MODULE NAME:	MODULE CODE:
DATABASES	DBAS6211
DATABASES	DBAS6211d

ASSESSMENT TYPE:	TEST (PAPER ONLY)
TOTAL MARK ALLOCATION:	60 MARKS
TOTAL HOURS:	1 HOUR (+5 minutes reading time)

INSTRUCTIONS:
1. Please adhere to all instructions in the assessment booklet.
2. Independent work is required.
3. Five minutes per hour of the assessment to a maximum of 15 minutes is dedicated to reading time before the start of the assessment. You may make notes on your question paper, but not in your answer sheet. Calculators may not be used during reading time.
4. You may not leave the assessment venue during reading time, or during the first hour or during the last 15 minutes of the assessment.
5. Ensure that your name is on all pieces of paper or books that you will be submitting. Submit all the pages of this assessment's question paper as well as your answer script.
6. Answer all the questions on the answer sheets or in answer booklets provided. The phrase 'END OF PAPER' will appear after the final set question of this assessment.
7. Remember to work at a steady pace so that you are able to complete the assessment within the allocated time. Use the mark allocation as a guideline as to how much time to spend on each section.

Additional instructions:
1. This is an OPEN BOOK assessment.
2. Calculators are allowed.
3. For open book assessments the students may have open access to all resources inclusive of notes, books (hardcopy and e-books) and the internet. These resources may be accessed as hard copies or as electronic files on electronic devices. All electronic devices batteries must be fully charged before the assessment as no charging of devices will be permitted during the sitting of the assessment. The IIE and associated brands accept no liability for the loss or damage incurred to electronic devices used during open book assessments.
4. Answer All Questions.
5. Instructions for assessments including practical computer work:
   - Use of good programming practice and comments in code is compulsory.
   - Save your application in the location indicated by the administrator (e.g., the Z:\ drive or your local drive).
   - Create a folder as follows: use the module code and your own student number and create a folder with a folder name as per the format shown here:
   - **StudentNumber_ModuleCode_Test**. Save all files (including any source code files, template files, design files, image files, text files, database files, etc.) within this folder.

- *E.g., if your student number is 12345, and you are writing an examination for the module PROG121, create a folder named **12345_Prog121_Test** and use this throughout the session to save all of your files.*
- ***Important:*** *Upon completion of your assessment, you must save and close all your open files and double click the ExamLog application on your desktop. You must follow the instructions carefully to ensure that the information about the files that you have submitted for this assessment has been logged on the network. Specify the location of your source code on your question paper.*

Question 1 – Entity Relationship Diagrams   **(Marks: 20)**

Answer this question in your answer script/answer booklet provided.

Draw an Entity Relationship Diagram (**ERD**) using Unified Modelling Language (**UML**) notation according to the below business rules. Your design should be at the **logical level** – include primary and foreign key fields and remember to remove any many-to-many relationships.

Tip: Pay attention to the mark allocation shown below.

Business rules of a scientific research organisation that wants to keep track of butterfly sightings reported by volunteers on their website:

1. All entities should have surrogate primary keys.
2. The name and surname of each user of the website must be stored in the database.
3. When a user signs up, they must provide at least one location where they will be observing butterflies. The user can add as many locations as they want, but each location is specific to the user that adds it.
4. For each location, a description as well as the latitude and longitude of each location must be stored in the database.
5. Users report sightings on the website. A sighting of a species of butterfly is reported by a specific user at a specific named location. The date and time of the sighting must also be stored in the database.
6. The English name as well as Latin name of each butterfly species must be stored in the database.

Hint: Think carefully about the number of entities involved in each relationship.

Marks will be awarded as follows:

Entities	5 marks		Foreign keys	2 marks
Relationships	4 marks		Other attributes	2 marks
Multiplicities	4 marks		Correct UML Notation	1 mark
Primary keys	2 marks		**Total**	**20 marks**

Question 2 – Normalisation   **(Marks: 20)**

Answer this question in your answer script/answer booklet provided.

The scientific research organisation has already collected a lot of data in a spreadsheet (an extract from the spreadsheet is shown below). The data has been normalised to first normal form already – underlined column names indicate composite primary key columns.

User ID	User Name	User Surname	Species ID	Species English Name	Main Colour ID	Main Colour Name	Date
1	Bob	Smith	5	African grass blue	1	Blue	2022/01/28
2	Sam	Ngwekazi	5	African grass blue	1	Blue	2022/01/29
1	Bob	Smith	1	Brown-veined white	2	White	2022/02/03
1	Bob	Smith	2	African monarch	3	Orange	2022/03/01
3	Sarah	Bhebhe	19	African migrant	2	White	2022/03/06

Note: The data reflects when a specific user *first* sighted a specific species.

Normalise the above data to the second normal form (2NF). Show all steps as well as the final answer in the form of dependency diagrams.

Question 3 – SQL   (Marks: 20)

Practical Computer Work: The answer to this question should be submitted electronically.

Using MySQL, create a **single** Structured Query Language (**SQL**) **script** that answers all the below questions. Include **comments** to indicate which part of the script answers which question.

The script **must execute correctly** using MySQL to get full marks.

Make use of the following Entity Relationship Diagram (ERD) and Data Dictionary:
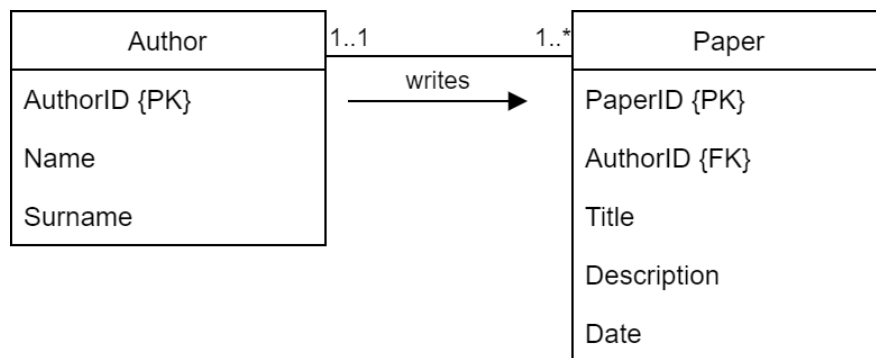

Table: Author

Field name	Data type	Data format	Field size	Req?	Description	Example
AuthorID {PK}	int			Yes	Autonumber primary key that uniquely identifies the author	1
Name	varchar(100)		100	No	Name of the author	Bob
Surname	varchar(100)		100	Yes	Surname of the author	Smith

Table: Paper

Field name	Data type	Data format	Field size	Req?	Description	Example
PaperID {PK}	int			Yes	Autonumber primary key that uniquely identifies the paper	3
AuthorID {FK}	Int			Yes	Foreign key that identifies the author of the paper	1
Title	varchar(255)		255	Yes	The title of the paper	Butterfly migration paths
Description	varchar(255)		255	No	A brief description of the paper	A study of how butterflies migrate across Africa
Date	date	YYYY/mm/dd		No	The date that the paper was published	2020/01/06

Q.3.1	Somebody already started creating the database. They have written the below code and executed it.	

```
1 ●     CREATE SCHEMA butterflies2022;
2 ●     USE butterflies2022;
3 ● ⊖ CREATE TABLE author (
4   │       authorid    INT AUTO_INCREMENT NOT NULL PRIMARY KEY,
5   │       name        varchar(100),
6   │       lastname    varchar(100)
7   └   );
```

	Q.3.1.1	Include the above SQL statements exactly as is in your SQL script. Add a comment above each statement explaining what it does.	(3)
	Q.3.1.2	Write an SQL statement to change the name of the column lastname in table author to be called surname and be a required field. **Note:** You may *not* change the already executed script to accomplish this.	(3)
Q.3.2	Write a SQL statement to create the Paper table with the foreign key constraint.	(8)
Q.3.3	Write a SQL statement to insert the following data:	(2)

Table: Author

AuthorID	Name	Surname
1	Bob	Smith
2	Sarah	McLaglenna

Q.3.4	Write a SQL statement to change the already inserted data as follows:	(4)

Table: Author

AuthorID	Name	Surname
2	Sarah	McLaglen

END OF PAPER