROUP BY Books_mc23bt029.genre
    -> ORDER BY Borrow_Count DESC;
+-----------+--------------+
| genre     | Borrow_Count |
+-----------+--------------+
| Fiction   |            2 |
| Dystopian |            2 |
| Romance   |            1 |
+-----------+--------------+
3 rows in set (0.01 sec)
```

B.(V)

```
mysql> SELECT Books_mc23bt029.title
    -> FROM Books_mc23bt029
    -> LEFT JOIN Borrowing_mc23bt029 ON Books_mc23bt029.book_id = Borro
wing_mc23bt029.book_id
    -> WHERE Borrowing_mc23bt029.book_id IS NULL;
+------------------------+
| title                  |
+------------------------+
| The Great Gatsby       |
| Moby-Dick              |
| War and Peace          |
| The Catcher in the Rye |
+------------------------+
4 rows in set (0.00 sec)
```

B.(VI)

```
mysql> SELECT Members_mc23bt029.name AS member_name,Books_mc23bt029.tit
le,Borrowing_mc23bt029.borrow_date
    -> FROM Members_mc23bt029
    -> JOIN Borrowing_mc23bt029 ON Members_mc23bt029.member_id = Borrow
ing_mc23bt029.member_id
    -> JOIN Books_mc23bt029 ON Borrowing_mc23bt029.book_id = Books_mc23
bt029.book_id
    -> WHERE Borrowing_mc23bt029.borrow_date < '2023-07-10';
+---------------+-----------------------+-------------+
| member_name   | title                 | borrow_date |
+---------------+-----------------------+-------------+
| Alice Johnson | To Kill a Mockingbird | 2023-07-01  |
| Bob Smith     | 1984                  | 2023-07-05  |
+---------------+-----------------------+-------------+
2 rows in set (0.00 sec)
```

B.(VII)

```
mysql> SELECT Authors_mc23bt029.name
    -> FROM Authors_mc23bt029
    -> JOIN BookAuthors_mc23bt029 ON Authors_mc23bt029.author_id = Book
Authors_mc23bt029.author_id
    -> GROUP BY Authors_mc23bt029.name
    -> HAVING COUNT(BookAuthors_mc23bt029.book_id) > 1;
Empty set (0.01 sec)
```

B.(VIII)

```
mysql> SELECT Books_mc23bt029.book_id,Books_mc23bt029.title,Books_mc23bt029.genre,Books_mc23bt029.year_published,Authors_mc2
3bt029.name AS author_name,
    ->      Authors_mc23bt029.nationality AS author_nationality
    -> FROM Books_mc23bt029
    -> JOIN BookAuthors_mc23bt029 ON Books_mc23bt029.book_id = BookAuthors_mc23bt029.book_id
    -> JOIN Authors_mc23bt029 ON BookAuthors_mc23bt029.author_id = Authors_mc23bt029.author_id
    -> WHERE Books_mc23bt029.year_published < 1925;
+---------+---------------------+--------------------+----------------+----------------+--------------------+
| book_id | title               | genre              | year_published | author_name    | author_nationality |
+---------+---------------------+--------------------+----------------+----------------+--------------------+
|       3 | Pride and Prejudice | Romance            |           1813 | Jane Austen    | British            |
|       5 | Moby-Dick           | Adventure          |           1851 | Herman Melville| American           |
|       6 | War and Peace       | Historical Fiction |           1869 | Leo Tolstoy    | Russian            |
+---------+---------------------+--------------------+----------------+----------------+--------------------+
3 rows in set (0.00 sec)
```

B.(IX)

```
mysql> SELECT Members_mc23bt029.name AS member_name,COUNT(DISTINCT Books_mc23bt029.genre) AS unique_genres
    -> FROM Members_mc23bt029
    -> JOIN Borrowing_mc23bt029 ON Members_mc23bt029.member_id = Borrowing_mc23bt029.member_id
    -> JOIN Books_mc23bt029 ON Borrowing_mc23bt029.book_id = Books_mc23bt029.book_id
    -> GROUP BY Members_mc23bt029.name
    -> HAVING unique_genres > 1;
Empty set (0.02 sec)
```

B.(X)

```
mysql> SELECT Authors_mc23bt029.nationality,COUNT(Borrowing_mc23bt029.book_id) AS borrow_count
    -> FROM Authors_mc23bt029
    -> JOIN BookAuthors_mc23bt029 ON Authors_mc23bt029.author_id = BookAuthors_mc23bt029.author_id
    -> JOIN Borrowing_mc23bt029 ON BookAuthors_mc23bt029.book_id = Borrowing_mc23bt029.book_id
    -> WHERE Borrowing_mc23bt029.return_date IS NULL
    -> GROUP BY Authors_mc23bt029.nationality;
Empty set (0.00 sec)
```