



Database Design and Development

December 2015

Sample 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

Consider the following SQL statement:

```
SELECT customer.LastName, COUNT(Orders.OrderID) As NumberOfOrders
FROM orders, customers
WHERE customer.customerID = Orders.CustomerID
GROUP BY LastName
HAVING COUNT(Orders.OrderID) > 18;
```

- a) What is the purpose of the COUNT function in this SQL statement? **2**
- b) What is the purpose of the GROUP BY command in this SQL statement? **3**
- c) What is the purpose of the HAVING command in this SQL statement? **3**
- d) How would you modify this SQL query so that it shows the orders for customers called 'Smith' regardless of how many orders have been made? **2**

Total: 10 Marks

Question 2

- a) Explain what a *domain* is in a relational database **and** give an example. **2**
- b) Show how you would use the Alter Table SQL command to add a domain on a database table. **3**
- c) Explain the concept of redundancy in a relational database **and** give an example. **5**

Total 10 Marks

Question 3

- a) Explain the concept of *functional dependence* with the use of an example. **5**
- b) How is functional dependence used in database development? **2**
- c) Explain what a deletion anomaly is in a database. **3**

Total: 10 Marks

Questions continue on next page

Question 4

- a) Explain what is meant by the term *superkey* in a relational database. 2
- b) Explain what is meant by the term *candidate key* in the relational model. 3
- c) Identify FIVE (5) properties that a relation must have in the relational model. 5

Total 10 Marks**Question 5**

- a) What is the main purpose of conceptual database design? 5
- b) What are the main features of logical database design? 5

Total 10 Marks**Question 6**

- a) What is meant by *referential integrity*? Give an example. 3
- b) Explain what is meant by a *propagation constraint* **and** give an example. 3
- c) Describe FOUR (4) options for propagation constraints in a database system. 4

Total 10 Marks**Question 7**

- a) Distinguish between *database transactions* and *database operations* with the use of an example. 4
- b) For a transaction in a database, identify FOUR (4) aspects that might affect performance and therefore need to be documented during physical design. 4
- c) How might the use of an index affect different types of database operations? 2

Total 10 Marks**Questions continue on next page**

Question 8

- a) What factors should be considered when choosing which columns to index in a database system? **5**
- b) Describe THREE (3) factors that need to be considered when deciding whether to store derived data in a database. **3**
- c) What type of documents might help a developer identify an organisation's derived data during database development? **2**

Total 10 Marks**Question 9**

- a) Describe FIVE (5) advantages an organisation might gain by implementing a distributed database. **5**
- b) Describe the main aspects of the principle of transparency in a distributed database. **5**

Total 10 Marks**Question 10**

- a) Discuss how a focus on 'subject-orientation' differentiates a data warehouse from an Online Transaction Processing System (OLTP). **4**
- b) Describe FOUR (4) features of an Online Analytical Processing (OLAP) tool. **4**
- c) Give a brief definition of data mining. **2**

Total 10 Marks**End of Examination Paper**