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 an e-commerce company that wants to keep track of their customers and their orders:

1. All entities should have surrogate primary keys.
2. A customer can place many orders over time and each order is placed by exactly one customer.
3. The name and surname of a customer must be stored in the database.
4. The date and status of an order must be stored in the database.
5. Each order can contain many items, and each item can be part of many different orders.
6. The name, description and unit price of every item must be stored in the database.
7. When an item is added to an order, the quantity ordered and the unit price of the item must be stored.
8. Each item in the database belongs to a category and a category has many items that belong to it.
9. The name of each of the categories must be stored in the database.

Marks will be awarded as follows:

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

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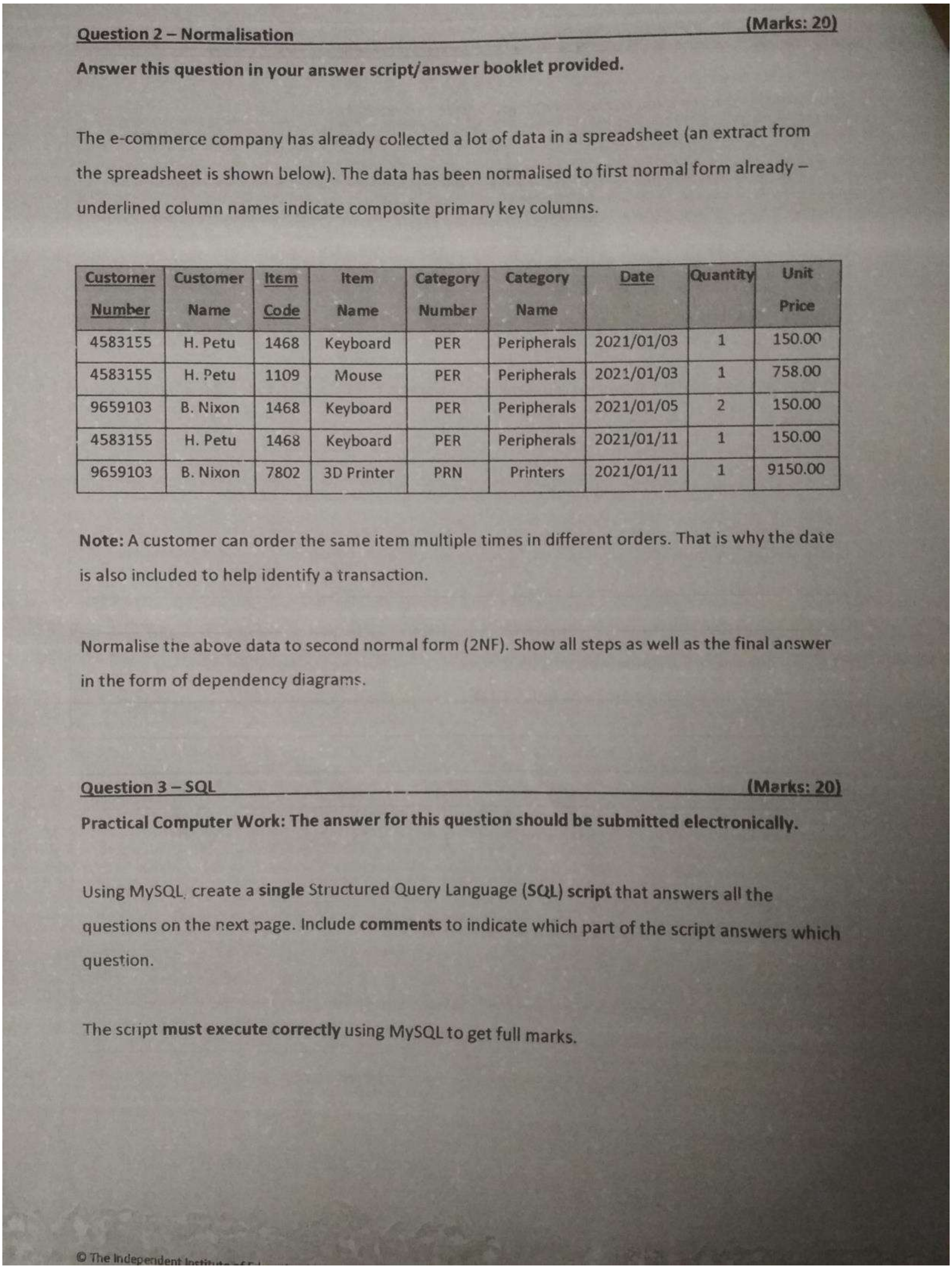

Question 2 – Normalisation (Marks: 20)

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

The e-commerce company 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.

<u>Customer Number</u>	Customer Name	<u>Item Code</u>	Item Name	Category Number	Category Name	<u>Date</u>	Quantity	Unit Price
4583155	H. Petu	1468	Keyboard	PER	Peripherals	2021/01/03	1	150.00
4583155	H. Petu	1109	Mouse	PER	Peripherals	2021/01/03	1	758.00
9659103	B. Nixon	1468	Keyboard	PER	Peripherals	2021/01/05	2	150.00
4583155	H. Petu	1468	Keyboard	PER	Peripherals	2021/01/11	1	150.00
9659103	B. Nixon	7802	3D Printer	PRN	Printers	2021/01/11	1	9150.00

Note: A customer can order the same item multiple times in different orders. That is why the date is also included to help identify a transaction.

Normalise the above data to 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 for this question should be submitted electronically.

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

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

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

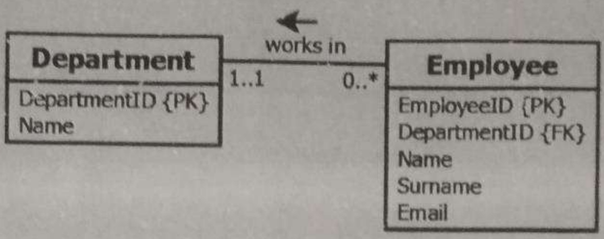

Table: Department

Field name	Data type	Data format	Field size	Req?	Description	Example
DepartmentID {PK}	int			Yes	Autonumber primary key that uniquely identifies a department	14
Name	varchar(50)		50	Yes	Name of the department	Shipping

Table: Employee

Field name	Data type	Data format	Field size	Req?	Description	Example
EmployeeID {PK}	int			Yes	Autonumber primary key that uniquely identifies an employee	5
DepartmentID {FK}	int			Yes	Foreign key that identifies the department of the employee	14
Name	varchar(50)		50	No	Name of the employee	Annie
Surname	varchar(50)		50	No	Surname of the employee	Williams
Email	varchar(100)		100	No	Email address of the employee	annie@shop.com

Q.3.1 Write SQL statements to:

Q.3.1.1 Create the schema, called shop_<your student number>. For example: shop_20987654. (2)

Q.3.1.2 Create the Department table. (4)

Q.3.1.3 Create the Employee table with the foreign key constraint. (8)

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Q.3.2 Write SQL statements to insert the following data: (6)

Table: Department

DepartmentID	Name
1	Shipping
2	Customer Service

Table: Employee

EmployeeID	DepartmentID	Name	Surname	Email
1	1	Annie	Williams	annie@shop.com
2	2	Bob	Ntshinga	bob@shop.com

END OF PAPER