School of Information Technologies
The University of Sydney

Practice Examination 2003
Foundational Database Systems
COMP5215
Total Time 2 hours
Perusal Time 10 minutes

• Answer ALL questions.
• It is an OPEN Book exam.
• Total marks 75.
SECTION A (15 MARKS)

Refer the ER diagram in Fig.1 for this section. Each question carries one mark.

Figure 1: ER Diagram

Q1 “is_cared_for” is a _______ relationship.
   1. binary
   2. secondary
   3. ternary
   4. many-to-many
   5. none of the above

Q2 “has” is a _______ relationship.
   1. binary
   2. weak
   3. one-to-one
   4. both 1 and 2
   5. none of the above

Q3 “Next_of_kins” is a _______.
   1. multivalued attribute
   2. weak attribute
   3. weak entity
   4. both 1 and 2
   5. none of the above
Q4 “medications” is a ________.
   1. weak entity
   2. weak attribute
   3. multivalued attribute
   4. both 2 and 3
   5. none of the above

Q5 The relation, “is assigned” is ________.
   1. many-to-many
   2. one-to-many
   3. one-to-one
   4. many-to-one
   5. none of the above

Q6 The entity, “outpatient” is ________.
   1. dependent
   2. weak
   3. subtype
   4. supertype
   5. none of the above

Q7 The entity, “inpatient” ________.
   1. is not an entity
   2. is an attribute
   3. has “Patient_Id” as primary key
   4. both 1 and 2
   5. none of the above

Q8 This system will have at least ____ tables in its physical model.
   1. six
   2. seven
   3. nine
   4. five
   5. none of the above

Q9 The attribute, “Patient_Id” is an attribute of ________.
   1. Patient
   2. Outpatient
   3. Inpatient
   4. both 2 and 3
   5. none of the above
Q10 “has” is a ________.

1. relationship
2. weak relationship
3. dependent relationship
4. not a relationship
5. none of the above

Consider the following as a simple example of a physical model for the ER diagram in Fig.1.

<table>
<thead>
<tr>
<th>PATIENT</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient_Id</td>
<td>Patient_Name</td>
<td>Physician_Id</td>
<td>medications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>BED</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>bed_id</td>
<td>Patient_Id</td>
</tr>
</tbody>
</table>

Figure 2: A physical model

The following functional dependencies exist.

- Patient_Id → Patient_Name, Physician_Id
- bed_id → Patient_Id
- Patient_Id → medications

Q11 The relation “PATIENT” is in ____.

1. 1NF
2. 2NF
3. 3NF
4. 1 and 2 but not 3
5. none of the above

Q12 The relation “BED” is in ____.

1. 1NF
2. 2NF
3. 3NF
4. both 2 and 3 but not 1
5. none of the above
Q13 In relation “BED”, “Patient_Id” is a ________.

1. key attribute
2. foreign key
3. composite key
4. both 1 and 3
5. none of the above

Q14 The SQL command “SELECT * from BED where Patient_Id = ‘sam342002’” will output ________.

1. the name of the patient in bed “sam342002”
2. details of a patient called Sam
3. bed number of the patient “sam342002”
4. the attending nurse
5. none of the above

Q15 The SQL command “UPDATE from BED values Patient_Id = ‘sam352002’” will ________.

1. delete the patient “sam342002”
2. replace the patient “sam342002” with “sam352002”
3. do nothing
4. add a new patient “sam352002”
5. none of the above

SECTION B (30 marks)

Question 1 (5 marks)
Draw the physical/relational model of the ER diagram (Figure 1) of Section A.

Question 2 (5 marks)
Normalize up to 3NF the physical/relational model generated in Question 1 above or explain if it is already in normal form.

Question 3 (20 marks)
Write the SQL commands for the following queries.

1. Details of the patient/s under the care of the physician (Physician_Id =321991).
2. Beds of the patients under the care of Dr. Silverstone (Physician_Id =sil431989).
3. Number of outpatients under the care of Dr. Silverstone (Physician_Id =sil431989).
4. Name of the patients who were discharged on 2003-10-23 and were under the care of Dr. Deathrow (Physician_Id =death666).
5. Number of patients who are asked to check back on 2003-12-22 under the care of Dr. Silverstone (Physician_Id =sil431989).
SECTION C (30 marks)

Consider the following database system for the questions that follow.

A rental car company classifies the vehicles it rents into four categories: compact, mid-size, full-size and luxury. The following information regarding each vehicle is also stored: Vehicle_Id, Make, Model, Year and Color. The company also keeps the record of all the customers. The information stored are Customer_Id, Name, Address, Phone and Credit Card. The rent is charged either per kilometer basis or per day basis. A deposit is also kept against each rentals. The information regarding the employee responsible for each rental is also recorded.

Question 1 (4 marks)
Draw a conceptual schema.

Question 1 (6 marks)
Draw an ER diagram.

Question 1 (6 marks)
Draw the physical/relation model.

Question 1 (5 marks)
Normalize the model to 3NF or explain if it is already in normal form.

Question 1 (9 marks)
Write the SQL commands for the following queries.

1. Details of the customer who rented silver Toyota Camry.
2. Total rent paid by the customer named John.
3. The color of the vehicle rented by Simon.