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Subject:	ADBMS
Section:	622-B

Ans 4.3:

Code:

```
CREATE TABLE StudentEnrollments (
   student_id INT PRIMARY KEY,
   student_name VARCHAR(100),
   course_id VARCHAR(10),
   enrollment_date DATE
);
INSERT INTO StudentEnrollments (student_id, student_name, course_id,
enrollment_date)
VALUES
(1, 'Ashish', 'CSE101', '2024-06-01'),
(2, 'Smaran', 'CSE102', '2024-06-01'),
(3, 'Vaibhav', 'CSE103', '2024-06-01');
```

```
#Part A
START TRANSACTION;

-- Step 1: Lock row with student_id = 1
UPDATE StudentEnrollments
SET course_id = 'CSE201'
WHERE student_id = 1;

-- Step 2: Later tries to lock student_id = 2
UPDATE StudentEnrollments
SET course_id = 'CSE301'
WHERE student_id = 2;
#Part B
START TRANSACTION;

-- Step 1: Lock row with student_id = 2
UPDATE StudentEnrollments
SET course_id = 'CSE202'
WHERE student_id = 2;

-- Step 2: Later tries to lock student_id = 1
UPDATE StudentEnrollments
SET course_id = 'CSE302'
WHERE student_id = 1;
```

```
#Part B: Applying MVCC to Prevent Conflicts
--Transaction 1 (User A - Reader)
START TRANSACTION ISOLATION LEVEL REPEATABLE READ;

-- Reads snapshot data
SELECT student_id, student_name, course_id, enrollment_date
FROM StudentEnrollments
WHERE student_id = 1;

--Transaction 2 (User B - Writer)
START TRANSACTION;

-- Updates same row
UPDATE StudentEnrollments
SET enrollment_date = '2024-07-10'
WHERE student_id = 1;

COMMIT;

# Part C: Comparing Locking vs MVCC
START TRANSACTION;
SELECT * FROM StudentEnrollments WHERE student_id = 1 FOR UPDATE;

UPDATE StudentEnrollments
SET course_id = 'CSE401'
WHERE student_id = 1;
```

START TRANSACTION;

SELECT * FROM StudentEnrollments WHERE student_id = 1;

-- This is BLOCKED until T1 commits

Scenario 2: MVCC (Snapshot Isolation)

Transaction 1 (Writer):

START TRANSACTION;

UPDATE StudentEnrollments

SET course_id = 'CSE402'

WHERE student_id = 1;

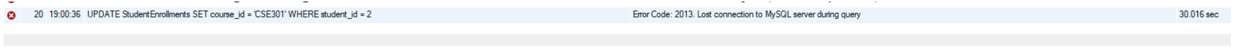
-- Not committed yet

Transaction 2 (Reader):

START TRANSACTION ISOLATION LEVEL REPEATABLE READ;

SELECT * FROM StudentEnrollments WHERE student_id = 1;

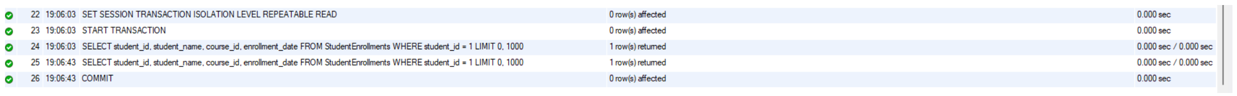
Output:
(A)



```
20  19:00:36  UPDATE StudentEnrollments SET course_id = 'CSE301' WHERE student_id = 2    Error Code: 2013. Lost connection to MySQL server during query    30.016 sec
```

The error “Lost connection to MySQL server during query” occurs because Tab 1 tried to update a row that was already locked by Tab 2.

PART B:

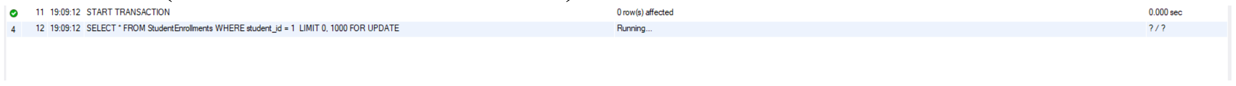


```
22  19:06:03  SET SESSION TRANSACTION ISOLATION LEVEL REPEATABLE READ                                                   0 row(s) affected    0.000 sec
23  19:06:03  START TRANSACTION                                                                                         0 row(s) affected    0.000 sec
24  19:06:03  SELECT student_id, student_name, course_id, enrollment_date FROM StudentEnrollments WHERE student_id = 1 LIMIT 0, 1000   1 row(s) returned    0.000 sec / 0.000 sec
25  19:06:43  SELECT student_id, student_name, course_id, enrollment_date FROM StudentEnrollments WHERE student_id = 1 LIMIT 0, 1000   1 row(s) returned    0.000 sec / 0.000 sec
26  19:06:43  COMMIT                                                                                                    0 row(s) affected    0.000 sec
```

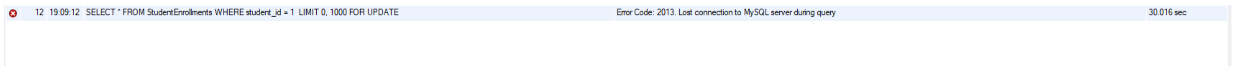
PART C:

Scenario 1

Session A (Transaction 1 - Locks row)



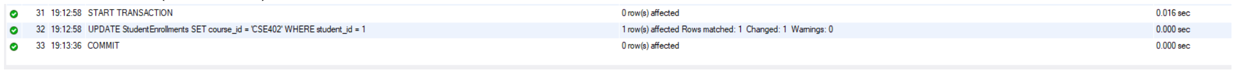
```
   11  19:09:12  START TRANSACTION                                                            0 row(s) affected   0.000 sec
4  12  19:09:12  SELECT * FROM StudentEnrollments WHERE student_id = 1  LIMIT 0, 1000 FOR UPDATE   Running...          ? / ?
```



```
12  19:09:12  SELECT * FROM StudentEnrollments WHERE student_id = 1  LIMIT 0, 1000 FOR UPDATE   Error Code: 2013. Lost connection to MySQL server during query   30.016 sec
```

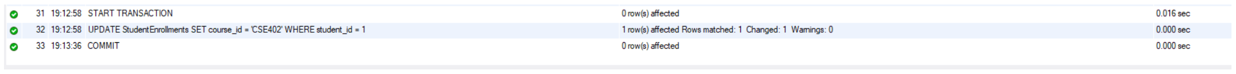
Scenario 2

Session A(Writer)



```
31  19:12:58  START TRANSACTION                                                  0 row(s) affected                                         0.016 sec
32  19:12:58  UPDATE StudentEnrollments SET course_id = 'CSE402' WHERE student_id = 1   1 row(s) affected Rows matched: 1  Changed: 1  Warnings: 0   0.000 sec
33  19:13:36  COMMIT                                                             0 row(s) affected                                         0.000 sec
```

Session B(reader)



```
31  19:12:58  START TRANSACTION                                                  0 row(s) affected                                         0.016 sec
32  19:12:58  UPDATE StudentEnrollments SET course_id = 'CSE402' WHERE student_id = 1   1 row(s) affected Rows matched: 1  Changed: 1  Warnings: 0   0.000 sec
33  19:13:36  COMMIT                                                             0 row(s) affected                                         0.000 sec
```