

[Penalty for plagiarism/copying: You will be awarded 0 for all the problems for this lab test if you are involved in any form of plagiarism/copying and an additional 10 marks will be deducted out of the total of 40 in Lab. All persons involved will be awarded the same penalty irrespective of who has copied from whom. Decision of the lab teachers is final and indisputable in this respect.]

**Read all the instructions carefully.**

1. Consider that we want to design a database that will store details of paintings in an art museum. The following information is given.

Each painting is identified by a painting\_id. We need to maintain the painting\_name, painting\_type (Only choices are oil, water and charcoal) and painting\_start\_date for each painting. For some paintings, painting\_start\_date may not be known.

We need to maintain data about the painters who have drawn the paintings. Each painter is identified by a painter\_cd. Other attributes for painter are painter\_name, date\_of\_birth and date\_of\_death. The date\_of\_death is not needed only for all the currently alive painters.

We need to maintain details of different painting generations. Each such generation is identified by a generation\_cd. We also need to maintain generation\_name, generation\_start\_date and a generation\_end\_date for each generation. Examples of possible values of generation\_name are Renaissance, Victorian, Impressionistic, Cubic, etc. The generation\_start\_date and the generation\_end\_date respectively denote from which date a painting generation started and when it ended. The generation\_end\_date is null for an ongoing generation.

Each painting belongs to only one generation and is drawn by only one painter. Assume there is no restriction on which painter paints which generation of painting.

The museum keeps track of the location of each painting in the museum building. wing\_no, room\_no and capacity (in terms of number of paintings it can keep) have to be maintained for this purpose. The same room no. can repeat in different wings, i.e., there might be room no. 3 in wing no. 1 and also room no. 3 in wing no. 4. Each room can keep more than one painting but can have paintings of up to 2 generations. Paintings of the same painter can be located in different rooms in different wings of the building.

(a) Draw an Entity-relationship (E-R) diagram **on a piece of paper** clearly identifying all the entity sets (both strong and weak if any), relationship sets, cardinalities, participations and attributes (including the type of attribute like key attribute, composite attribute, multi-valued attribute, derived attribute, etc.). Strictly use the notation that uses rectangular boxes to denote entities with attributes inside the rectangles, diamonds to represent relations and cardinality is represented using the format l..h to denote the minimum and maximum cardinality as shown in the diagram given at the end of the question paper. Clearly state any reasonable assumption that you make.

[15 Marks]

- (b) From the ER-Diagram, derive the tables (See the naming convention below) using correct rules for relational model generation from ER model. Draw the database schema **on a piece of paper**. Clearly mark the columns, primary keys and foreign keys for each table. This forms your database schema. There should not be any redundant table in the database schema and also no redundant data.

All your table names must start with your <Roll No> without the first two digits (For example, if your roll number is 18CS10001, your table names must start with CS10001). This should be followed by a random string (Between 3-4 characters long) to complete the table name and NOT derived from the entity/relationship name. We will figure out which table corresponds to which entity/relationship in the ER Diagram. You need not worry about the same. [15 Marks]

- (c) Along with the database schema, write a query statement **on a piece of paper** that would **require** an SQL SELECT statement which has to access all your tables. **YOU DO NOT NEED TO WRITE THE SQL.** [5 Marks]

- (d) Write appropriate CREATE table SQLs to create all your tables in the database (**each table name in the format mentioned above**). You must specify all appropriate data types, keys and constraints. We will test your remaining answers using these CREATE table statements. Hence, these should be valid SQL statements. **Note, these will NOT be written on paper. See submission instructions below.** [10 Marks]

- (e) Write a SELECT statement that retrieves all the painters along with the details of their paintings and corresponding painting generations where the total number of paintings of the painter is at least 2.

Write INSERT statements to insert appropriate rows in the tables that would require execution of the above SQL statement and satisfy the requirements mentioned below. Show the results of execution of the SQL on your dataset using MySQL/Oracle. There should be at least 3 distinct painters returned as a result of the query. Output result format: (painter\_cd, painter\_name, date\_of\_birth, date\_of\_death, painting\_id, painting\_name, painting\_type, painting\_start\_date, generation\_name, generation\_start\_date, generation\_end\_date). [6 (Select Statement) + 8 (Insert Statements) + 6 (Query Results) = 20 Marks]

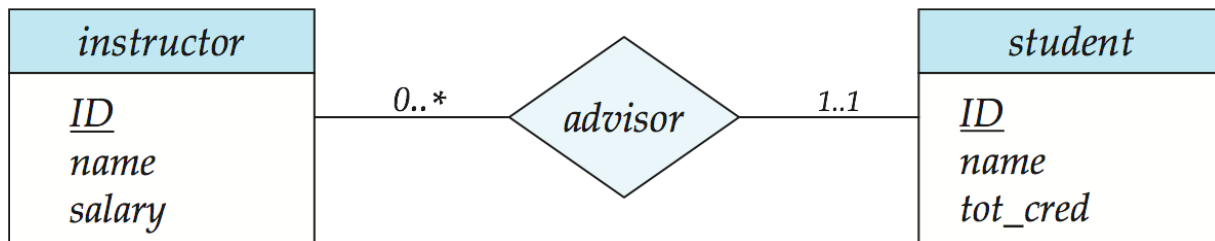
- (f) Write a SELECT statement that gives details of the locations of various paintings that belong to generations which have ended (i.e., generation\_end\_date is NOT NULL) and painted by painters who are currently NOT alive (i.e., they have a NOT NULL date\_of\_death).

Delete all rows inserted for Question (e) and insert appropriate rows in the tables that would require execution of the above SQL statement and satisfy the requirements mentioned below. Show the result of execution of the SQL on this dataset using MySQL/Oracle. There should be at least 3 distinct physical museum rooms (i.e., 3 distinct wing\_no, room\_no combinations) and at least 2 distinct generations in your result set. Output result format: (wing\_no, room\_no, painter\_cd, painter\_name, date\_of\_birth, date\_of\_death, painting\_id, painting\_name, painting\_type, generation\_name, generation\_start\_date, generation\_end\_date). [6 (Select Statement) + 8 (Insert Statements) + 6 (Query Results) = 20 Marks]

Submit the following through appropriate Moodle links:

- i. Scanned copies of the **handwritten** ER-Diagram (Problem a), **handwritten** Database Schema (Problem b) and the **handwritten** problem statement (Problem c). At the top of each page your roll number and name should be written. The maximum total number of such pages can be 8. Formats accepted are: jpeg, png and pdf. No Zip file is allowed. Submit the files against the link for Questions a\_b\_c.
- ii. A text file (**NOT handwritten**) containing all the CREATE table statements for Question d. At the top of the file, your roll number and name should be written. Submit it against the link for Question d.
- iii. A text file (**NOT handwritten**) containing the SELECT statement, the INSERT statements and the Query results (exported in text format from MySQL/Oracle) for Question e. At the end of this file, you should also write DELETE statements to delete all the rows from all the tables that were populated by the INSERT statements. We will use these statements to test the next question (Question f). At the top of the file, your roll number and name should be written. Submit the text file against the link for Question e.
- iv. A text file (**NOT handwritten**) containing the SELECT statement, the INSERT statements and the Query results (exported in text format from MySQL/Oracle) for Question f. At the end of this file, you should also write DELETE statements to delete all the rows from all the tables that were populated by the INSERT statements. We will use these statements to test the previous question (Question e). At the top of the file, your roll number and name should be written. Submit the text file against the link for Question f.

(All your file names should be distinct and they must start with **LT1\_<Roll\_no>**)



**ERD Format (Refer to Question a)**