



Database Design and Development

06 August 2019

Examination Paper

Answer ALL questions.

Clearly cross out surplus answers.

Time: 3 hours

The maximum mark for this paper is 100.

Any reference material brought into the examination room must be handed to the invigilator before the start of the examination

Answer ALL questions

Marks

Question 1

- a) With the use of an example, explain the concept of a domain. 2
- b) With the use of an example, explain the concept of functional dependency. 4
- c) Explain the purpose of normalisation. 2
- d) Explain the concept **and** purpose of de-normalisation. 2

Total 10 Marks

Question 2

Consider the following table which shows orders for an office supplies company. Note that the table is not normalised and contains duplications e.g. order 2100 appears twice.

Order ID	Order Date	Product Code	Product Name	No of Products	Customer ID	Customer Name
2100	01-JAN-2019	P11	Deluxe Desk	1	C789	Sally Smith
2100	01-JAN-2019	C11	Standard Desk	5	C789	Sally Smith
2611	03-JAN-2019	P99	Super Projector	1	C789	Sally Smith
1309	31-DEC-2019	J99	Standard Office Chair	1	C980	Colin Clark
1299	01-DEC-2019	XP1	Deluxe Office Chair	1	C876	Humzah Khan
1567	03-DEC-2019	J99	Standard Office Chair	2	C754	Johnny West

- a) Explain what anomalies might arise because of the way this table is structured. 6
- b) Explain how this data can be restructured so that anomalies do not arise. 4

Total 10 Marks

Question 3

- a) Define the term datatype **and** provide TWO (2) examples of datatypes available in SQL. **3**
- b) With the use of an example, explain what is meant by an outer join in SQL. **3**
- c) With the use of an example, explain what the Cartesian product is of two tables in SQL. **3**
- d) Describe the entity integrity rule. **1**

Total 10 Marks

Question 4

- a) Explain what is meant by derived data in a database system. **4**
- b) Give TWO (2) examples of situations where derived data might be used. **3**
- c) With the use of an example, briefly explain what is meant by a redundant relationship in an ER model. **2**
- d) What is the usual approach during logical design to redundant relationships in an ER diagram? **1**

Total 10 Marks

Question 5

- a) Explain the terms: Data Definition Language (DDL) **and** Data Manipulation Language (DML) in SQL. Provide TWO (2) examples to illustrate the difference. **6**
- b) Explain what is meant by the term *tuple* in the relational model. **2**
- c) With the use of an example explain what is meant by the term *cardinality* in the relational model. **2**

Total 10 Marks

Question 6

- a) Give a definition of logical database design. **2**
- b) Identify FOUR (4) of the activities undertaken during logical design. **4**
- c) Discuss why different levels of access are required for different users when accessing a database system. **4**

Total 10 Marks**Question 7**

- a) Outline the chief activities in the physical design stage of database development. **4**
- b) With the use of an example define business rules **and** the role they might have in a database. **4**
- c) Identify TWO (2) items of information that would need to be recorded for each column of a table at the physical design stage. **2**

Total 10 Marks**Question 8**

- a) Identify **and** explain THREE (3) different types of indexes used in a database system. **6**
- b) Explain TWO (2) disadvantages of database indexes. **2**
- c) Identify TWO (2) types of columns that are likely to be indexed in a database system. **2**

Total 10 Marks

Question 9

Top Plate is a ceramics company that manufactures crockery items such as cups and plates. They are based in Stoke-on-Trent in the United Kingdom. They have spread their business from its original base and are now a large multinational company that deals with the manufacture, import and export of their products. They operate in a number of Asian, South American and North American countries. They have sales branches in more than one country. Their manufacturing bases are in India and Brazil. From there, goods are shipped to the sales branches. Their management offices which oversee the whole business are still in Stoke-on-Trent.

- a) Describe FIVE (5) advantages Top Plate might gain by implementing a distributed database. **5**
- b) Why might security be an issue in a distributed database? **2**
- c) Identify THREE (3) implementation or performance factors that need to be considered when choosing a DBMS for a distributed database. **3**

Total 10 Marks**Question 10**

- a) Outline the key reasons that organisations are increasingly implementing data warehouse systems. **6**
- b) Identify **and** discuss TWO (2) types of tools that can be used for interaction with a data warehouse. **4**

Total 10 Marks**End of Paper**