

Q1 Solution:

a)

--Creating Tables:

(Table name: passenger\_cs23bt065)

```
mysql> CREATE TABLE passenger_cs23bt065 (pid INT PRIMARY KEY,pname VARCHAR(50),age INT);
Query OK, 0 rows affected (0.04 sec)

mysql> describe passenger_cs23bt065;
+-----+-----+-----+-----+-----+-----+
| Field | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| pid   | int           | NO   | PRI | NULL    |       |
| pname | varchar(50)   | YES  |     | NULL    |       |
| age   | int           | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.01 sec)
```

(Table name: Reservation\_cs23bt065)

```
mysql> CREATE TABLE Reservation_cs23bt065 (pid INT ,class VARCHAR(15),tid INT,FOREIGN KEY (pid) REFERENCES passenger_cs23bt065 (pid));
Query OK, 0 rows affected (0.04 sec)

mysql> describe Reservation_cs23bt065;
+-----+-----+-----+-----+-----+-----+
| Field | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| pid   | int           | YES  | MUL | NULL    |       |
| class | varchar(15)   | YES  |     | NULL    |       |
| tid   | int           | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.01 sec)
```

--Inserting Values:

(Table name: passenger\_cs23bt065)

```
mysql> INSERT INTO passenger_cs23bt065 (pid,pname,age) VALUES (0,"Sachin",65),(1,"Rahul",66),(2,"sourav",67),(3,"Anil",69);
Query OK, 4 rows affected (0.03 sec)
Records: 4 Duplicates: 0 Warnings: 0

mysql> SELECT * FROM passenger;
ERROR 1146 (42S02): Table 'CS23BT065.passenger' doesn't exist
mysql> SELECT * FROM passenger_cs23bt065;
+-----+-----+-----+
| pid | pname | age |
+-----+-----+-----+
| 0   | 'Sachin' | 65 |
| 1   | 'Rahul' | 66 |
| 2   | 'sourav' | 67 |
| 3   | 'Anil' | 69 |
+-----+-----+-----+
4 rows in set (0.00 sec)
```

(Table name: Reservation\_cs23bt065)

```
mysql> INSERT INTO Reservation_cs23bt065 (pid,class,tid) VALUES (0,"AC",8200),(1,"AC",8201),(2,"SC",8201),(2,"SC",8204),(3,"AC",8202);
Query OK, 5 rows affected (0.02 sec)
Records: 5 Duplicates: 0 Warnings: 0

mysql> select * from Reservation_cs23bt065;
+----+-----+-----+
| pid | class | tid |
+----+-----+-----+
| 0   | 'AC'  | 8200 |
| 1   | 'AC'  | 8201 |
| 2   | 'SC'  | 8201 |
| 2   | 'SC'  | 8204 |
| 3   | 'AC'  | 8202 |
+----+-----+-----+
5 rows in set (0.00 sec)
```

Q1 Solution:

b) Queries and Output:

i)

```
mysql> SELECT p.pid, p.pname, p.age, r.class, r.tid FROM passenger_cs23bt065 p LEFT JOIN Reservation_cs23bt065 r ON p.pid = r.pid;
+----+-----+-----+-----+-----+
| pid | pname | age | class | tid |
+----+-----+-----+-----+-----+
| 0   | 'Sachin' | 65 | 'AC' | 8200 |
| 1   | 'Rahul' | 66 | 'AC' | 8201 |
| 2   | 'sourav' | 67 | 'SC' | 8201 |
| 2   | 'sourav' | 67 | 'SC' | 8204 |
| 3   | 'Anil' | 69 | 'AC' | 8202 |
+----+-----+-----+-----+-----+
5 rows in set (0.01 sec)
```

ii)

```
mysql> SELECT class, COUNT(DISTINCT pid) AS total_passengers FROM Reservation_cs23bt065 GROUP BY class;
+-----+-----+
| class | total_passengers |
+-----+-----+
| 'AC' | 3 |
| 'SC' | 1 |
+-----+-----+
2 rows in set (0.01 sec)
```

iii)

```
mysql> SELECT p.pname, p.age FROM passenger_cs23bt065 p JOIN Reservation_cs23bt065 r ON p.pid = r.pid WHERE p.age > 65 AND r.class = "AC";
+-----+-----+
| pname | age |
+-----+-----+
| 'Rahul' | 66 |
| 'Anil' | 69 |
+-----+-----+
2 rows in set (0.00 sec)
```

iv)

```
mysql> SELECT tid FROM Reservation_cs23bt065 GROUP BY tid HAVING COUNT(DISTINCT pid) > 1;
+-----+
| tid |
+-----+
| 8201 |
+-----+
1 row in set (0.00 sec)
```

v)

```
mysql> SELECT r.class, AVG(p.age) AS average_age FROM passenger_cs23bt065 p JOIN Reservation_cs23bt065 r ON p.pid = r.pid GROUP BY r.class;
+-----+-----+
| class | average_age |
+-----+-----+
| 'AC'   | 66.6667     |
| 'SC'   | 67.0000     |
+-----+-----+
2 rows in set (0.00 sec)
```

Q2 Solution:

a)

--Creating Tables:

i) (Table Name: Books\_cs23bt065)

```
mysql> CREATE TABLE Books_cs23bt065 (book_id INT PRIMARY KEY, title VARCHAR(100), genre VARCHAR(50), year_published INT);
Query OK, 0 rows affected (0.04 sec)

mysql> describe Books_cs23bt065;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| book_id    | int           | NO   | PRI | NULL    |       |
| title      | varchar(100)  | YES  |     | NULL    |       |
| genre      | varchar(50)   | YES  |     | NULL    |       |
| year_published | int          | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)
```

ii) (Table Name: Authors\_cs23bt065)

```
mysql> CREATE TABLE Authors_cs23bt065 (author_id INT PRIMARY KEY, name VARCHAR(100), nationality VARCHAR(50));
Query OK, 0 rows affected (0.05 sec)

mysql> describe Authors_cs23bt065;
+-----+-----+-----+-----+-----+-----+
| Field      | Type          | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| author_id  | int           | NO   | PRI | NULL    |       |
| name       | varchar(100)  | YES  |     | NULL    |       |
| nationality | varchar(50)   | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
3 rows in set (0.01 sec)
```

iii) (Table Name: Members\_cs23bt065)

```
mysql> CREATE TABLE Members_cs23bt065 (member_id INT PRIMARY KEY, name VARCHAR(100), membership_date DATE, membership_type VARCHAR(20));
Query OK, 0 rows affected (0.04 sec)

mysql> describe Members_cs23bt065;
+-----+-----+-----+-----+-----+-----+
| 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(20)  | YES  |     | NULL    |       |
+-----+-----+-----+-----+-----+-----+
4 rows in set (0.00 sec)
```

iv) (Table Name: Borrowing\_cs23bt065)

```
mysql> CREATE TABLE Borrowing_cs23bt065 (borrow_id INT PRIMARY KEY, member_id INT, book_id INT, borrow_date DATE, return_date DATE, FOREIGN KEY (member_id) REFERENCES Members_cs23bt065 (member_id), FOREIGN KEY (book_id) REFERENCES Books_cs23bt065 (book_id));
Query OK, 0 rows affected (0.06 sec)

mysql> describe Borrowing_cs23bt065;
+-----+-----+-----+-----+-----+-----+
| 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 (0.01 sec)
```

v) (Table Name:BookAuthors\_cs23bt065)

```
mysql> CREATE TABLE BookAuthors_cs23bt065 (book_id INT, author_id INT, FOREIGN KEY (book_id) REFERENCES Books_cs23bt065 (book_id), FOREIGN KEY (author_id) REFERENCES Authors_cs23bt065 (author_id));
Query OK, 0 rows affected (0.05 sec)

mysql> describe BookAuthors_cs23bt065;
+-----+-----+-----+-----+-----+-----+
| Field | Type | Null | Key | Default | Extra |
+-----+-----+-----+-----+-----+-----+
| book_id | int | YES | MUL | NULL | |
| author_id | int | YES | MUL | NULL | |
+-----+-----+-----+-----+-----+-----+
2 rows in set (0.00 sec)
```

--Inserting Values:

i) (Table Name: Books\_cs23bt065)

```
mysql> INSERT INTO Books_cs23bt065 (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 (0.01 sec)
Records: 7 Duplicates: 0 Warnings: 0

mysql> select * from Books_cs23bt065;
+-----+-----+-----+-----+
| book_id | title | genre | year_published |
+-----+-----+-----+-----+
| 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 |
+-----+-----+-----+-----+
7 rows in set (0.00 sec)
```

ii) (Table Name: Authors\_cs23bt065)

```
mysql> INSERT INTO Authors_cs23bt065 (author_id, name, nationality) 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 (0.02 sec)
Records: 7 Duplicates: 0 Warnings: 0

mysql> select * from Authors_cs23bt065;
+-----+-----+-----+
| author_id | name | nationality |
+-----+-----+-----+
| 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' |
+-----+-----+-----+
7 rows in set (0.00 sec)
```

iii) (Table Name: Members\_cs23bt065)

```
mysql> INSERT INTO Members_cs23bt065 (member_id, name, membership_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 (0.02 sec)
Records: 5 Duplicates: 0 Warnings: 0

mysql> select * from Members_cs23bt065;
+-----+-----+-----+-----+
| member_id | name | membership_date | membership_type |
+-----+-----+-----+-----+
| 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' |
+-----+-----+-----+-----+
5 rows in set (0.00 sec)
```

iv) (Table Name: Borrowing\_cs23bt065)

```
mysql> INSERT INTO Borrowing_cs23bt065 (borrow_id, member_id, book_id, borrow_date, return_date) VALUES (1, 1, 1, '2023-07-01', '2023-07-15'), (2, 1, 2, '2023-07-05', '2023-07-20'), (3, 3, 3, '2023-07-10', '2023-07-24'), (4, 1, 7, '2023-07-12', '2023-07-26'), (5, 5, 2, '2023-07-15', '2023-07-29');
Query OK, 5 rows affected (0.02 sec)
Records: 5 Duplicates: 0 Warnings: 0

mysql> select * from Borrowing_cs23bt065;
+-----+-----+-----+-----+-----+
| borrow_id | member_id | book_id | borrow_date | return_date |
+-----+-----+-----+-----+-----+
| 1 | 1 | 1 | 2023-07-01 | 2023-07-15 |
| 2 | 1 | 2 | 2023-07-05 | 2023-07-20 |
| 3 | 3 | 3 | 2023-07-10 | 2023-07-24 |
| 4 | 1 | 7 | 2023-07-12 | 2023-07-26 |
| 5 | 5 | 2 | 2023-07-15 | 2023-07-29 |
+-----+-----+-----+-----+-----+
5 rows in set (0.00 sec)
```

v) (Table Name: BookAuthors\_cs23bt065)

```
mysql> INSERT INTO BookAuthors_cs23bt065 (book_id, author_id) VALUES
-> (1, 1), (2, 2), (3, 3), (4, 4), (5, 5), (6, 6);
Query OK, 6 rows affected (0.02 sec)
Records: 6 Duplicates: 0 Warnings: 0

mysql> select * from BookAuthors;
ERROR 1146 (42S02): Table 'SSL_6.BookAuthors' doesn't exist
mysql> select * from BookAuthors_cs23bt065;
+-----+-----+
| book_id | author_id |
+-----+-----+
| 1 | 1 |
| 2 | 2 |
| 3 | 3 |
| 4 | 4 |
| 5 | 5 |
| 6 | 6 |
+-----+-----+
6 rows in set (0.00 sec)
```

Q2 Solution:

b) Queries and its Output:

i)

```
mysql> SELECT b.title, b.genre, br.borrow_date, br.return_date FROM Books_cs23bt065 b JOIN Borrowing_cs23bt065 br ON b.book_id = br.book_id JOIN Members_cs23bt065 m ON br.member_id = m.member_id WHERE m.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)
```

ii)

```
mysql> SELECT b.title, a.name FROM Books_cs23bt065 b JOIN BookAuthors_cs23bt065 ba ON b.book_id = ba.book_id JOIN Authors_cs23bt065 a ON ba.author_id = a.author_id;
```

title	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)

iii)

```
mysql> SELECT m.name, COUNT(br.book_id) AS borrowed_count FROM Members_cs23bt065 m  
-> LEFT JOIN Borrowing_cs23bt065 br ON m.member_id = br.member_id GROUP BY m.name;
```

name	borrowed_count
'Alice Johnson'	1
'Bob Smith'	1
'Carol Williams'	1
'David Brown'	1
'Eve Davis'	1

5 rows in set (0.00 sec)

iv)

```
mysql> SELECT b.book_id, b.title, b.genre, b.year_published, a.name, a.nationality FROM Books_cs23bt065 b JOIN Borrowing_cs23bt065 br ON b.book_id = br.book_id GROUP BY b.genre ORDER BY borrow_count DESC LIMIT 1;
```

genre	borrow_count
'Fiction'	2

1 row in set (0.00 sec)

v)

```
mysql> SELECT b.title FROM Books_cs23bt065 b LEFT JOIN Borrowing_cs23bt065 br ON b.book_id = br.book_id WHERE br.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)

vi)

```
mysql> SELECT m.name, b.title, br.borrow_date FROM Members_cs23bt065 m JOIN Borrowing_cs23bt065 br ON m.member_id = br.member_id JOIN Books_cs23bt065 b ON br.book_id = b.book_id WHERE br.borrow_date < '2023-07-01';
```

name	title	borrow_date
'Alice Johnson'	'To Kill a Mockingbird'	2023-07-01
'Bob Smith'	'1984'	2023-07-05

2 rows in set (0.01 sec)

vii)

```
mysql> SELECT a.name FROM Authors_cs23bt065 a JOIN BookAuthors_cs23bt065 ba ON a.author_id = ba.author_id GROUP BY a.name HAVING COUNT(ba.book_id) > 1;
```

Empty set (0.00 sec)

```
mysql>
```

viii)

```
mysql> SELECT a.name FROM Authors_cs23bt065 a JOIN BookAuthors_cs23bt065 ba ON a.author_id = ba.author_id mysql> SELECT b.book_id, b.title, b.genre, b.year_published, a.name, a.nationality FROM Books_cs23bt065 b JOIN BookAuthors_cs23bt065 ba ON b.book_id = ba.book_id JOIN Authors_cs23bt065 a ON ba.author_id = a.author_id WHERE b.year_published < 1925;
```

book_id	title	genre	year_published	name	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 (0.01 sec)

ix) and x)

```
mysql> SELECT m.name, COUNT(DISTINCT b.genre) AS unique_genres FROM Members_cs23bt065 m JOIN Borrowing_cs23bt065 br ON m.member_id = br.member_id JOIN Books_cs23bt065 b ON br.book_id = b.book_id GROUP BY m.name
HAVING unique_genres > 1;
Empty set (0.00 sec)

mysql> SELECT a.nationality, COUNT(br.book_id) AS borrow_count FROM Authors_cs23bt065 a JOIN BookAuthors_cs23bt065 ba ON a.author_id = ba.author_id JOIN Borrowing_cs23bt065 br ON ba.book_id = br.book_id WHERE
br.return_date IS NULL GROUP BY a.nationality;
Empty set (0.00 sec)
```