**Question:**

Consider an application which is being developed for a ‘Used Car seller’. For storing various details related to the cars and owners, create the tables according to the schemas given below;

***CAR(Car\_Reg\_No, Brand, Model, Variant, Model\_Year, Color, Year\_Of\_Purchase, Kilometers)***

***OWNER(Owner\_ID, Owner\_Name, Owner\_Phone, License\_Number)***

***OWNER\_CAR(Owner\_ID, Car\_Reg\_No, Price)***

**I - Consider the following as important components while creating the tables;**

a. The columns that are underlined are Primary keys

b. All columns must contain some values.

c. Choose the appropriate data types which would match the most for all the attributes.

d. Use constraint names for all the constraints you create.

e. For table CAR;

          i. Brand should be one of { ‘Maruti’, ‘Ford’, ‘Hyundai’ }

          ii. Color should be one of { ‘Black’, ‘White’, ‘Red’, ‘Blue’ }

          iii. Kilometers should be less than 50000.

f. For table OWNER;

          i. Owner\_ID should start with ‘OID’

          ii. License\_Number should be unique value.

g. For table OWNER\_CAR;

          i. Price should be greater than Rs.150000.

**II - After table creation, write the queries to alter the tables according to the requirements given below;**

a. Add the Foreign Key in OWNER\_CAR table to refer Owner\_ID from OWNER table.

b. Add the Foreign Key in OWNER\_CAR table to refer Car\_Reg\_No from CAR table.

c. Add an attribute Owner\_Address in OWNER table.

d. Add an attribute Test\_Status of the car which accepts character based values.

e. Remove the column Year\_Of\_Purchase from CAR.

f. Remove the column Owner\_Address from OWNER table.

g. Remove the Unique constraint of License\_Number attribute.

h. Remove the color constraint so that any colored cars can be inserted.

i. Add a column Years\_Used to OWNER\_CAR table which stores the number of years the car used by the owner.

j. Remove the table OWNER\_CAR from the database completely.

k. Change the type of License\_Number attribute from character based type to number type.

**Answers:**

***The queries are written in SQL as used in Oracle RDBMS***

**I – Table Creation:**

I have listed the requirements for creating tables as specified in the question in the table given below; Type column in the following table lists the appropriate types for every attribute and Constraints column list the conditions to be satisfied while creating a table.

**Requirement specification for CAR;**

|  |  |  |
| --- | --- | --- |
| **Attributes** | **Type** | **Constraints** |
| Car\_Reg\_No | CHAR  (Because the length of the registration number will not be in varying lengths. They are fixed length values) |          PRIMARY KEY,           NOT NULL |
| Brand | VARCHAR  (Brand name can be of varying length. Hence, it is advisable to use VARCHAR or VARCHAR 2) |          CHECK  (The permitted values are ‘Maruti’, ‘Ford’, ‘Hyundai’ only)           NOT NULL |
| Model | VARCHAR  (Model name is of varying length) |          NOT NULL |
| Variant | VARCHAR  (Variant is like ‘ZXi’, ‘LDi’ etc. But it could be of different length for different brand cars. Hence, VARCHAR would be used) |          NOT NULL |
| Model\_Year | NUMBER  (Stores only year value) |          NOT NULL |
| Color | VARCHAR |          CHECK  (The permitted values for color are ‘Black’, ‘White’, ‘Red’, ‘Blue’ only)           NOT NULL |
| Year\_Of\_Purchase | NUMBER |          NOT NULL |
| Kilometers | NUMBER |          CHECK  (The value should be less than 50000 kilometers)           NOT NULL |

**Query:**

(Convention used - All the words given in ALL CAPS are keywords. All the words represented in RED color are either table names/attribute names. All the words represented in GREEN color are constraint names.)

CREATE TABLE Car

(Car\_Reg\_No CHAR(12) NOT NULL,

Brand VARCHAR(10) NOT NULL,

Model VARCHAR(10) NOT NULL,

Variant VARCHAR(5) NOT NULL,

Model\_Year NUMBER(4) NOT NULL,

Color VARCHAR(10) NOT NULL,

Year\_Of\_Purchase NUMBER(4) NOT NULL,

Kilometers NUMBER(5) NOT NULL,

CONSTRAINT Car\_Reg\_No\_PK PRIMARY KEY (Car\_Reg\_No),

CONSTRAINT Brand\_CK CHECK (Brand IN (‘Maruti’, ‘Ford’, ‘Hyundai’)),

CONSTRAINT Color\_CK CHECK (Color IN (‘Black’, ‘White’, ‘Red’, ‘Blue’)),

CONSTRAINT Km\_CK CHECK (Kilometers < 50000));

**Requirement specification for OWNER;**

|  |  |  |
| --- | --- | --- |
| **Attributes** | **Type** | **Constraints** |
| Owner\_ID | CHAR |          PRIMARY KEY,           CHECK  (every owner id should start with the letters ‘OID’)           NOT NULL |
| Owner\_Name | VARCHAR |          NOT NULL |
| Owner\_Phone | NUMBER |          NOT NULL |
| License\_Number | CHAR |          UNIQUE  (We accept unique values only. Duplicate values should be denied)           NOT NULL |

**Query:**

CREATE TABLE Owner

(Owner\_ID CHAR(10) NOT NULL,

Owner\_Name VARCHAR(30) NOT NULL,

Owner\_Phone NUMBER(10) NOT NULL,

License\_Number CHAR(10) NOT NULL,

CONSTRAINT Owner\_ID\_PK PRIMARY KEY (Owner\_ID),

CONSTRAINT Owner\_ID\_CK CHECK (Owner\_ID LIKE ‘OID%’),

CONSTRAINT LN\_UQ UNIQUE (License\_Number));

**Requirement specification for OWNER\_CAR;**

|  |  |  |
| --- | --- | --- |
| **Attributes** | **Type** | **Constraints** |
| Owner\_ID | CHAR |          PRIMARY KEY,           NOT NULL |
| Car\_Reg\_No | CHAR |          PRIMARY KEY           NOT NULL |
| Price | NUMBER |          CHECK  (Car price should be more than 150000)           NOT NULL |

**Query:**

CREATE TABLE Owner\_Car

(Owner\_ID CHAR(10) NOT NULL,

Car\_Reg\_No CHAR(12) NOT NULL,

Price NUMBER(8) NOT NULL,

CONSTRAINT Owner\_Car\_PK PRIMARY KEY (Owner\_ID, Car\_Reg\_No),

CONSTRAINT Price\_CK CHECK (Price > 150000));

**II – Table Alteration:**

As per the given specification of section I, the tables are created. Let us modify the tables as per the instruction in section II.

a. Add the Foreign Key in OWNER\_CAR table to refer Owner\_ID from OWNER table.

*A FOREIGN KEY can be added using the following syntax;*

*“FOREIGN KEY (attribute\_name\_in\_ForeignKey\_Table) REFERENCES Target\_Table\_Name(attribute\_referred\_in\_Target\_table)”*

**Query II a:**

ALTER TABLE Owner\_Car ADD CONSTRAINT Owner\_FK FOREIGN KEY (Owner\_ID) REFERENCES Owner(Owner\_ID);

b. Add the Foreign Key in OWNER\_CAR table to refer Car\_Reg\_No from CAR table.

**Query II b:**

ALTER TABLE Car ADD CONSTRAINT Car\_FK FOREIGN KEY (Car\_Reg\_No) REFERENCES CAR(Car\_Reg\_No);

c. Add an attribute Owner\_Address in OWNER table.

**Query II c:**

ALTER TABLE Owner ADD Owner\_Address VARCHAR(40) NOT NULL;

d. Add an attribute Test\_Status of the car which accepts character based values.

**Query II d:**

ALTER TABLE Car ADD Test\_Status VARCHAR(10) NOT NULL;

e. Remove the column Year\_Of\_Purchase from CAR.

*The syntax to remove a column from an existing table is “DROP COLUMN column\_name”*

Query II e:

ALTER TABLE Car DROP COLUMN Year\_Of\_Purchase;

f. Remove the column Owner\_Address from OWNER table.

**Query II f:**

ALTER TABLE Owner DROP COLUMN Owner\_Address;

g. Remove the Unique constraint of License\_Number attribute.

*Removing constraints can be done using the syntax “DROP CONSTRAINT constraint\_name”*

**Query II g:**

ALTER TABLE Owner DROP CONSTRAINT LN\_UQ;

*[Recall from the table definition of Owner, LN\_UQ is the name of the UNIQUE constraint]*

h. Remove the color constraint so that any colored cars can be inserted.

**Query II h:**

ALTER TABLE Car DROP CONSTRAINT Color\_CK;

i. Add a column Years\_Used to OWNER\_CAR table which stores the number of years the car used by the owner.

**Query II i:**

ALTER TABLE Owner\_Car ADD Years\_Used NUMBER(2);

j. Remove the table OWNER\_CAR from the database completely.

The syntax for removing a table from the database permanently is “DROP TABLE table\_name”

**Query II j:**

DROP TABLE Owner\_Car;

k. Change the type of License\_Number attribute from character based type to number type.

The syntax for changing the data type or size is “MODIFY COLUMN column\_name datatype”

**Query II k:**

ALTER TABLE Owner MODIFY COLUMN License\_Number NUMBER(10);

[Note: If you would like to change the data type of size of any attribute, then you should delete all the existing records before alteration. This can be done in two ways;

DELETE FROM table\_name;

TRUNCATE TABLE table\_name;]