Question 01)

Steps for the populate the table:

1. Create the tables of courses and modules.
2. Write the PL/SQL procedure to insert records into both tables with validation.
3. Populate the tables using data from the appendix.

1. Create the tables of courses and modules

```
-- Create the course and modules tables
CREATE TABLE course (
  course_id VARCHAR2(13) NOT NULL PRIMARY KEY,
  title VARCHAR2(200),
  description VARCHAR2(2000),
  course_leader VARCHAR2(200),
  date_modified DATE,
  number_of_credits NUMBER
);

CREATE TABLE modules (
  module_id VARCHAR2(100) NOT NULL PRIMARY KEY,
  course_id VARCHAR2(13) REFERENCES course (course_id)
);
```

SQL Worksheet

```
2  CREATE TABLE course (
3     course_id VARCHAR2(13) NOT NULL PRIMARY KEY,
4     title VARCHAR2(200),
5     description VARCHAR2(2000),
6     course_leader VARCHAR2(200),
7     date_modified DATE,
8     number_of_credits NUMBER
9  );
10
11 -- Create the modules table
12 CREATE TABLE modules (
13    module_id VARCHAR2(100) NOT NULL PRIMARY KEY,
14    course_id VARCHAR2(13) REFERENCES course (course_id)
15 );
16
```

```
Table created.

Table created.
```

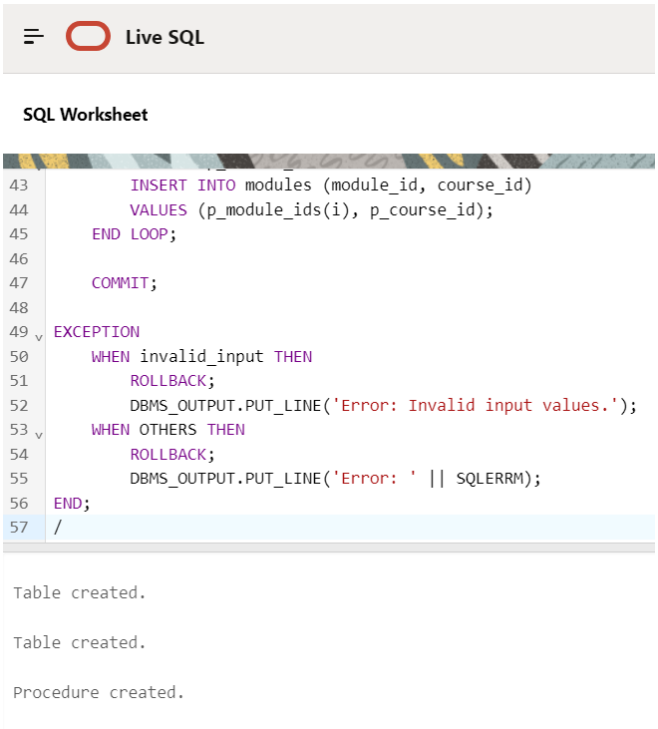
2. Write the PL/SQL procedure to insert records into both tables with validation.

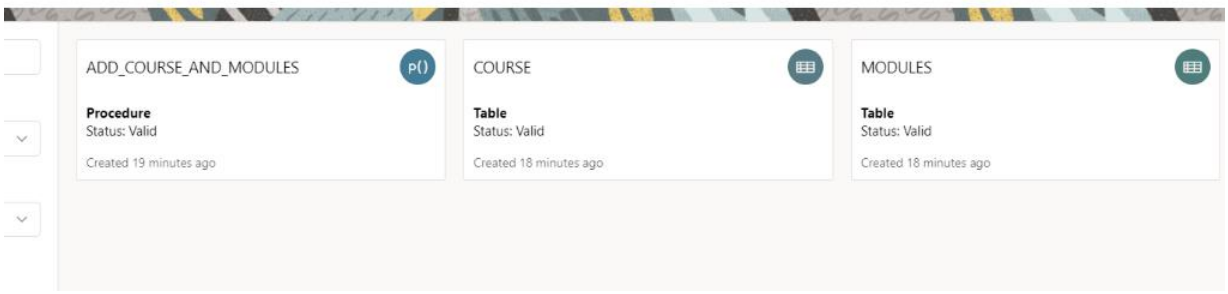
```
CREATE OR REPLACE PROCEDURE add_course_and_modules (
    p_course_id       IN VARCHAR2,
    p_title           IN VARCHAR2,
    p_description     IN VARCHAR2,
    p_course_leader   IN VARCHAR2,
    p_date_modified   IN DATE,
    p_number_of_credits IN NUMBER,
    p_module_ids      IN SYS.ODCIVARCHAR2LIST -- Using Oracle's collection type
) IS
    -- Exception to handle invalid input
    invalid_input EXCEPTION;
BEGIN
    -- Validate input for course_id, title, course_leader, and number_of_credits
    IF p_course_id IS NULL OR p_title IS NULL OR p_course_leader IS NULL OR p_number_of_credits IS
NULL THEN
        RAISE invalid_input;
    END IF;

    IF p_number_of_credits <= 0 THEN
        RAISE invalid_input;
    END IF;

    -- Insert data into the course table
    INSERT INTO course (
        course_id, title, description, course_leader, date_modified, number_of_credits
    ) VALUES (
        p_course_id, p_title, p_description, p_course_leader, p_date_modified, p_number_of_credits
    );

    -- Insert corresponding modules into the modules table
    FOR i IN 1..p_module_ids.COUNT LOOP
        INSERT INTO modules (module_id, course_id)
        VALUES (p_module_ids(i), p_course_id);
    END LOOP;

    -- Commit the transaction
    COMMIT;

EXCEPTION
    WHEN invalid_input THEN
        -- Rollback in case of invalid input
        ROLLBACK;
```

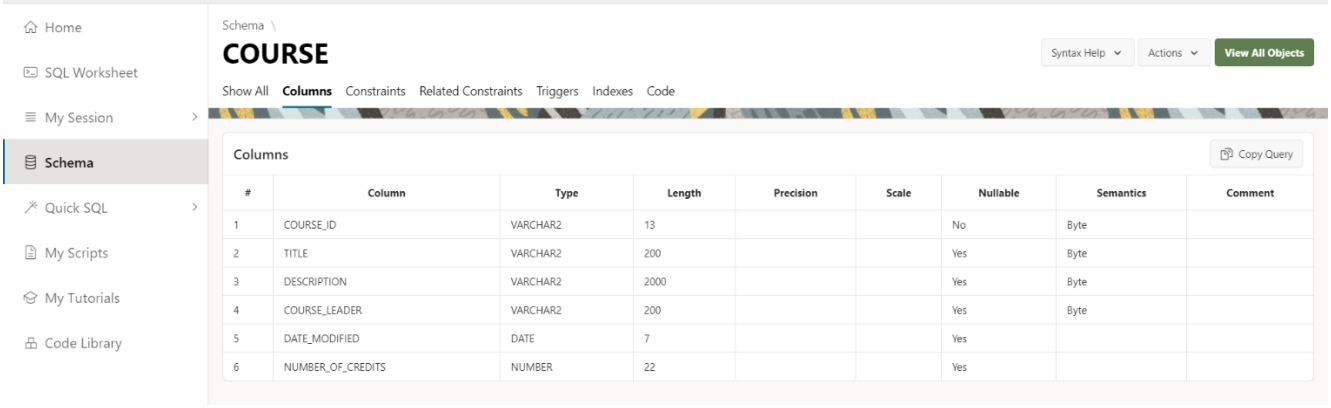
```
    DBMS_OUTPUT.PUT_LINE('Error: Invalid input values.');
  WHEN OTHERS THEN
    -- Handle other exceptions
    ROLLBACK;
    DBMS_OUTPUT.PUT_LINE('Error: ' || SQLERRM);
END;
/
```

Explanation:

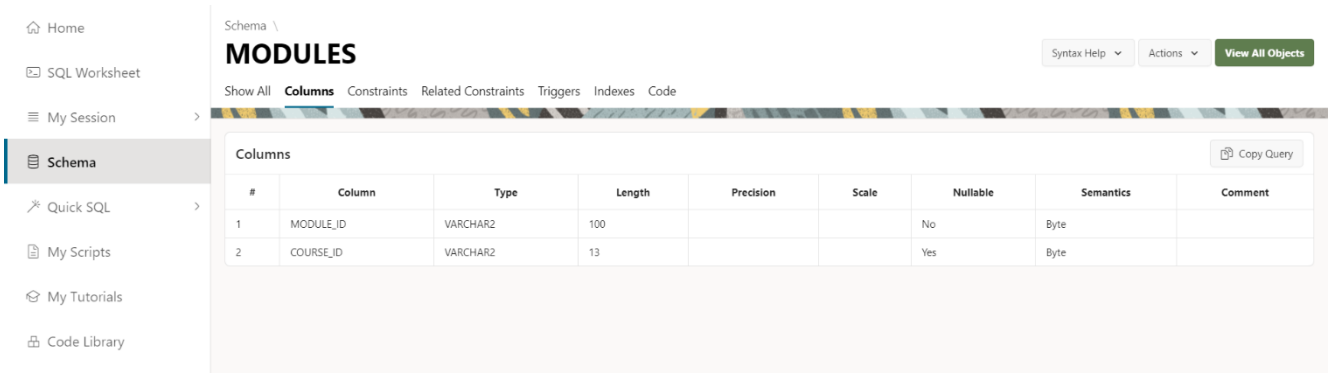
- ***Input Validation:*** *The procedure verifies that if course_id, title, course_leader, and number_of_credits are provided and if number_of_credits is a positive number.*
- ***Inserting Course:*** *This procedure inserts a new course record into the course table.*
- ***Inserting Modules:*** *A collection (Oracle's SYS.ODCIVARCHAR2LIST) is used to pass multiple module_id values, and each module is inserted into the modules table.*
- ***Exception Handling:*** *The transaction is rolled back if any errors are found, including invalid inputs.*







Course columns



Modules columns

3. Populate the Tables using data from the appendix

1. Inserting Course C001 (Computing)

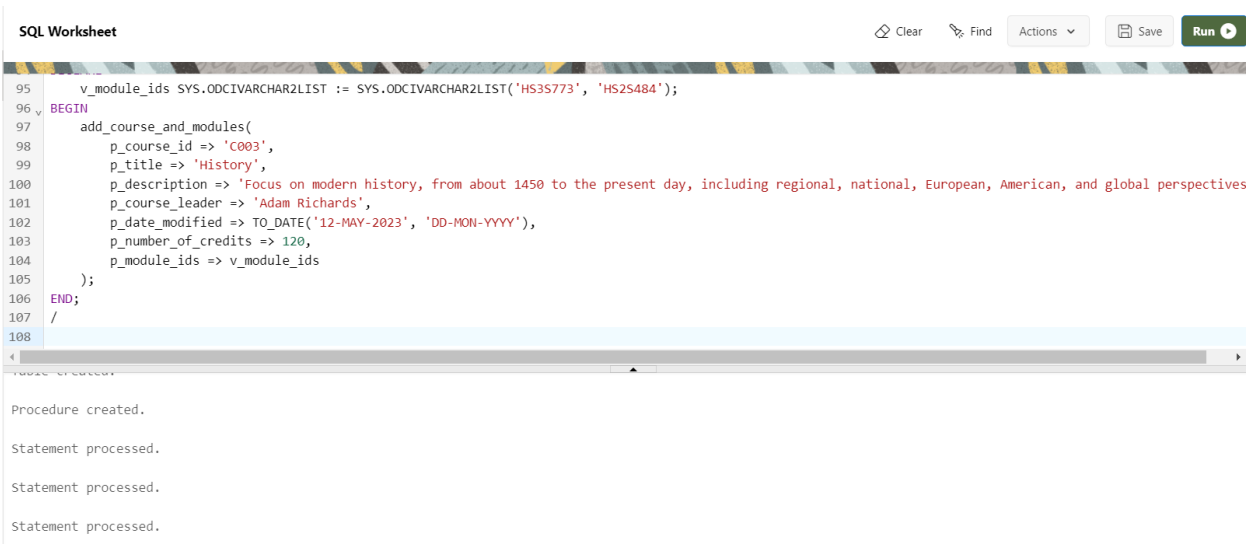
```
DECLARE
  v_module_ids SYS.ODCIVARCHAR2LIST := SYS.ODCIVARCHAR2LIST('IS1S464', 'IS3S662');
BEGIN
  add_course_and_modules(
    p_course_id => 'C001',
    p_title => 'Computing',
    p_description => 'Focuses on developing skills that employers demand for roles in the IT industry.',
    p_course_leader => 'Richard Jones',
    p_date_modified => TO_DATE('20-APR-2024', 'DD-MON-YYYY'),
    p_number_of_credits => 120,
    p_module_ids => v_module_ids
  );
END;
/
```

2. Inserting Course C002 (Business)

```
DECLARE
  v_module_ids SYS.ODCIVARCHAR2LIST := SYS.ODCIVARCHAR2LIST('BS1S737', 'BS3S374');
BEGIN
  add_course_and_modules(
    p_course_id => 'C002',
    p_title => 'Business',
    p_description => 'Focuses on management and looks at the different functions of business and how
they inter-relate.',
    p_course_leader => 'Thomas Page',
    p_date_modified => TO_DATE('03-MAR-2021', 'DD-MON-YYYY'),
    p_number_of_credits => 120,
    p_module_ids => v_module_ids
  );
END;
/
```

3. Inserting Course C003 (History)

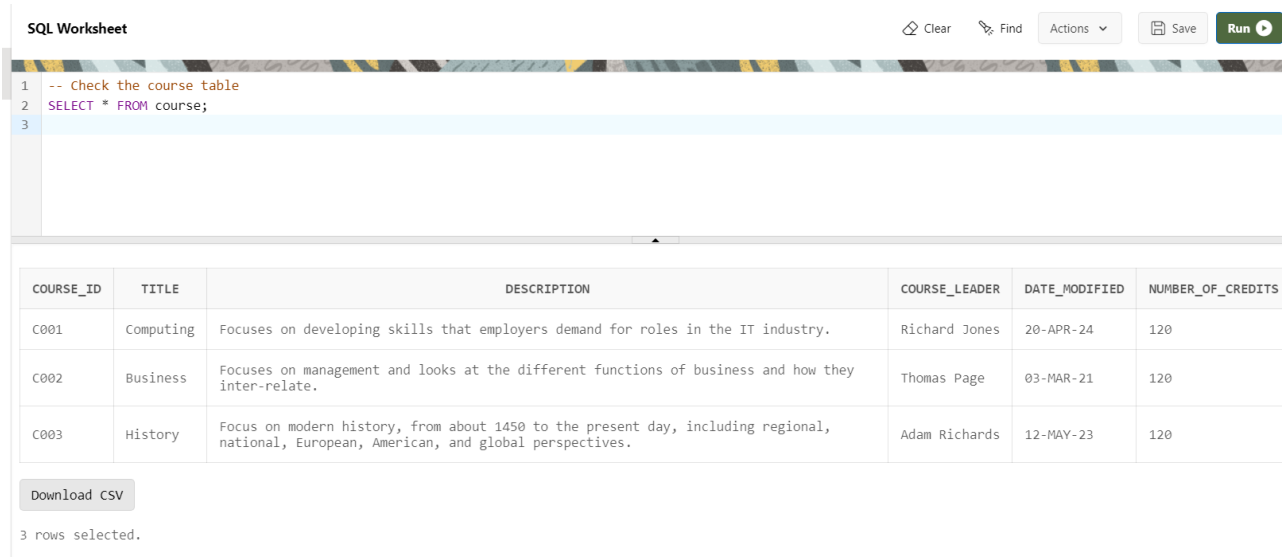
```
DECLARE
  v_module_ids SYS.ODCIVARCHAR2LIST := SYS.ODCIVARCHAR2LIST('HS3S773', 'HS2S484');
BEGIN
  add_course_and_modules(
    p_course_id => 'C003',
    p_title => 'History',
    p_description => 'Focus on modern history, from about 1450 to the present day, including regional,
national, European, American and global perspectives.',
    p_course_leader => 'Adam Richards',
    p_date_modified => TO_DATE('12-MAY-2023', 'DD-MON-YYYY'),
    p_number_of_credits => 120,
    p_module_ids => v_module_ids
  );
END;
/
```



To verify that the records were inserted correctly, run the following SQL queries:

-- Check the course table

SELECT * FROM course;



COURSE_ID	TITLE	DESCRIPTION	COURSE_LEADER	DATE_MODIFIED	NUMBER_OF_CREDITS
C001	Computing	Focuses on developing skills that employers demand for roles in the IT industry.	Richard Jones	20-APR-24	120
C002	Business	Focuses on management and looks at the different functions of business and how they inter-relate.	Thomas Page	03-MAR-21	120
C003	History	Focus on modern history, from about 1450 to the present day, including regional, national, European, American, and global perspectives.	Adam Richards	12-MAY-23	120

Download CSV

3 rows selected.

-- Check the modules table

SELECT * FROM modules;

MODULE_ID	COURSE_ID
IS1S464	C001
IS3S662	C001
BS1S737	C002
BS3S374	C002
HS3S773	C003
HS2S484	C003

Download CSV

6 rows selected.

Whole Script

```
-- 1. Create the course and modules tables
CREATE TABLE course (
  course_id VARCHAR2(13) NOT NULL PRIMARY KEY,
  title VARCHAR2(200),
  description VARCHAR2(2000),
  course_leader VARCHAR2(200),
  date_modified DATE,
  number_of_credits NUMBER
);

CREATE TABLE modules (
  module_id VARCHAR2(100) NOT NULL PRIMARY KEY,
  course_id VARCHAR2(13) REFERENCES course (course_id)
);

-- 2. Create the procedure to insert a new course and modules
CREATE OR REPLACE PROCEDURE add_course_and_modules (
   p_course_id       IN VARCHAR2,
   p_title           IN VARCHAR2,
   p_description     IN VARCHAR2,
   p_course_leader   IN VARCHAR2,
   p_date_modified   IN DATE,
   p_number_of_credits IN NUMBER,
   p_module_ids      IN SYS.ODCIVARCHAR2LIST
) IS
   invalid_input EXCEPTION;
BEGIN
   IF p_course_id IS NULL OR p_title IS NULL OR p_course_leader IS NULL OR p_number_of_credits IS
NULL THEN
      RAISE invalid_input;
   END IF;

   IF p_number_of_credits <= 0 THEN
      RAISE invalid_input;
   END IF;

   INSERT INTO course (
      course_id, title, description, course_leader, date_modified, number_of_credits
   ) VALUES (
      p_course_id, p_title, p_description, p_course_leader, p_date_modified, p_number_of_credits
   );

   FOR i IN 1..p_module_ids.COUNT LOOP
```

```
      INSERT INTO modules (module_id, course_id)
      VALUES (p_module_ids(i), p_course_id);
   END LOOP;

   COMMIT;

EXCEPTION
   WHEN invalid_input THEN
      ROLLBACK;
      DBMS_OUTPUT.PUT_LINE('Error: Invalid input values.');
   WHEN OTHERS THEN
      ROLLBACK;
      DBMS_OUTPUT.PUT_LINE('Error: ' || SQLERRM);
END;
/

-- 3. Insert records into the course and modules tables using the procedure

-- Example for course C001
DECLARE
   v_module_ids SYS.ODCIVARCHAR2LIST := SYS.ODCIVARCHAR2LIST('IS1S464', 'IS3S662');
BEGIN
   add_course_and_modules(
      p_course_id => 'C001',
      p_title => 'Computing',
      p_description => 'Focuses on developing skills that employers demand for roles in the IT industry.',
      p_course_leader => 'Richard Jones',
      p_date_modified => TO_DATE('20-APR-2024', 'DD-MON-YYYY'),
      p_number_of_credits => 120,
      p_module_ids => v_module_ids
   );
END;
/

-- Example for course C002
DECLARE
   v_module_ids SYS.ODCIVARCHAR2LIST := SYS.ODCIVARCHAR2LIST('BS1S737', 'BS3S374');
BEGIN
   add_course_and_modules(
      p_course_id => 'C002',
      p_title => 'Business',
      p_description => 'Focuses on management and looks at the different functions of business and how
they inter-relate.',
      p_course_leader => 'Thomas Page',
```

```
      p_date_modified => TO_DATE('03-MAR-2021', 'DD-MON-YYYY'),
      p_number_of_credits => 120,
      p_module_ids => v_module_ids
   );
END;
/

-- Example for course C003
DECLARE
   v_module_ids SYS.ODCIVARCHAR2LIST := SYS.ODCIVARCHAR2LIST('HS3S773', 'HS2S484');
BEGIN
   add_course_and_modules(
      p_course_id => 'C003',
      p_title => 'History',
      p_description => 'Focus on modern history, from about 1450 to the present day, including regional,
national, European, American, and global perspectives.',
      p_course_leader => 'Adam Richards',
      p_date_modified => TO_DATE('12-MAY-2023', 'DD-MON-YYYY'),
      p_number_of_credits => 120,
      p_module_ids => v_module_ids
   );
END;
/
```