

**UNIVERSITY OF LONDON**

**GOLDSMITHS COLLEGE**

**B. Sc. Examination, Spring 2012**

**COMPUTING AND INFORMATION SYSTEMS**

**IS52027A**

**Databases, Networks and the Web**

**Duration: 3 hours**

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*This paper is in two parts, Part A and Part B. There are a total of three questions in each part. **You should answer TWO questions from Part A and TWO questions from Part B.** Your answers to Part A and Part B should be written in separate answer books.*

*Full marks will be awarded for complete answers to a total of four questions, two from Part A and two from Part B. Each question carries 25 marks. The marks for each part of a question are indicated at the end of the part in [.] brackets.*

*There are 100 marks available on this paper.*

*No calculators should be used.*

**THIS PAPER MUST NOT BE REMOVED  
FROM THE EXAMINATION ROOM**

# **PART A**

### Question 1

a) Briefly explain the role of the clause GROUP BY and the role of the clause HAVING in an SQL query. [4]

b) The two tables below store data about employees working in the departments of a company. The attributes of the *Department* table are the department id, the department name, and the employee id of its manager. The attributes of the *Employee* table are the employee id, the employee name, the job name, the salary, and the id of the department where the employee works. The underlined attributes form primary keys in their respective tables.

**Department** (deptId: string, deptName: string, managerId: string)

**Employee** (empId: string, empName: string, jobName: string, salary: integer, deptId: string)

Write the following queries in SQL:

- i. Display the average salary. [2]
- ii. Display the number of all employees working in the company. [2]
- iii. Display the name of the manager of the Sales department. [3]
- iv. Display the name and the salary of the employee that has the largest salary. [3]
- v. Display the department names and the number of their employees for each type of job (note that jobName provides the type of jobs: secretary, programmer, etc). [3]
- vi. Display the name and the id of the department that has the largest number of employees. [4]
- vii. Display the names of the departments whose employees' average salary is at least 40K. [4]

## Question 2

a)

- i. Briefly explain (in one sentence) the purpose of a database index. [1]
- ii. Provide an example of a SQL command that creates an index. Mention whether your SQL command belongs to the Data Manipulation Language or Data Definition Language. [3]

b) The following database is to provide details about stores selling various models of computers.

**Store**(storeId: string, storeName: string, address: string, telephone: string)

**Computer**(modelId: string, modelName: string, make: string, cpu: string, ram: integer, hd: integer)

**Availability**(storeId: string, modelId: string, price: integer, quantity: integer)

The table *Store* contains details on computer stores, namely the store id, name, address, and telephone. In particular the city is placed at the end of the string of characters providing the address (for instance '22 Liverpool Street, EC335NW London'). The table *Computer* contains details as the computer model id, the model name (as 'Latitude D800', etc), the make (as 'DELL', etc), the name of the CPU (as 'i5-900', etc), the amount of RAM memory and the capacity of the hard disk. The table *Availability* contains information about the stores where a computer model is sold, the price and the number of units (quantity) of that computer model available in those stores. Note that the underlined attributes form primary keys in their respective tables, the attribute *modelName* is an alternate key, and the attribute *address* should always have a value.

Taking into account the above description, the following database commands are to be written in SQL.

- i. Create the above tables by choosing the necessary foreign keys. [9]
- ii. Update the prices of all computers named Latitude D800 produced by Dell, by diminishing them by 10%. [3]
- iii. Create a view that provides the information composed of the computer model name, its CPU, its RAM, its hard disc capacity, and its minimum price across all stores, if this minimum price is under £600. Then mention whether or not this view is updatable and justify the answer. [6]
- iv. Create a view that provides the names and addresses of stores in London. [3]

### Question 3

a) Draw four ER diagrams each of which containing a relationship only and the corresponding entities, as required in the itemised list below. Name all the elements in each example (relationships, entities, attributes) such that each diagram represents a real case situation and then express in English (text) the meaning captured by each diagram.

- i. A recursive relationship. [3]
- ii. A binary relationship with attributes. [3]
- iii. A ternary relationship. [3]
- iv. A quaternary relationship. [3]

b) Draw an EER diagram for the following specification regarding properties for rent and their owners. Your diagram should clearly express any existing attributes (in particular simple attributes, primary keys, multiple valued attributes, composed attributes, and derived attributes), as well as any constraints. [13]

*The details about properties that are to be handled in a database system are the property id, the address composed of street, city and postcode, the type (which may be flat or house), the number of rooms and the rent. Each property has one owner only which has an address and a telephone number. An owner can have one or more properties. All owners are either private owners or business owners. Private owners have a name and are identified by an owner id. Business owners have a business type, a contact name, and are identified by a name of the business.*