Database Systems Project – 1
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<u>**Task – 1**</u>

A. **List of Entities:**
   a. Postcard
   b. ThematicCategories
   c. TimePeriod
   d. PostcardCategories

B. **For each attribute:**

Postcard	
p_Id	Int(5)
t_id	Int(5)
title	Varchar(30)
description	Varchar(255)
color	Varchar(15)
condition	Varchar(25)
date	Date
price	Int(10)

TimePeriod	
t_id	Int(5)
time_era	Varchar(25)

ThematicCategories	
cat_Id	Int(5)
category	Varchar(50)

PostcardCategories	
p_id	Int(5)
cat_id	Int(5)

Task – 2

A. Database Schema:
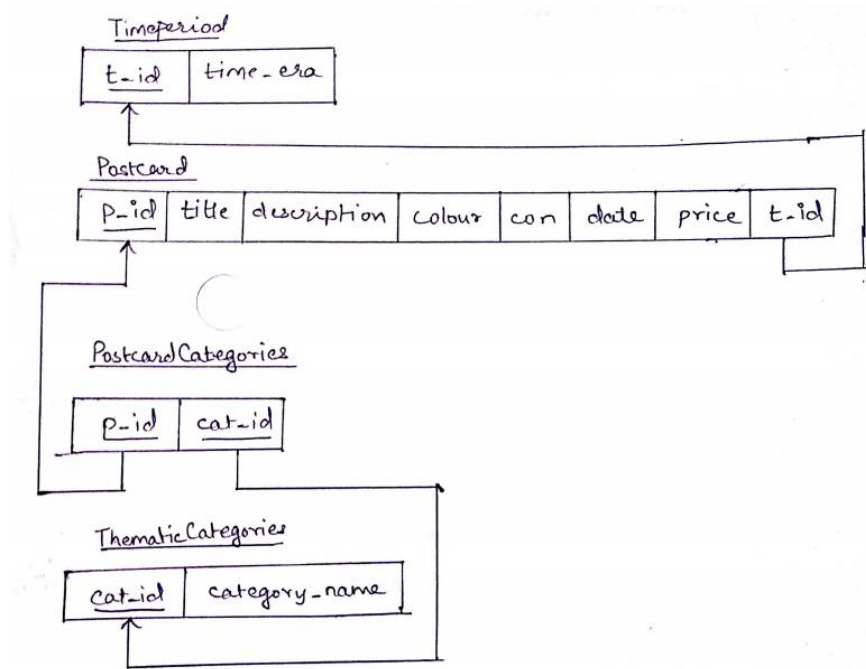
B.

a. About relationships. There are a total of 3 relations

    i. The relation between **Postcard** and **PostcardCategories** defines which category does a postcard belongs to.

    ii. The relationship between **PostcardCategories** and **ThematicCategories** defines each Thematic Category can be related to many tuples of the PostcardCategories. Explicitly, the relationship i. & ii. satisfies the condition of one postcard being associated with many categories, and one category to be associated with many postcards.

    iii. The third relation between **Postcard** and **TimePeriod** states which time era does a single postcard belongs to.

b. Cardinality of relationships:

    i. **Postcard** and **PostcardCategories** is a **many to one** relationship

    ii. **PostcardCategories** and **ThematicCategories** has a **one to many** relationship

    iii. **Postcard** and **TimePeriod** has a **one to one** relationship

C. **Constraints:**
   a. **Primary Key** of Postcard, TimePeriod and ThematicCategories cannot be NULL. This is **Entity Constraints.**
   b. **Foreign Key**: Time_Id in Postcard is a Primary Key: Time_Id in TimePeriod. This is **Referential Integrity Constraints.**
   c. **Foreign Key**: Postcard_Id, **Foreign Key:** Cat_Id in PostcardCategories is a **Primary Key:** Postcard_Id, **Primary Key:** Cat_Id in Postcard and ThematicCategory respectively. This is a **Referential Integrity Constraint**.
   d. There is a Key that uniquely identifies the entity in the schema. This is a **Key Constraint**.

Task – 3

A. **SQL Code to implement Schema:**
- CREATE DATABASE postcard;
- USE postcard;
- CREATE TABLE TimePeriod(t_id int(5) NOT NULL, time_era varchar(25), PRIMARY KEY(t_id));
- CREATE TABLE ThematicCategories(cat_id int(5) NOT NULL, category_name varchar(25), PRIMARY KEY (cat_id));
- CREATE TABLE postcard(p_id int(5) NOT NULL, t_id int(5), title varchar(30), description varchar(255), colour varchar(15),con varchar(25), p_date DATE, price double, PRIMARY KEY(p_id), FOREIGN KEY (t_id) REFERENCES timeperiod (t_id));
- CREATE TABLE postcardcategories(p_id int(5), cat_id int(5), PRIMARY KEY(p_id,cat_id), FOREIGN KEY (p_id) REFERENCES postcard(p_id), FOREIGN KEY (cat_id) REFERENCES thematiccategories(cat_id));
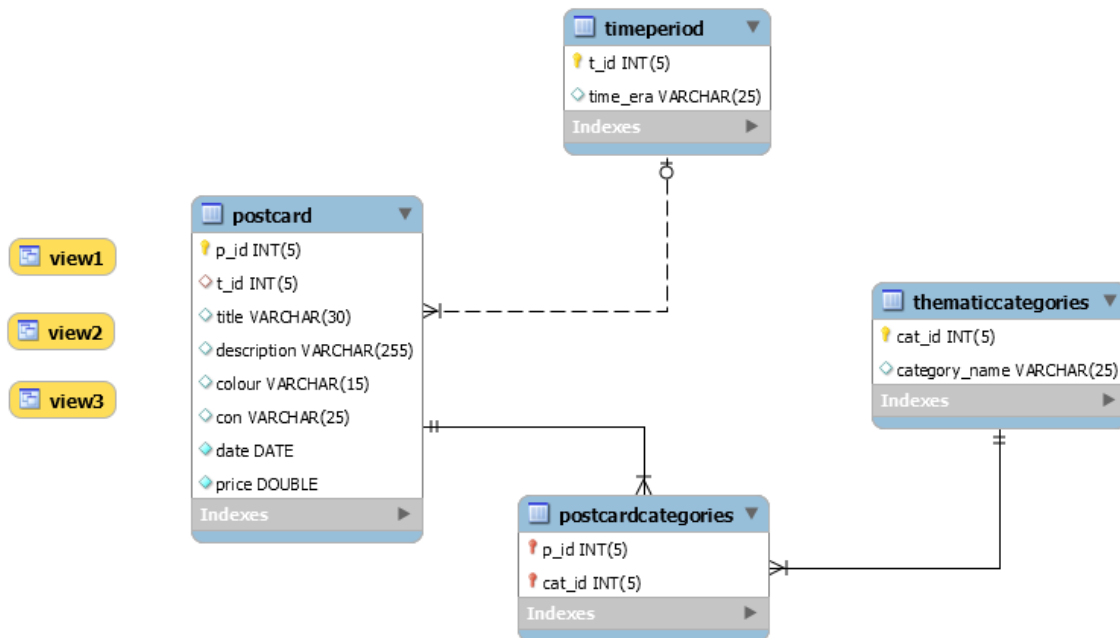
B. **Populate Table**

<u>Time Period:</u>

- INSERT INTO timeperiod(t_id,time_era) VALUES (2,'silverera'), (3,'modernera');

<u>Thematic Categories:</u>

- INSERT INTO thematiccategories(cat_id,category_name) VALUES (1,'nature'),(2,'buildings'),(3,'people');

<u>Postcard:</u>

- INSERT INTO postcard (`p_id`, `t_id`, `title`, `description`, `colour`, `con`,`date`, `price`) VALUES ('1', '1', 'Happy Birthday', 'For Celebrating Birthday', 'b/w', 'mint', '2014-10-05', '21.3'),('2', '3', 'Official Posts', 'Commercial uses of postcards', 'b/w', 'mint', '2011-04-5', '12.33'), ('3', '3', 'Official Posts', 'Commercial uses of postcards', 'b/w', 'acceptable', '2009-9-30', '3.44'), ('4', '2', 'Adventure Sports', 'Cards dedicated towards adventure sports.', 'color', 'very good', '2011-3-3', '14.33'), ('5', '1', 'Adventure Sports', 'Cards dedicated towards adventure sports.', 'color', 'poor', '2008-7-25', '34.5'), ('6', '1', 'Happy Birthday', 'For Celebrating birthday.', 'b/w', 'good', '2013-6-5', '10.25'), ('7', '2', 'Summer', 'Postcards that relate to summer season.', 'color', 'acceptable', '2012-3-9', '6.55'), ('8', '3', 'Get Well Soon', 'Cards to ease people in pain.', 'b/w', 'good', '2007-7-16', '7.66'), ('9', '1', 'European Mail', 'Used at the time of mail in Europe continent.', 'color', 'poor', '2011-9-13', '2.55'), ('10', '1', 'European Mail', 'Used at the time of mail in Europe continent.', 'color', 'acceptable', '2012-3-4', '12.55'), ('11', '1', 'Ancient Mails', 'Postcards used in ancient times as mails', 'b/w', 'poor', '2013-9-13', '133.66'), ('12', '3', 'Gift Postcards', 'Used to greet people with gift.', 'color', 'mint', '2012-2-3', '5.88'), ('13', '2', 'Telegram Postcard', 'Elegant Telegram styled postcard', 'color', 'good', '2014-7-3', '17.35'), ('14', '2', 'Religious Postcards', 'Describes the specific religion', 'b/w', 'good', '2014-10-05', '7.55'), ('15', '2', 'Mauritius', 'Holidays in Mauritius', 'color', 'acceptable', '2011-5-30', '30.22'), ('16', '3', 'Mountains', 'Description about the mountains of Central Asia', 'color', 'good', '2008-3-1', '100'), ('17', '1', 'Architecture', 'About the people and building', 'color', 'good', '2008-3-1', '100');

<u>PostcardCategories:</u>

- INSERT INTO `postcard`.`postcardcategories` (`p_id`, `cat_id`)VALUES ('1', '3'), ('2', '3'), ('3', '3'), ('4', '1'), ('4', '3'), ('5', '1'), ('5', '3'), ('6', '3'), ('7', '1'), ('8', '3'), ('9', '2'), ('9', '3'), ('10', '2'), ('10', '3'), ('11', '2'), ('11', '3'), ('12', '2'), ('12', '3'), ('13', '2'), ('13', '3'), ('14', '1'), ('14', '2'), ('15', '1'), ('15', '3'), ('16', '1'), ('16', '2'), ('17', '1');

C. Initial State of the Database

- TimePeriod:

t_id	time_era
1	goldenera
2	silverera
3	modernera

- ThematicCategories:

cat_id	category_name
1	nature
2	buildings
3	people

- Postcard:

p_id	t_id	title	description	colour	con	date	price
1	1	Happy Birthday	For celebrating birthday	b/w	mint	2014-10-05	21.3
2	3	Official Posts	Commercial uses of postcards	b/w	mint	2011-04-05	4.33
3	3	Official Posts	Commercial uses of postcards	b/w	acceptable	2009-09-30	3.44
4	1	Adventure Sports	Cards dedicated towards adventure sports.	color	very good	2011-03-03	14.33
5	1	Adventure Sports	Cards dedicated towards adventure sports.	color	poor	2008-07-25	34.5
6	1	Happy Birthday	For Celebrating birthday.	b/w	good	2013-06-05	10.25
7	2	Summer	Postcards that relate to summer season.	color	acceptable	2012-03-09	6.55
8	3	Get Well Soon	Cards to ease people in pain.	b/w	good	2007-07-16	7.66
9	1	European Mail	Used at the time of mail in Europe continent.	color	poor	2011-09-13	2.55
10	1	European Mail	Used at the time of mail in Europe continent.	color	acceptable	2012-03-04	12.55
11	1	Ancient Mails	Postcards used in ancient times as mails	b/w	poor	2013-09-13	133.66
12	3	Gift Postcards	Used to greet people with gift.	color	mint	2012-02-03	5.88
13	2	Telegram Postcard	Elegant Telegram styled postcard	color	good	2014-07-03	17.35
14	2	Religious Postcards	Describes the specific religion	b/w	good	2014-10-05	7.55
15	2	Mauritius	Holidays in Mauritius	color	acceptable	2011-05-30	30.22
16	3	Mountains	Description about the mountains of Central Asia	color	good	2008-03-01	100
17	1	Architecture	About the people and their way of living.	color	good	2014-10-05	90.25

- Postcardcategories:

p_id	cat_id
4	1
5	1
7	1
14	1
15	1
16	1
17	1
9	2
10	2
11	2
12	2
13	2
14	2
16	2
1	3
2	3
3	3
4	3
5	3
6	3
8	3
9	3
10	3
11	3
12	3
13	3
15	3

Task – 4

a) SELECT title FROM postcard;

```
mysql> SELECT title FROM postcard;
+---------------------+
| title               |
+---------------------+
| Happy Birthday      |
| Official Posts      |
| Official Posts      |
| Adventure Sports    |
| Adventure Sports    |
| Happy Birthday      |
| Summer              |
| Get Well Soon       |
| European Mail       |
| European Mail       |
| Ancient Mails       |
| Gift Postcards      |
| Telegram Postcard   |
| Religious Postcards |
| Mauritius           |
| Mountains           |
| Architecture        |
+---------------------+
17 rows in set (0.00 sec)
```

b) SELECT count(*) FROM postcard;

```
mysql> SELECT count(*) FROM postcard;
+----------+
| count(*) |
+----------+
|       17 |
+----------+
1 row in set (0.00 sec)
```

c) SELECT title, count(*) FROM postcard GROUP BY title HAVING count(title)=1;

```
mysql> SELECT title, count(*) FROM postcard GROUP BY title HAVING count(title)=1
;
+---------------------+----------+
| title               | count(*) |
+---------------------+----------+
| Ancient Mails       |        1 |
| Architecture        |        1 |
| Get Well Soon       |        1 |
| Gift Postcards      |        1 |
| Mauritius           |        1 |
| Mountains           |        1 |
| Religious Postcards |        1 |
| Summer              |        1 |
| Telegram Postcard   |        1 |
+---------------------+----------+
9 rows in set (0.00 sec)
```

d) SELECT title, count(*) FROM postcard GROUP BY title HAVING count(title)>1;

```
mysql> SELECT title, count(*) FROM postcard GROUP BY title HAVING count(title)>1
;
+------------------+----------+
| title            | count(*) |
+------------------+----------+
| Adventure Sports |        2 |
| European Mail    |        2 |
| Happy Birthday   |        2 |
| Official Posts   |        2 |
+------------------+----------+
4 rows in set (0.00 sec)
```

e) SELECT pc.title, pc.date FROM postcard pc JOIN postcardcategories pd ON pc.p_id=pd.p_id
   WHERE pc.date>'2014-1-1' AND pd.cat_id IN (SELECT cat_id FROM thematiccategories WHERE
   category_name='people');

```
mysql>
mysql> SELECT pc.title, pc.date FROM postcard pc JOIN postcardcategories pd ON p
c.p_id=pd.p_id WHERE pc.date>'2014-1-1' AND pd.cat_id IN (SELECT cat_id FROM the
maticcategories WHERE category_name='people');
+------------------+------------+
| title            | date       |
+------------------+------------+
| Happy Birthday   | 2014-10-05 |
| Telegram Postcard| 2014-07-03 |
+------------------+------------+
2 rows in set (0.00 sec)
```

f) SELECT DISTINCT pc.title, pc.p_id FROM postcard pc JOIN timeperiod t ON pc.t_id=t.t_id JOIN
   postcardcategories pd ON pc.p_id = pd.p_id WHERE pd.cat_id IN (SELECT cat_id FROM
   thematiccategories WHERE category_name='buildings' OR category_name = 'people') AND t.t_id
   IN (SELECT t_id FROM timeperiod WHERE time_era="goldenera");

```
mysql>
mysql> SELECT DISTINCT pc.title, pc.p_id FROM postcard pc JOIN timeperiod t ON p
c.t_id=t.t_id JOIN postcardcategories pd ON pc.p_id = pd.p_id WHERE pd.cat_id IN
 (SELECT cat_id FROM thematiccategories WHERE category_name='buildings' OR categ
ory_name = 'people') AND t.t_id IN (SELECT t_id FROM timeperiod WHERE time_era="
goldenera");
+------------------+------+
| title            | p_id |
+------------------+------+
| European Mail    |    9 |
| European Mail    |   10 |
| Ancient Mails    |   11 |
| Happy Birthday   |    1 |
| Adventure Sports |    4 |
| Adventure Sports |    5 |
| Happy Birthday   |    6 |
+------------------+------+
7 rows in set (0.00 sec)
```

g) SELECT p.title, p.p_id FROM postcard p JOIN (SELECT p_id FROM postcardcategories GROUP BY p_id HAVING count(p_id)>1) pd ON p.p_id=pd.p_id;

```
mysql> SELECT p.title, p.p_id FROM postcard p JOIN (SELECT p_id FROM postcardcat
egories GROUP BY p_id HAVING count(p_id)>1) pd ON p.p_id=pd.p_id;
+----------------------+-------+
| title                | p_id  |
+----------------------+-------+
| Adventure Sports     |    4  |
| Adventure Sports     |    5  |
| European Mail        |    9  |
| European Mail        |   10  |
| Ancient Mails        |   11  |
| Gift Postcards       |   12  |
| Telegram Postcard    |   13  |
| Religious Postcards  |   14  |
| Mauritius            |   15  |
| Mountains            |   16  |
+----------------------+-------+
10 rows in set (0.07 sec)
```

h) SELECT sum(pc.price) AS amount FROM postcard pc JOIN timeperiod t ON pc.t_id=t.t_id WHERE t.t_id IN (SELECT t_id FROM timeperiod WHERE time_era = "silverera");

```
mysql> SELECT sum(pc.price) AS amount FROM postcard pc JOIN timeperiod t ON pc.t
_id=t.t_id WHERE t.t_id IN (SELECT t_id FROM timeperiod WHERE time_era = "silver
era");
+---------+
| amount  |
+---------+
|  61.67  |
+---------+
1 row in set (0.00 sec)
```

i) SELECT pc.con, avg(pc.price) AS average FROM postcard pc GROUP BY con;

```
mysql> SELECT pc.con, avg(pc.price) AS average FROM postcard pc GROUP BY con;
+-------------+---------------------+
| con         | average             |
+-------------+---------------------+
| acceptable  |               13.19 |
| good        |  38.843333333333334 |
| mint        |  10.503333333333334 |
| poor        |   56.90333333333333 |
| very good   |               14.33 |
+-------------+---------------------+
5 rows in set (0.00 sec)
```

j) SELECT max(price) FROM postcard WHERE con!='poor';

```
mysql>
mysql> SELECT max(price) FROM postcard WHERE con!='poor';
+------------+
| max(price) |
+------------+
|        100 |
+------------+
1 row in set (0.00 sec)
```

Task – 5

a) CREATE VIEW view1 AS SELECT title,con,price FROM postcard;

```
mysql> select * FROM view1;
+---------------------+------------+--------+
| title               | con        | price  |
+---------------------+------------+--------+
| Happy Birthday      | mint       |  21.3  |
| Official Posts      | mint       |  4.33  |
| Official Posts      | acceptable |  3.44  |
| Adventure Sports    | very good  | 14.33  |
| Adventure Sports    | poor       |  34.5  |
| Happy Birthday      | good       | 10.25  |
| Summer              | acceptable |  6.55  |
| Get Well Soon       | good       |  7.66  |
| European Mail       | poor       |  2.55  |
| European Mail       | acceptable | 12.55  |
| Ancient Mails       | poor       | 133.66 |
| Gift Postcards      | mint       |  5.88  |
| Telegram Postcard   | good       | 17.35  |
| Religious Postcards | good       |  7.55  |
| Mauritius           | acceptable | 30.22  |
| Mountains           | good       |   100  |
| Architecture        | good       | 90.25  |
+---------------------+------------+--------+
17 rows in set (0.00 sec)
```

b) CREATE VIEW view2 AS SELECT DISTINCT pc.title, t.time_era,c.category_name FROM postcard pc JOIN timeperiod t ON pc.t_id=t.t_id JOIN postcardcategories pd ON pc.p_id = pd.p_id JOIN thematiccategories c ON pd.cat_id = c.cat_id;

```
mysql> select * FROM view2;
+---------------------+-----------+---------------+
| title               | time_era  | category_name |
+---------------------+-----------+---------------+
| Adventure Sports    | goldenera | nature        |
| Architecture        | goldenera | nature        |
| Summer              | silverera | nature        |
| Religious Postcards | silverera | nature        |
| Mauritius           | silverera | nature        |
| Mountains           | modernera | nature        |
| European Mail       | goldenera | buildings     |
| Ancient Mails       | goldenera | buildings     |
| Telegram Postcard   | silverera | buildings     |
| Religious Postcards | silverera | buildings     |
| Gift Postcards      | modernera | buildings     |
| Mountains           | modernera | buildings     |
| Happy Birthday      | goldenera | people        |
| Adventure Sports    | goldenera | people        |
| European Mail       | goldenera | people        |
| Ancient Mails       | goldenera | people        |
| Telegram Postcard   | silverera | people        |
| Mauritius           | silverera | people        |
| Official Posts      | modernera | people        |
| Get Well Soon       | modernera | people        |
| Gift Postcards      | modernera | people        |
+---------------------+-----------+---------------+
21 rows in set (0.00 sec)
```

c) CREATE VIEW view3 AS SELECT c.category_name, avg(p.price) FROM postcard p JOIN postcardcategories pd ON pd.p_id = p.p_id JOIN thematiccategories c ON c.cat_id = pd.cat_id GROUP BY c.category_name;

```
mysql> select * from view3;
+---------------+---------------------+
| category_name | avg(p.price)        |
+---------------+---------------------+
| buildings     |   39.93428571428571 |
| nature        |   40.48571428571428 |
| people        |   22.924615384615382 |
+---------------+---------------------+
3 rows in set (0.00 sec)
```