The University of Sydney

SCHOOL OF INFORMATION TECHNOLOGIES

Sample Exam Format - COMP 5138

RELATIONAL DATABASE MANAGEMENT SYSTEMS

EXAMINATIONS SEMESTER TWO,

TIME ALLOWED: TWO HOURS

This examination paper comprises 5 pages including this page

INSTRUCTIONS TO CANDIDATES

ANSWER ALL QUESTIONS in the examination booklet provided.

This paper comprises five questions each with multiple parts.

Questions are not worth equal marks. The mark to be awarded for each part is indicated. Marks total 60.

The following material is provided: Answer Booklet/s.

Materials allowed None

Use of Calculators: Not permitted

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>Mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>/20</td>
</tr>
<tr>
<td>2</td>
<td>/15</td>
</tr>
<tr>
<td>3</td>
<td>/15</td>
</tr>
<tr>
<td>4</td>
<td>/15</td>
</tr>
<tr>
<td>Total</td>
<td>/65</td>
</tr>
</tbody>
</table>

EXAMINATION PAPER NOT TO BE REMOVED FROM THE EXAMINATION ROOM
Question 1: Entity-Relationship Model and Mapping [20 marks]

This question is to test your knowledge on E-R modeling and mapping into relational schema using SQL.

Consider the following Case of ABC medical center.

Case: ABC Medical Center

(a) Draw an E-R diagram for ABC hospital based on the above given information. Clearly indicate the primary keys which you have chosen. [10 Marks]

(b) Translate your E-R diagram to SQL table definitions, by giving corresponding CREATE TABLE statements. For each attribute, choose appropriate domain types. Include all necessary PRIMARY KEY, FOREIGN KEY, and domain constraints. [10 Marks]
Question 2: SQL [15 marks]

This question is to test your knowledge on SQL. Give SQL queries answering the given questions, based on the following relational schema:

person ( license, name, address )
car ( regno, model, year )
accident ( report nr, location, date )
owns ( license, regno )
involved ( license, regno, report nr, damage amount )

(a) Find the owner of the car with regno="NSW123”  [2marks]

(b) Find the total number of accident on 1 June 2006. [2 marks]

(c)

(d)

(e)
Question 3: Relational Algebra [15 marks]

This question is to test your knowledge on relational algebra.

Consider the following relational schema:

person (license, name, address)
car (regno, model, year)
accident (report nr, location, date)
owns (license, regno)
involved (license, regno, report nr, damage amount)

Write the following queries in relational algebra:

(a) The owner and car regno for all accidents occurred before 1 June 2006. [2mark]

(b) List the location of all accidents occurred before 1 June 2006. [3marks]

(c) List all car regno and owner name, address for accidents with damage amount over $1000.00 [3marks]

(d)

(e)
**Question 4: Transactions [15 marks]**

This question is to test your knowledge on transactions management.

Consider the following relational schema and scenario of a bank’s account records:

**Accounts** (acctNo, balance);

You are asked to write a function `transfer()` that reads the balances of two accounts and transfer an amount of money, checks that the first account has at least that much money, and if so moves the money from the first account to the second. Following is a sketch of the function `transfer()`

```
1) EXEC SQL BEGIN DECLARE SECTION;
2)   int acct1, acct2; /* the two accounts*/
3)   int balance1; /*the amount of money in the first account*/
4)   int amount; /*the amount of money to transfer*/
5) EXEC SQL END DECLARE SECTION;
6) void transfer() {
7)   /* C code to prompt the user to enter accounts 1 and 2 and an amount of
   money to transfer in variable acct1, acct2, and amount */
8)   EXEC SQL SELECT balance INTO : balance1
9)   FROM Accounts
10)  WHERE acctNo = :acct1;
11)  if (balance1 >= amount) {
12)     EXEC SQL UPDATE Accounts
13)        SET balance = balance + :amount
14)        WHERE acctNo = :acct2;
15)     EXEC SQL UPDATE Accounts
16)        SET balance = balance - :amount
17)        WHERE acctNo = :acct1;
18}) else /* C code to print a message that there were insufficient funds to make
   the transfer */
19})
```

(a) What happen if there is failure after line (14) for some reasons such as computer fails or network connecting fails? [2marks]

(b) Fix the given `transfer()` function to become a correct embedded SQL transaction. [3marks]

(c)

(d)

(e)